Oral History of Cindy Mason

Interviewed by:
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Weber: So I'm Marc Weber of the Computer History Museum. I'm here with my colleague, Chris Garcia, and we're interviewing Cindy Mason, who started the first computer science department in the outback of Australia. Thank you for talking with us.

Mason: Thank you. Nice to be here.

Weber: So just start really briefly with your background. Where did you grow up, your full name, and what-- well, say that first.

Mason: Shoe size, hat size, ring size, etc?

Weber: Yeah, credit card number.

Mason: I grew up in Indiana. My dad was a math teacher and my mom worked at the bank, but she later became a homicide detective. When I grew up, my dad was always telling stories about math - all over the house, car trips, long car trips.

Weber: Was that fun or not?

Mason: You know mostly, I just absorbed it. At times, we would definitely avoid being in a room with Dad alone because he would talk a lot. But it really did help me not to even think about being afraid of math, because he just made it fun, I guess.

Weber: And so you got interested in computing as a child or better?

Mason: Yeah, I think some of my childhood experiences definitely made it an unthinking move, to work on computers in college and then later. My babysitter had a robot arm he was working on in the basement and I spent hours there… didn't think much about it, just thought it was neat. Then we had some relatives in Pensacola, Florida that worked on computers for the Navy and I remember once being in this giant, dark, cold room with all these machines and the lights on those machines were so fascinating. So when they said, "What do you want to major in?" in college, there was no dithering - computers. I always had an easy time with math in school. I need to give dad credit for that. Yeah I took math in the advance classes because I guess I could figure the solutions out differently or somehow, and then do you want me to talk about that, high school math?

Weber: I mean, very quickly.

Mason: I took high school classes in grade school, so my dad would just drag me along. So I learned how to type in fourth grade, so I think that might be one thing that makes it easy for me on computers too because I was-- it was easy and I set records for typing, and then I was kind of interested in codes and hieroglyphics. Gregg shorthand was also, I set records for that. It was just fun for me. I know on some tests apparently I scored very high and everyone around was shocked I think, because maybe I don't look like I would be smart at math.

Weber: And you liked puzzles?

Mason: I didn't like puzzles so much. I liked stories, I suppose. Secret languages and codes. Finding meaning and patterns in things.

Weber: And what did you think you wanted to be when you'd grow up?

Mason: Oh, boy. Well, mostly people didn't ask me that. The truth is because I was from Indiana, I was taught things like how to make a good pie crust and peach pie and making a hope chest for future husband and family. That's how I was raised.

Weber: But if you mother was a homicide detective...

Mason: That was later. When she was married to my dad, she didn't work and she wasn't allowed to work. She wasn't allowed to drive. That's what they fought about all the time actually. Do we want to put this on the film? But it's really part of I think what some women have gone through in the past. So yeah, she was-- my mom was very independent and that was the time that women were starting to burn their bras in the sixties and wanting to work, wanting to have independent money, wanting to be able to have their own cars. And back in Indiana, there was a struggle inside the house about that.

Weber: But there was no question about going to college. Was that a struggle?

Mason: That's right. No, Dad said-- well, there had been three generations of family on his side that went to Purdue. The colors of Purdue were black and yellow, and when we were little, he used to dress us up like these little bumblebees. and we'd go to the football games dressed like that. I mean, it's a little-- yeah. <laughs> That's the truth.

Weber: So it was okay you went to Purdue then?

Mason: Yes.

Weber: And majored in computer science?

Mason: I majored in computer science, although I started out in a double major, computer science and oceanography because I also loved the ocean. We used to go adventuring on vacations and often went to Florida. So I started out with lots of oceanography classes - geology, physics, etc., but the computer courses were so intense I ended up in the computer science building all the time and I made these friends there, and we'd stay up all night long drinking coffee and programming. Friends and family thought I was out partying, but really I was in the basement of the computer science building.

Weber: And so how old were you when you first used a computer then?

Mason: Probably sixteen, yeah. Well, if the robot arm counts, I was probably nine.

Weber: So you we reprogramming, helping with...

Mason: Well, it was my babysitter and he sort of just tolerated me being there, but when he was gone, I would go back in the room and look at what was going on. It was mostly mechanical engineering,\

Weber: But it was in your basement or his basement?

Mason: It was in his family's basement.

Weber: So you would play with the robot arm and do programming?

Mason: Well mostly, I studied the way that it would move. He was trying to teach it handwriting. But we also listened a lot to Jimi Hendrix and I think that actually had a big influence too.

Weber: On computing in your life?

Mason: On being-- thinking differently I guess, not being afraid of that, thinking it was normal. I don't know how to explain that, looking back, but I still like Jimi Hendrix.

Weber: Me too. So then after college, what did you do?

Mason: So after I graduated with the Bachelor's degree, I worked for a while at the King Sun Fu pattern recognition lab in the Purdue EE dept, trying to work on new algorithms for image processing that might be good for parallel processing…. I got a job at Lawrence Livermore Lab, which is out here in California, where we are right now. My college sweetheart and I moved out here with actually a group of friends. We said, "Hey, you guys, there's a moving van showing up if you want to go to California, get your stuff over here by Saturday!" because we had a moving allowance and, I think it was fifteen hundred pounds. At that point in your life, you don't own a lot of things, so anybody who wanted to go put their stuff in the van and we all came out. So I worked at Lawrence Livermore Lab in their national super computing center there. My job was to maintain the code that did integrity checking and indexing on the file systems. We called it the disc farm, which is basically what you now call a cloud. People all over the world uploaded and accessed their files from the disk farm. But we want to talk about Australia! The move to Australia happened when my husband, who-- actually, my college sweetheart and I got married, but we followed his job. So his job went into Australia, and that was after being at Livermore for about one year. I was also a grad student at the time too. I enrolled in grad school while I was working at the lab...

Weber: Where?

Mason: It was a UC program at Livermore Lab. It was an interdisciplinary program with University of California through UC Berkeley, UC Davis and the lab, also run by UC. Edward Teller, a physicist at the lab, had a special program for distributed computing and physics, and so just outside the gates of the lab, they had all these physics and computer people come out and teach classes.

Weber: Did you actually work with Teller?

Mason: I never worked with him, but he was our department chair. So when a secretary had a birthday, he would show up and make a speech, or if something important happened around there, he would show up.

Garcia: What time frame was this? This was seventies?

Mason: That was in the eighties.

Garcia: Eighties? Were you working with the Octopus network for the disc system?

Mason: Not the octopus, although those guys were doing some amazing innovation with distributed computing and protocol stacks, I was over in the national computer center, the place where they filmed the movie, Tron. Our center had to do with running magnetic fusion energy experiments for physicists. It

supported large scale data and parallel computing for energy physics that were run by scientists all over - the US, EU, etc.

Garcia: Oh, the Tokamak. No, the...

Mason: Yeah, it was like a baseball or 'yin-yang' shape. Two big U shaped magnets that fit t ogether. They brought in those big magnets one weekend, using the old Egyptian building method for moving giant heavy objects - you lay the telephone poles down on the road and a cable is attached to the magnet that is pulled across the poles, when you run out of poles you move the ones from the back around to the front and start again, dragging the magnet across. Its a slow process but it worked…

Weber: But what's the thing they have now?

