



Oral History of Lillian F