Mason: The lab? They've got all kinds of different projects now, because they're transitioned out of weapons testing.

Weber: Because I was just on a tour there where they showed us the fusion thing, but that's-- that was much...

Garcia: Yeah, the laser ignition,…?

Weber: That's more recent.

Garcia: So you were in the disc side?

Mason: Yes, the 'disk farm'… Well, there was a whole separate area of computing at the lab that had to do with nuclear weapons physics and running the programs that the lab had. Those guys were creating distributed operating systems for the first time and the protocols for distributing-- the stack, and those guys were some of our teachers. Richard Watson, John *. But where I worked was a place that provided computing support to the physicists who needed massive compute power, they were running massively parallel programs for energy experiments with magnetic fusion. So we were sort of a subscription based remote computing resource and cloud support for their files. My job was to monitor the disk farm and the data to make sure the data didn't get corrupted. The code I maintained created an index of all the data files, and did integrity checking or consistency checking across all the files in the disk farm or 'cloud'. It was a really cool disk farm because we had a robot system for part of it… it was arranged as a hierarchy of media based on speed - the hard drives were directly connected to the super computer system, and then there were a series of honeycombs that housed files and robots moved around honeycombs to fetch

a requested file that was transferred to the fast hard drives. The slowest media, as you might expect, were tapes.

Weber: Well, they still use tapes.

Mason: When you run ten years' worth of research, you end up storing things on slower media.

Weber: But this was in-- because I saw their main facility with the disks now. It's probably the same building because they had a timeline of stuff going way back.

Mason: Did you see the movie Tron?

Garcia: Oh, yeah.

Mason: It was that computer center.

Weber: It's the same one then.

Mason: We had those big computers, the crays, that ran vector computing, and they generated so much heat the building used some of it for its heating.

Weber: They still use tapes for their final stuff.

Mason: Yeah, it makes sense sometimes for large archivals. The short tapes went into these honeycombs and there were these robot arms and you could retrieve with an XYZ coordinate.

Weber: The tape robots.

Garcia: And we have that tape robot in the museum collection.

Weber: True, we do.

Mason: The one from Livermore Lab?

Weber: Yeah.

Mason: Wow, that is so cool!

Weber: We have a lot from Livermore.

Garcia: They've been very generous.

Weber: So your husband got this job but you had no job, so you decided to follow?

Mason: Not exactly, I was working at the lab and a grad student.

Weber: Right, but then when he went to Australia.

Mason: That's right. So I followed my man to the outback if that's really the question.

Weber: And you had no work permit probably, right?

Mason: We both were given working Visas.

Weber: Yeah, the equivalent.

Mason: Of course, I didn't actually know what I was going to do there in Australia, I had been really busy - so I quit a full time job and I quit school.

Weber: Had you been before?

Mason: Never been, had no idea what I was really getting into.

Weber: And what year was this?

Mason: That was in '82, 1982.

Weber: So what was his job there?

Mason: Don was a digital signal processing guy and he worked on satellite data. To tell you the truth, I don't really know that much about what he did because we didn't talk about work. We had so much else going on that we just didn't really talk about work too much.

Weber: It was probably classified, some of it, anyway, right?

Mason: I can neither confirm nor deny these type of comments. <laughs>

Weber: So you like Jimi Hendrix, but on the other hand, you had no-- for you, it was no issue to work for a defense organization?

Mason: I don't really think I understood a whole lot about what we were getting ready to do. To me, it was just a big adventure going to Australia.

Weber: No, no, but I'm saying working for Livermore, working for a nuclear weapons lab was no-- you didn't have any inner conflicts over that?

Mason: I love it that you ask this. <i edited out the section where I talked about earth day since it was wrong/the dates…. Its true the generation I was in thought a lot about the environment and nuclear weapons but we did not start earth day, so if its all right, according to the directions, we can correct factual errors.. that would be a factual error…>

Mason: Going into a nuclear weapons lab was not something that I thought, "Well, I'm going to work on nuclear weapons." What I thought was, "No, I'm going to stop nuclear weapons." That's actually what was in my heart. So I wasn't really a big rebel about it, but when I would be asked if I wanted to work on a project, I would say no if it wasn't in tune with my values. And so where I ended up was actually in a group of people that were in these ratty little trailers on the edge of the lab at the time, with a very small budget, who were working on anti-nuclear weapon treaty verification technology. So the guys that were going to Geneva and the UN, they had to have the technology to back up being able to verify UN treaties if countries sign a Comprehensive Test Ban Treaty. Are they actually doing what they say? And so one of the best ways to do that was using seismology, and the problem of processing all that data was massive. I mean, we have big data now, but we also had big data back then. Peta bytes. It was just not something a lot of people knew so much about. I mean, we were collecting sensor data in a global monitoring network twenty-four/seven and you had to look at all the data.. every last byte. Everything that showed up in the sensor signal was recognized in order to know whether it was river ice breaking up in the spring or a truck going by or actually something significant like a nuclear test. You couldn't just let one of them

go by, you had to look at all of it. So it was a really juicy problem for artificial intelligence,-- but this is after I got back from Alice Springs. I went back to the lab actually when I returned from Alice Springs.

Weber: Sorry, in college, what degree did you get?

Mason: I got a Bachelor's in computer science with a minor in math. I switched out of oceanography. I love rocks and I loved the geology labs, and oceanography trips, but I was just spending all my time on computers. It just ended up that way.

Weber: So then sorry, let's go back to Australia when you first arrived.

Mason: So yeah, we flew in from Sydney to Alice and this was just after the honeymoon. We spent our honeymoon in New Zealand. The immediate arrival was me trying to figure out what to do in a way because I thought I was supposed to be this good wife. I don't know if I should talk about this on film , but it's true, its a part of what happened. The thing I thought I was supposed to do was cook and clean, because suddenly I didn't have a job and I wasn't in school anymore. But I would sort of wait at the door for him to come home from work like a faithful golden retriever, having waxed the floor three times, hoping he would notice the shine. I mean, what kind of thing was that?

Weber: With a martini.

Mason: Well, we did like the Greenies and the Blueys (Aussie beer), but you see, the reason it might be important to tell that domestic part of the story is because you could say, I started the computer science department because I set the kitchen on fire. Well, there was no Mexican food and we really missed Mexican food. There were no chips even. You could make your own salsa, but where do you get your chips? Somebody from Los Angeles would send in these shipments of Mexican supplies, Mexican food supplies. So we had tortillas, but no chips. I was trying to make Mexican, and needed chips, but somehow there was a giant grease fire… I hadn't really cooked much before we got married, so after that, we decided that I should try to find something else to do. That's when I wandered downtown to the computer store and I just started hanging out down there.

Garcia: In Alice Springs?

Mason: Yes in Alice Springs. It was just a little shop- more like a combination electronic fix-it shop that also sold some computers. The owner and I became friends, he knew the folks working at the local community college and so he phoned them up and said, "Hey, you guys should sit down together." So that is kind of how we got started working on computer programming classes in the outback.

Weber: And how big was Alice Springs at the time? How many people?

Mason: It has about 20,000 or so now, in 2018. It definitely had less than twenty thousand people back then. The area where Alice Springs is located, is what is known as a territory, a bit like the Yukon in Canada. It's not a regular state so the laws there are mostly created by and for the indigenous people and it's a very sort of sacred area. So in town, you would find when you went to the grocery store or just walking down the street, there were a lot of indigenous people. There's probably at least twelve different languages, because Alice Springs was the place where all the different tribes would come for their connections with healthcare or government councils or paperwork, whatever they had to do in the town.

Weber: Benefits or lawsuits.

Mason: The things that were supporting their life as they continued to try to cope and live with the modern world that was invading their land. It's still an ongoing resolution of how to do it. In fact, the Australians are now in the middle of negotiations, giving back most of the country, to the native inhabitants. It's quite fascinating, what's happening there now.

Weber: But at the time, I mean, what were relations like between the natives and the settlers?

Mason: Gosh. Well, I think I would not be able to speak for the entire city. I mean, I just have my own experience of it.

Weber: Oh yeah no, but your impression when you came in, was it polarized?

Mason:No there wasn't any tension or anything. I think people liked each other basically. It was just--they were in their own world. Its very different from ours, physically and psychologically, spiritually. Mostly, they don't live in houses because it seems all of nature is their home in a way, and many of the things that go on in their lives are related to nature, as far as I know. I'm not an authority, but there was an article in the local paper when the first aborigine, well native inhabitant, began to work at a bank. It was a significant achievement because paper wasn't really a part of their culture in the northern territory. Art and music, and all the instruments and all the art is made from natural things. The paint is made from local rocks and the instruments, like for example, the didgeridoo, it comes from a hollowed out tree limb, which is made by termites, and their corroberrees or gatherings, have to do with things they make. The rhythms for that is also made from with sticks.

Weber: You described people sleeping outside kind of in the dry riverbeds.

Mason: Yes, There were town “camps”, mostly in the Todd riverbed, its totally sand or near it. The northern territory land belongs mostly to the aborigines, or the native inhabitants, and they have sacred sites. It’s a world called the Dreamtime that connects where they live with their ancestors, for tens of thousands of years. Occasionally that means they camp in the dry riverbeds. Mostly the region around Australia is like an ocean of sand anyway. Australia is a continent, which has no borders with any other countries. It’s an island. So the interior where we were, and where we created the computer science department is mostly desert. The town of Alice Springs sits geographically dead center in the middle of three big deserts.

Weber: So then you did become-- well, you worked at the community college, but how did that come about?

Mason: The owner of the local computer shop knew Anna Lichtenberg, and a few others at the college. He introduced us. Anna was head of education programs and we sat down and talked and she found out that I had a background in computers. Mostly the college taught trade or craft skills like car mechanics or hair dressing. But at that time Anna and I met, the college was just starting to think about creating a program for the community to learn about computers. And so it was just luck in a way -- things just lined up. I happened to have nothing to do and I definitely needed to get out of the kitchen and Anna was starting to think about creating a new program. So I the first class which was just a general class on computing literacy for whoever showed up, and it filled up almost immediately.

Garcia: When you went into the program, were there actually computers already there?

Mason: Oh yeah, that’s one of those questions. No, there was nothing. We were in a little group of makeshift buildings at the end of town near Anzac Hill, and yes, the first class and all the other classes except for a couple of them were done without computers, which is-- I mean, I’ve heard people in India talk about why they do math and people in jungles talk about it, because the power goes down all the time for them. But for us, there was just, it just hadn’t happened yet.

Weber: So there was the combination fixit/computer store in town, but that was the only...

Mason: Right, there was a small shop.

Weber: And you didn’t have the budget to buy them obviously.

Mason: Well, it was just getting started for people to even think about it back then. And there wasn’t that many people in town. So the first class was a general introduction where we talked about input and output, the keyboard, ascii code, and how can you use computers to do things. But I also got into talking

about the idea of computability. So I taught them about the Church-Turing thesis and I taught them what a Turing machine was, and that was actually a homework assignment was to create a Turing machine. And so we did a lot of things on paper. So we had the first class and when that filled up, and we had a second class and that filled up, and a third. So then the next quarter, because the people in the first class wanted to know more, we added more different classes. So we kept the original introduction classes, which now there were three of them, and then here is the magic part. When we were packing to move to Alice, I happened to threw everything that had to do with my computer classes and all the magazines I had on my shelves, into our moving boxes and brought them with me, just in case, because I had no idea like I said, what I was going to get into over there. So I just so happened to have an issue of the Communications of the ACM, which had an article about how to create a stellar computer science curriculum, and that is actually what I looked at to create the classes there. When the first classes filled up and people wanted to learn more, I started looked at what the CACM guidelines recommended for that, and then of course I had all my CS books and my notes. Sheer luck. So I added a class on algorithms and data structures. I taught folks about queues and stacks and files, using a chalk board.

Then I developed a class on computer architecture and we covered De Morgan's Law, and/or and not, gates, memory, CPU and the clock and the program for the cycle of executing instruction sets. What's an assembler? What's a compiler? The architecture. So we also had a programming class. That's when we ran into the problem of needing a computer. So it became very clear after like, the second week that everybody was just going to be totally bored if we didn't find some way to get them actual computers. My husband rallied and got a couple Apple IIs and then we also had a couple other people bring in computers. We only had four computers in the lab, so I created this little lab and of course there were a lot more people than that. So we had to have signup sheets and I mean, it was really kind of-- oh gosh, I look back and I think, "How did we do that?" But it just happened. We would sit together and work out bugs and build programs for simple things like file input and output. So there continued to be more interest and so I added the same classes for the third quarter, but I threw in complexity and algorithms, because that was mathy, but people weren't that interested in n-log-n stuff.

Weber: They wanted to get their hands on computers.

Mason: Yeah, people are down to basics living out there. "How do I use this thing to help me with my life?" "I'm on a sheep station out here, can I do something with it?" or-- even something simple, "I want to organize my recipes."

Garcia: How many students were there in the program?

Mason: So the first class-- that's what I was trying to remember because this was so long ago. There was as much as the room could hold. The first class was, I think we had eight initially signup and when word got out it filled up, maybe twenty people. And then...

Weber: And what kind of people?

Mason: Townspeople. We had a few people drive in from the stations, but mostly townspeople and kids who wanted to learn. There were some high school kids who came. Some folks who used school of the air or radio education came in for the classes.

Weber: So a range of ages?

Mason: Yes, for the introductory classes, and then for the more advanced classes, I tended to have fewer high school students. they're high school kids, they want to have fun, crack jokes. When content got more serious more technical, it was more of the adult population. We did program a game. We used BASIC for that and we created a small database and stuff like that. It was pretty simple, but it was really about the concepts of computers. I kind of think as we have more and more computers in our lives now, with the Internet of Things, people really need this kind of general literacy about technology-- well, that's what's behind the raspberry pie project at Cambridge, to educate the public about computers.

Garcia: So you had a couple Apple IIs and a couple other machines. Now what was the sort of-- how long did your work there go?

Mason: So I was there for fifteen months. Just long enough to build basic courses for a certificate program. I had taken a leave of absence at grad school back in California, and I didn't want to lose that. So I came back, as I had promised I would so that I could keep my position at the school to go back to the PhD program.

Weber: But your husband stayed there?

Mason: Yes, my husband stayed on for the rest of his tour, which was another five months or so, and then we moved back to Livermore and I was in the same place I was.

Weber: And that's when you were working for the treaty verification group?

Mason: Right. I got a fellowship for grad school that enabled me to have freedom to work on a project of my own choosing. I didn't realize it but that was another lucky moment. A lot of graduate students don't have that kind of choice. They kind of bow to the whims of their professor because the professor's paying them and the hope is the prof will help them do something interesting. The program at the lab empowered us to have our own funding and I could go to whatever project made sense to work on. And that was a very fortunate blessing now that I look at it.

Weber: Were there many other women in computing at Livermore?

Mason: There were some. It was mostly physicists there and the computer people were seen as sort of supporting physicists. I do know that the group I was in, there were a lot more women in the group I was in than the other groups, and most of them were really good looking. I'm not sure what's going on there, but anyway.

Garcia: And so there's sort of the stories about sort of the stratification of Livermore among-- you have various levels of people there as they interact. Did you ever experience any of that?

Mason: What do you mean?

Garcia: Sort of like that the-- like the physicists are sort of on the top and everyone else is supporting, propping them up.

Mason: Oh, that. You're asking me if I experienced physicists arrogance! I would say yes. <laughs> But rightly so because when you start to look at what physics is, they're studying the universe. What is the universe made out of? But yeah, the programmers, I don't think they (physicists) really understood that the computers were essential to what they were doing and it was important.

Weber: You mean the physicists?

Mason: Yeah, and it was important. Not to sort of be rude. So yeah, you pegged that. <laughs>

Weber: It sounds a lot like CERN, where the whole invention of the web was against the backdrop of computer people and an organization where physicists were the rulers. So it's probably a similar feeling.

Mason: It's invisible like our plumbing.

Weber: But you didn't have a distinction between-- I mean, all the physicists were essentially building stuff, or were there many theoreticians? You had both.

Mason: Yes, the lab had both. My PhD work was in the earth science group and so I was really around the guys who understood digital signal processing and were inventing algorithms for trying to piece out information from really crazy signals, coming out of nuclear tests or not. The group was definitely heavy

male, but there were a few female earth scientists and they were very cool and we're all still friends to this day actually.

Garcia: And what was your dissertation on?

Mason: So my dissertation had to do with cooperative intelligent software agents that were analyzing data from a global monitoring network to support whether or not there had been a violation of a comprehensive test ban treaty. So basically you've got to have the technology to back those treaties up really and I did get to go to Geneva, I did get to sit in on these UN subcommittees. It was fascinating. But I think when you're in the moment of doing this stuff, you don't think about it, you just do the next thing. Chop wood, carry water. <laughs>

Weber: So how long were you back in California?

Mason: How long...

Weber: Because then you went back to Australia or no?

Mason: I traveled in Australia again several times, but I didn't-- I mean, the period of time when I created the department, Alice Springs, when I went back, I was there as a tourist. I didn't go back and work again there. So I guess what you're asking me is when I finished graduate school, what did I do? Is that what you're asking?

Weber: I thought you had gone back. I guess I was wrong, because where does the telegraph station fit in then?

Mason: So for the longest time in the eighteen hundreds, most people couldn't make it across the continent of Australia from the top end, or north to south. So Darwin is on the top end in the north and it sits next to Papua New Guinea and Indonesia. They were trying to connect across the land north to south in order to bring goods in and to communicate. So Australia is a colony of England and to communicate back with England took months and months. Things had to be sent by ship. So they were motivated to set up a telegraph. The original explorers finally broke through and created a telegraph station in the 1870s or 1880s, and that was in Alice Springs. So the idea of transitioning that area to include the internet has a kind of import, which I don't think I realized as an American to that history of the place. And bringing the people in a remote isolated town into the modern world with diffusing the ideas of, you know, computer email and oh, surfing the Web and all those things, especially in such a remote region.

Garcia: But that came obviously later. I mean in when you were there I mean that's-- there was no-- you weren't networked to anything.

Mason: Oh boy. <laughs> We didn't-- I mean there weren't even very many TV shows. There were two or three stations that had shows occasionally. There were often reruns of either knee surgery or a cricket match and so there were a lot of video rentals going on. So the continuation from when I was actually there and set up this department was that over a per-- so I went back to the United States and finished my graduate studies. And meanwhile, the college cs program I started kind of blossomed - the computer science department continued to grow and the small college eventually became what is now known as Charles Darwin University. So the IT department actually offers degrees. I mean we had a curriculum that could have been a degree but now it's full-fledged and it's part of a national set of campuses of Charles Darwin University.

Garcia: So just tell the story that you think is- is import about Alice Springs and about bringing that connection to it.

Mason: So when I look back at Alice Springs the town itself and what we did there in terms of creating a- a community connection to the modern world with our computer studies classes, it helps to imagine where we were, and what it was like to live there. Its hard to imagine for most of us. The place itself is smack dab in the middle of a sea of deserts. The continent of Australia is on the edge of some jungle and greenery but mostly it's a vast ocean of sand. And so it's also super hot and there's the flies. I mean *flies.* And there are poisonous snakes, there's poisonous spiders. We had a deadly Redback spider in our mailbox one morning for instance. To live there, you better have a four-wheel drive because the roads were not very good. So- so think about the continent of Australia and all this sand and then put your finger right in the middle. That's Alice Springs. To the north the biggest town is on the coast. That's Darwin. That's 1500 kilometers or 1,000 miles. To the south the biggest town is also on the coast, same distance, about 1,000 miles or 1500 kilometers. You want to go west, Perth is the biggest town and that's also on the coast. Its much further away. And to get to Perth there's no straight road. You got go first down to Adelaide and then go straight west over past the Nullarbor Plains. Nullarbor Plains are the edge of the continent that used to be connected to Antarctica. So when Australia broke free from Antarctica, like there was Pangaea and then there was a part of Australia and Antarctica that stayed together. The terrain is very same-y… it looks the same in all directions. Its a weird environment psychologically for people. So easy to get confused about east and west if you stop on the road.. and water is really important So the roads existed but were not great. Some 'highways' were still just the one lane, so you needed to pull over to share when and if you saw another car. And look out for road trains - semi-trucks that would have 3, 4 or maybe even 5 trailers with a big head of steam hauling goods across the continent. People and kangaroos were sometimes road kill. There was a train called the Ghan that came to town once a week They called it the Ghan after the Afghanis who brought goods to town using the camel trains. So until that train track came in from Adelaide in the south to Alice Springs everything came in by camel. There are wild camels around town, out in deserts and at the dump. There was also a camel farm - the gal that did the national geographic special trip from Alice to Ocean; she trained around Alice Springs to do her trip.

And this is really just to paint a picture of the place. The isolation, the heat, and the constant challenges of the physical environment were part of daily life. You had to be trained and prepared in case you broke down because its pretty easy to die out there and even little things can turn into big ones fast. There were not very many places to get help. So we had a second battery system in the vehicle for example. I ***(how to catch an emu?) had to learn how to take a fan belt on and off, practice using tools, always have water and an extra jerry can of gasoline. And one time we drove out to Uluru, which is a sacred site, also called Ayers Rock and there was no paved road, only a dirt trek. And well, we hit a rock and cracked the gas pipe. So we were a bit stranded. We got a ride from some aborigines and we were very grateful for the ride, but I tell you what, in the backseat on the floor was a giant iguana that they had killed for dinner. And so but, you know, you just do it. And so in many ways this is a place that is out of time. It was as if Europeans had really never settled it or even been there. And so I think when you start something like a computer science program or department you don't really appreciate perhaps, how that can have a shift in the people and the history of time of a place. They didn't even have stoplights in town when we were building up the Alice Springs cs program. Actually, they installed the first stoplight during this time…. People didn't have an easy time adjusting to that…they were colliding. <laughs> And like it's on the radio, so-and-so had an accident. They played an instructional jingle on the Alice radio, you know, <singing> red means stop, green means go. They had to really, you know, soften that message, You know, you've got to slow down. You got to stop. You know, put the brakes on. Come to a full stop-- you know, it was really quite out of time. There were no movie theaters, no real restaurants to speak of, which is why I was interested in cooking Mexican food. And so that I think is some of the picture. It was a desolate godforsaken place smack dab in the middle of a vast desert place. But it's- it's a magical place. There are strange animals there. Like the emus, which are like an ostriches, and that's actually how you can save your life if you're stuck out bush somewhere. Emus are very curious. And so if for some reason you break down, what you do is you get a big stick and you tie your shirt on there and you hide behind the bush waving the flag or, you know, the shirt. And when the emu comes close you grab it. So that's dinner. But that's- that's something you learn when you-- when you go there at first. To think about what its like to be in a civilized place, there are not very many animals about in towns and cities. But the animal and bird life were remarkable. I think that's what made being there so magical for me. Despite the isolation. Driving to the college campus you might see cockatoos, which are these like exotic tropical birds and they are hanging out on the lawns where the lawn sprinklers are in the morning, gathered like pigeons, except, they would cost, five or ten grand each here? And there are hundreds of zebra finch that load up a bush, they have bright red beaks and black and white striped feathers, and neon green parrots called budgies. You could see them by the thousands in the sky turning and shifting together like a school of fish. Not far from town there are brumbies, the wild horses. One time we slept outside in a riverbed while out bush and woke up to brumes all around us, snorting and stamping… It was like a dream. Another time while camping, we set up the camp after dark, and woke up the next day realizing we had slept where a mob of kangaroos hung out and we ha slept on a whole bunch of kangaroo poop. It was everywhere.

<laughter>

Mason: So this is I think a picture of where it was that really does make a big part of the story of why taking those first steps to educate everyone there about computer science. That looking back now, it was

an important part of their local history to do that sort of thing. Now if you go there there's a train going north and the road going north is better. And--

Garcia: There was not a train down then?

Mason: There was a train from Alice down south to Adelaide but not one to/from the north… it was just a one lane road. Darwin, the northern town where the road ends, has been wiped out several times by tropical storms. the other danger I think on the road was not just finding gas and getting help if you broke down, but there were these things called road trains, which are these massive like three and four lorry or semi truck jobs that could just blow you off the road.

Garcia: But there was regular mail, I assume.

Mason: Yeah. There was regular mail in town. One time it came on a horse. But, and- and these were like backup systems. There was a guy in a motor scooter who mostly delivered the mail. And we had the- the opportunity to experience a lot of weather phenomena when we were there, which is another reason it's good to teach math if you're going to teach computers if you're in an area of the world that has climate problems, because sometimes you don't go outside, or the electricity can go, or food can't get through. We were required to have a second refrigerator/freezer fully stocked.

G**arcia**: Good- good telephone service?

Mason: Pretty much.

Garcia: And the-- so the telegraph came early. But then after you left, I mean I presume that they- they got on line at some point. What first were there people logging into BBS is it? Or probably not, telephone was too expensive. So I mean it wasn't till the Internet that-- or when was the first outside--

Mason: When was the year I got to Alice Springs? Is that what you're asking?

Garcia: Well, I mean there probably was not a UUCP phase 'cause there's not enough nerds there. They were probably not dialing up BBS's given the telephone charges. So I assume there was no connectivity until well into the '90s, right?

Mason: I think that's pretty true. I would say that there could be some exceptions to that, but because of the technical people who were working outside of town at Pine Gap, the Joint Defense Space Research Agency. Its the reason many of us were living in Alice.

Garcia: Right.

Mason: But the public interest in technology was just getting started. I don't think people that lived out there cared about being indoors in an office with a machine. They really learned to do things for survival, fixing cars, cooking, doing hair, reading - even, learning to read. I also taught a reading studies class.

Garcia: And so the computers, when you were there people were buying for stand-alone use for what standard, early '80s things, word processing or spreadsheets or?

Mason: Yeah, of the few people who were already interested, I mean they would do things like index their videos.

Garcia: Right, and videos must've been big already by the '80s, right, starting to be?

Mason: Yes. Those were probably the most popular stores in town <laughs> were the video stores.

Weber: And so let's go back actually to after your time at Livermore. What did you do after you got your degree?

Mason: Well, I had a lucky streak again. I got to go to NASA Ames. That was my dream, I wanted to work at NASA. My thesis was on distributed artificial intelligence and I got absorbed into the artificial intelligence group there. And when I was there I was working on these off planet robot teams, that was one project I had. It was a big four-story High Bay. And it was tested in these simulated environments - the moon and Mars. We got to create that environment, get down on our hands and knees in the dirt. It was fun. <laughs> And so I also worked on another project at NASA, which was a global network of robotic telescopes. And that was kind of cool because we were sort of creating a new way of doing astronomy. So before this you had these isolated individual telescopes but in a global network you can actually have cooperative telescope observing systems like “pass the star”. “pass the star” is a viewing strategy where as the night progresses and the night sky changes, the light comes up, telescope X cant observe because its getting llight, so it ‘passes the star’ to another telescope, telescope Y, that can still see the sky just fine because its still night on the part of the planet where its at. It takes over and then when its getting light over there cloud cover the star is passed again to the next telescope so you have this 24 hour science going on as well as automatic cataloging of what's going on.

Mason: The next job after that was at Stanford University in the School of Medicine, but it was joint with the Palo Alto Veterans Hospital and that was looking at speech interfaces for the quadriplegic veterans. And, so although I left Livermore and the lab, I've really just lived in the Bay Area. I got to know U.C. Berkeley as a grad student even though I was working at the lab in Livermore. The lab phd program through "Teller tech", that's what the students called it, supported an interdisciplinary program across U.C. and Stanford, so my PhD advisor at U.C. Berkeley was Professor Lotfi Zadeh, in the Computer EECS Department at Berkeley. And I returned to Berkeley as an employee after my time at Stanford with a grant from a mining company in Australia using cooperative intelligent agents to build a 4d image of the earth from sensor data . I left Berkeley right when 911 happened. Berkeley is a very interesting place, but its kind of like Halloween every day there, so if the world starts going crazy, like when the twin towers where trashed, and the plane tried to hit the pentagon well it's not so clear what will happen next, its not a good feeling to be in Berkeley. So I left. I rented out the house to some students from South America and they paid cash so I came back over to Stanford and was immediately absorbed into John McCarthy's AI group. And I was working on common sense reasoning in cooperative software agents, but I did something else that I think is possibly better. At UC Berkeley, before 911, I had started working on a new kind of ai that took emotions as part of cognition… I built a programming language EOP - Emotion-Oriented Programming and then at Stanford, it evolved into the idea of compassionate intelligence. John and I had many heated discussions about this idea. For almost 3 years he was against it. He wrote a sci fi story about it - 'The Robot and The Baby'… its on the net. But so the idea is that intelligence is not just about logic (Aristotle) and its not just probabilities (Francis Bacon). I started looking at what it is people are going through in cognition from an emotional lens. Did you know that children who have reading disabilities, if they are sitting on the lap of a loving grandmother, their reading problems often go away? So there was a real connection for me between emotion and intelligence and this was right at the time when brain science was starting to go crazy with new discoveries and you had people who were mapping the neurochemistry and neurotransmitters of the brain and it turns out there are receptor sites for these neurotransmitter in the entire body, even your little toe. So there is a relationship between emotion and cognition and the body and all that. And so I really I couldn't find what I was looking for in computer science or in the west. There was one class at Berkeley on emotional psychology, that and all the new brain science, convinced me emotions are a cocktail of enzymes and transmitters and hormones that run all through our bodies. Including the brain. And that AI had not even really touched emotion. Just the opposite. So I had to leave the EECS Dept from time to time and study other things. I studied the teachings of the east, because its a world that sees the mind completely differently, and are upfront about the relation of emotion and mind. For example, the Chinese character for mind has the character for heart. I began studying Chinese and Japanese medicine because the philosophy is not to separate emotion from thinking. It incorporates mind and emotion into diagnosis and treatment. I also began studying with these Tibetans who have a long history focused on the mind/emoitons/spirit.

Garcia: What were you looking for?

Mason: Pardon?

Garcia: What were you looking for? You said you couldn't find it in computer.

Mason: I was-- yeah, I was looking for a way to bring emotions into AI. There really wasn't anything at the time. Rod Picard and I were working on it, but it was under the radar. There was one paper, it was a sleeper paper back in the '80s and it was entitled, "Why Robots Need Emotion," I think that was the name of it. And--

Weber: By Breazeal?— Cynthia Breazeal ?

Mason: Oh no, that-- Cynthia, that was much later. She worked on social robotics. It depends on emotion for sure, robot facial expression was her first human-robot interaction project I believe.

Weber: Oh, really?

Mason: She was much later than the paper I mentioned. It was by an Englishman, Aaron Sloman. His work was the only thing I could find when I began putting emotions into a software agent's mental state. And very little attention was paid to it for a long time. So I first published a website about programming software with emotions when I was still at Berkeley, in the late 90's. It was called emotional machines. Minsky had also been working on it, although from a different angle. And Roz Picard was also beginning her work on emotion hardware at that time. So she was doing the hardware side of emotions and I was doing the software. And a friend of ours, Henry Lieberman, knew both of us and he put us together. And we were both keeping ourselves under the radar. We both had other projects outside the emotions work that we were doing that kept up our jobs. Because emotions were not considered to be rational, they were not considered to be part of rational thought. And so the idea of bringing emotions into the field apparently seemed ridiculous to most folks at the time. For example, when I first showed my white paper on Emotion-Oriented Programming to my department chair at UC Berkeley, he literally patted me on the head and said, "That's cute." <laughs>. And I'm sure he's going to chuckle now, looking back, but that's how it was. So people were just not thinking that way yet. And I think despite the lack of peer belief in what we were doing with emotion, I knew it was only because they had not done the math and eventually it had to come round that way. Because when you look at the new brain studies, at medicine and how cognition is affected by emotion its really clear we needed to that to make real progress in AI. Having seen what was going on in other fields like psychoneuroimmunology and in other cultures-- it gave me the courage to go ahead and not worry so much about what my colleagues thought and just do it. And so now fast forward to today and that work has of age. Many people are working on it. There's software to extract emotion from text for finding meaning in language, for determining if the emotion in a person's physical behavior has violent intent…. I later worked on a robot priest and wrote a paper that summarizes many of the ideas of our time, "Engineering Kindness," that is popular outside the U.S. <laughs> Yeah, it's probably one of the most frequently read papers that I-- that I've got on Academia.edu. That and robots and sex. But, so that's more about what's happened since I left Alice Springs.

Garcia: But the robot priest, does it have any echoes of the robot arm you were playing with as a kid?

Mason: Yeah. I do. What we are exposed to as kids shapes us a lot. My grandmother's kisses and hugs, and mom's soft voice when I was hurt or ill. But the science is needed to make sense of it, to justify making it part of our technology. I think that robots have a capacity in society to do things that are either helpful to us or that we simply fail at as humans. Or maybe I shouldn't say "fail" but that we biological humans just can't. I know most of us don't like to get bored. Dr. Ed Weiss said once, "You know the difference between a human with emotional intelligence and a robot with emotional intelligence? It's that you can tell your same very truly sad story, an emotionally intelligent robot over and over and it will cry with you every time." So there-- there's some limits to what we humans can do, not just emotionally, but there are environments that we can't go in. Like I have a friend right now who's working with an undersea robot from his boat to look around the oceans and ice shelf near Iceland and Greenland. They're mapping the seafloor to see how our weather and climate are changing things. People can't really do that sort of thing by themselves. But with a human-robot team, so much more is possible. There's another robot down on the Gulf of Mexico looking at core samples to find out how much of the globby oil from the Gulf of Mexico has settled on the bottom and how it's affecting marine life in the Gulf. Getting back to your question — The robot priest project had to do with a couple things. It had to do with trust. We have lost public trust in a lot of ways, not just in the church, the Catholic Church. I think most people know about that problem now. we've lost faith in our banks. We've lost faith in people who are supposed to know what they're doing with our data who don't, because data breach and hacking stories are very common now. And so I think the idea of a robot priest, robot monk or robot rabbi follows naturally from creating emotional intelligence, compassionate intelligence in AI. It becomes possible to have ethics, to program ethics as part of a standard in social robots. Emotionally socially kind (and ethical) robots play a role in the world now and I believe it will only increase in importance as more of us grow in self awareness. First, programming trust worthy behavior in robots means we need to know what it is to build and maintain trust and also to see the value of what we gain by trusting each other. New scientific discoveries across multiple fields support the idea we humans have a biological and a survival need for trust. My paper on "Appearance and Reality in AI" talks about this in detail. But basically, our immune system, our nervous system, and even our generation of neural stem cells is affected by social relationships. So that's a good reason to design trustworthiness into our robots. That's the bigger point of building the robot priest. Its a way to open the conversation to our blind spot on this. Let me explain a little bit what I mean by this. We have a kind of social relation with all of our devices. Cliff Nass and his user experience group at Stanford discovered that we begin to treat and talk to each other the same way we treat the objects that we're around. So in other words, there's a rub-off effect, a contagiousness, from how we interact with a computer device to how we interact with one another. Once you know this, it becomes important to compel inventors, designers and programmers to create devices that bring out the best in us, to enhance human potential. If that's not enough reason… it turns out, through these repeated interactions, repeated kinds of thoughts, we're not just changing how we treat one another, we're actually changing our brains and our genes. There's a Canadian researcher at McGill University who showed that the expression of genes regulating our stress response is affected by how much kindness and tenderness we have in our lives. His work and others like it have changed the national response to domestic violence and the national health care system. So if we can create or model positive

interactions in our devices, because we spend so much time with them now, it can have a positive rub off effect. I really hope that's our future.

Weber: I think the reason that I never knew about McCarthy's group is that he never had anyone working on sort of an emotional artificial intelligence, which seems very distant from McCarthy's thought. <laughs>

Garcia: He's not-- he's not the one. <laughs>

Mason: I really-- <laughs> you guys are asking the best questions. Yeah. John, well, so I did work on common sense reasoning. But in the end, John definitely saw the usefulness of it. He began to respect it I think, because he did in the end, write me a very nice letter of recommendation.

Garcia: Mm-hm. Right.

Mason: Common sense is what my software agents were using. And although his group did not focus on emotion my traditional AI work on common sense and belief maintenance - a workhorse of common sense, was a gateway to working on emotional common sense. I think once you're a card-carrying member of AAAI people are friendly to you and other AI people. But, yeah, we - John and I, didn't always agree — for three years we debated on whether robots should or should not have emotion and my perspective was and still is, that AI needed to incorporate emotion into all aspects of cognition to really overcome its limits. Although he did agree eventually that there was a time and place for robot emotions. John wrote a science fiction story in response to our conversations called, "The Robot and the Baby." The story demonstrates situations where you don't want a robot to have an emotional reaction like people do because people sometimes panic under stress and don't act very helpful, like if a house catches on fire. Robots are supposed to be helpful to people. If you programmed robots to be emotionally just like people then you give them a potentially uncontrolled emotional realm. I agree that this is a bad idea. Because you're potentially going to have robots with psychoses, anxiety, depression, posttraumatic stress, all that stuff we suffer with. You will then need a robot psychiatrist. Do we really want to re-create that mental health situation? Probably not. But I think what you might be asking is how did my work relate to John McCarthy's interest in common sense and logic. There is a back story. I initially met him when I was a graduate student. I got an award from the AAAI, which is the national AI group, for the thesis project that involved common sense reasoning among a cooperative group of software agents. And he signed off on that award and that's how I knew him initially. But years later, we met up again at an AI conference in Detroit. It was more informal, so we got to talk about other interests, like his views on nuclear weapons. I was sharing some Scotch with some AI friends. Actually it was some Aussies. John was sitting by himself across the and the Australians are so friendly. They said, "Hey, look. There's John over there, why don't you see if he wants to join us?" And so the minute he joined us, he-- took this tumbler and filled it with Scotch. And we all had a great time.

Weber: Yeah, I know-- was that-- was Dick Janson one of those Australians researchers?

Mason: Ross Quinlan?

Weber: Oh, yeah.

Mason: Yeah, Ross--

Weber: Mm-hm.

Mason: -- gorgeous human being.

Weber: Yeah, I—John McCarthy is one of those names that I'm familiar with actually through the world of science fiction, oddly enough <laughs>.

Mason: Oh, really?

Weber: Yeah. That's actually I knew McCarthy before I got into computer history because he would occasionally attend BayCon. <laughs> And so we'd go there. And then when I saw him there the last time, I saw him right before he died, maybe a year. McCarthy was there with Knuth, and everyone else was very excited to see the author. I was way more excited about seeing Don Knuth <laughs> at a convention.

Mason: Yeah, Don Knuth's a legend, too. There's all these legends around here. But yeah, no, John didn't always agree with the idea of emotions and AI. I wrote a paper called "The Logical Road to AI Leads to a Dead End." He didn't like that, wanted me to change the title and I never did. He passed away before we could talk much more about why he wanted me to change it. But I did sort of soften that stance because we do need both logic and emotion. We really need to have as much potential for intelligence as we can and to do that, we need to have hybrid AI systems that bring in multiple approaches to solving problems. That's really been a theme of my work throughout because I worked on a lot of problems in the world, not just as research. The cooperative software agents architecture I built at the lab was used a few times, on new kinds of astronomy at Nasa using a global network of robotic telescopes, on an earth modeling system that's still working in Dallas, Texas. Hard problems in the real world often need more than AI - statistics, signal processing, control systems.... Most of my work with AI has been part of what you'd call hybrid systems.

Garcia: So you want AI should have emotions but they should be repressed then.

Mason: Well--

Garcia: No, I'm kidding <laughs>.

Mason: No. But there is a point to your joke…. Like John's point. EOP lets a programmer or designer choose the amount or the balance of logic and emotion depending on the problem.. And so when the designer when you use EOP language you can actually shift how much emotion or logic is in the code based on the application, you can turn a dial in a way from pure logic to pure emotion. So if you want both, you're somewhere in the middle on that dial. And then to bring it together in decision making, I built a truth maintenance system, a consistency maintenance system. And what that does is to incorporate emotion in reasoning by managing what 'makes sense' or what is common sense in the context. The consistency maintenance has common sense knowledge from mood and personality theory, social and group theory, and problem specific common sense. These are all factors in decision making and in monitoring agent decision making for consistency. Monitoring, or meta-level cognition, is needed when you allow emotions to combine with or justify your beliefs. David Hume, the philosopher, said our logic starts in the heart. The architecture for an agent that can do that needs to have a meta-level to monitor the intermingling of logic and emotion. The decisions and agent makes can include emotional aspects of belief or not, depending on the application. So if it's useful. When you build these kinds of tools and applications then you're right. You have to think hard about do we want to have emotions here or do we want logic? Or do we need both? Those are tough technical problems to solve, I'm still working on some of it <laughs>. A great place for this is in decision making for public safety. My colleague, Grant Soosala, who does work on these kinds of systems is consulting with the folks building a fast train across Australia. His view is that It takes not just brain and heart, but brain and heart and guts. So he's actually taken my architecture to the next step. He calls it m-braining.

Weber: Hm. And I mean there's obviously technical problems. Are there moral issues involved?

Mason: I-- yeah. Yeah, absolutely especially when you think about the fact that we are capturing so much user experience data, the idea that we can capture emotions based on face expressions, that technology's here. What do we do with that and how should it be protected? I don't know if you know this guy, Paul Ekman. He worked with the Dalai Lama and also studied some of Charles Darwin's original works on emotions in animals, and discovered these things called micro expressions.

Garcia: Oh, yeah. Yeah, now I know about that.

Mason: Right? Probably Paul Ekman's biggest claim to fame is that he can tell when people are lying by watching their micro-expressions. More broadly though, he can also tell if you're feeling disdain, if you're feeling arrogance, if you're feeling haughty, if you're feeling sad or if you're really feeling happy about something. Say you're in a murder interview and you're actually happy the person was killed. You are

probably going to try to hide that feeling, especially if you're the one that did it! But micro expressions reveal those inner feelings and attitudes. And if you're trained in how to recognize micro expressions or you build a piece of software that can analyze video data for micro expressions, how do you draw the lines for what needs protection and privacy? Because it's kind of a personal invasion to find out someone's inner feelings without them giving them to you or without your permission. There are profound ethics, profound social implications. How do we change in response to the fact we can now do this with technology? And there's a lot of people trying to talk about this right now. In fact, Vint Serf is having a kind of a forum on this in about a month. And I'll be there. This is definitely a focus. So you guys ask really good questions <laughs>.

Garcia: But the actual systems that you've built then that use emotions I mean what are typical example?

Mason: Well, when I first started out I was really just trying to capture the mental and emotional concepts that I'd seen in other fields like education and health, how emotion plays a cognitive role. So I created a kind of adapted version of my software agent language. I added the ability to create common sense objects or vocabulary that represented the concepts that relate to emotion and mental state. This makes it possible to build semantic ontology that can model some of the core concepts in psychological theories. So the first application was to create a software agent with knowledge of personality and emotion to sort images. The images were already tagged with things like 'birthday' 'thank you' 'sympathy' and so on. And then later I worked with a group of other people to create emotional signatures for mir brain scan images. Another application was to do emotional indexing on web page content. Another application was to detect potentially violent behavior in airport video camera footage. So in EOP you weren't restricted to a particular psychological theory of emotions. And it still let me access other software through foreign function calls - accessing data bases, crunching image data in the cloud or on another computer, etc. It has the same architectures for the agents that I used for other cooperative software agents systems. I think the important thing to say about EOP is because it's a programming tool, it's got an architecture that lets you access other agents and other kinds of computation. But its a language that lets you build different kinds of cognitive decision making with different kinds of psychological models. That's not fixed. Its important because there must be at least 6 different theories of emotion. So if you wanted to work with an enneagram, for example, which is a psychological theory in some sense of- of personality and mood, that is possible just as its possible for me to build up a model of Chinese medical views on emotion and mental state. The image indexing I first did was with Hallmark Cards. They have a huge problem with indexing all the artwork they own at this point.

Garcia: <laughs>

Mason: Seriously! They have zillions of cards going back to the '20s or something. And they want to find out how can to quickly find images with relevant emotional content for their stores' seasonal displays or occasions. And so to have that mass of image data that's already been tagged or labelled by people, it's perfect to point emotion technology at the problem so it can index faster. Our brains do the same thing

you know. Another application, was in France. Remember here in the U.S. this emotional AI thing was not really accepted quickly. But what I found was people in Europe and other countries were very interested in it, so that's who I ended up working with more. The French government had an interest in video at-- networks of video cameras at airports and public spaces for protection, to look at behavior analytics. And so it turns out if you watched children running around in an airport, they're running pretty fast compared to the parents. People have certain patterns of movement in an airport. And people who do bad things in an airport have a distinct pattern and you can actually notice that and it can be represented in part with emotions. So that's an example of a hybrid system where you'd want to have some digital signal processing, some conventional AI with behavior and emotion ontologies and things related to behavior as well as perhaps some conventional processing of emotion information extracted from the video.

Garcia: But that means its maybe they're more related than I understand. But it seems like being able to analyze emotions or interpret them is a quite separate function from an AI that exhibits emotions.

Mason: Yes. When you start to look at what is now a field of affective computing, you see there's people specializing in expression of emotion on the face--

Garcia: Right.

Mason: -- people who are--

Garcia: But that arouse us.

Mason: -- recognizing emotion of the face, people who are looking at emotion in the voice or expressing emotion in the voice, people who are looking at representing mental state. So extracting or mining emotional factors from data that you see and hear, personality profiles of the people, creating a model, internal cognitive model of someone, it’s become a new kind of data. I gave a talk about this at MIT in a class about Common Sense run by Henry Lieberman. These extracted or mined elements of our emotion life become memes in a sense. You can store them in a file. And Martine Rothblatt talked about the idea of capturing cognitive state. A cognitive meme should also include emotion because in reality it does include emotion.

Garcia: Right. But I mean that, I don't think John McCarthy was arguing computers shouldn't try to interpret emotions. It's more about giving AI-- giving emotions to an AI, right, building an AI system that's exhibiting emotions.

Mason: Yes, that's right. I think John was rooted primarily in logic and math and he saw the world in terms of that language. And so, when I would talk with John about AI it wasn't necessarily about an application. It was about the fundamental idea of whether AI should have emotion.

Garcia: But have meaning exhibit emotions.

Mason: Well--

Garcia: Or even be able to parse emotions.

Mason: -- for us, it was-- for me, anyway, no. It wasn't so much about that because I think when you do basic AI research you're not necessarily thinking about how it will be embodied. Will it be a software agent? Will it be a film application? Or will it be in a robot? Does it have a face? Does it have arms? Is it on treads? That's- that's really a different sort of practice of engineering in a way. If you want to talk about AI, like general AI, okay, we're talking about what does intelligence look like fundamentally? That is the question that John and I would talk about, is there this fundamental notion of AI that we create. We humans are creating these artifacts. Should they have emotions? And so, in the story, the science fiction story that John wrote, "The Baby and the Robot," he does build a robot with no emotion that calculates what to do step-by-step in an emergency and the human panics. So that was his argument for that. I didn't mean to sort of say that's what we really talked about but the fundamentals, and that's where you have to go back to brain sciences. You have to listen to people who work with education for people who have troubles with cognition, and look at what's helping them. But more importantly, there is a connection between the mind and the heart and the gut, some people would say. In fact, we're just starting to explore these new paradigms and what it means for the future of AI.

Garcia: Mm-hm.

Mason: And it's tough to get people here in the core AI group to really move out of their comfort zones. It's easier to go on an international forum where people all over the world who think differently connect. And that's kind of how it's happened.

Garcia: And so you're at Stanford now or--

Mason: I'm actually at Berkeley. John passed away--

Garcia: Oh, true, true. Sorry.

Mason: Mm-hm. John passed away and he was a really smart guy. He set things up so his machines and websites would all continue to work. And so he kept us on, me, his wife Carol, and his son Timothy for a couple years. But then we were absorbed into SRI International. And I-- but I was really-- I stayed connected with Berkeley because my PhD advisor was there and he's such a smart guy, Lotfi Zadeh. He- he always gave me good advice and usually when I ignored his advice something went wrong. But <laughs> the-- yeah, so I'm- I'm co-chair of Technology and--

Garcia: Philosophy.

Mason: -- and Philosophy.

Garcia: Right.

Mason: And this was a great broad title because of things I end up doing are all over the place like ethics. So--

Garcia: Anything--

Weber: I'm done. I'm good.

Garcia: Well, thank you. And was there anything in particular you want to add?

Mason: Well, I guess--

Garcia: Or that we didn't cover?

Mason: -- I just look forward to happens in the future. I mean I know this is a history museum but what's going on in the right now in the world with AI? It's hard to even keep up with it.

END OF THE INTERVIEW

The animals are also extremely unusual compared to the rest of the world. They hop for one thing. So the climate is extremely unusual. It can fluctuate 50 degrees in one day.

There's not much to do there, which could explain another reason why people showed up for the computer classes. But the- the best thing I thought was going out in the four-wheel drive.

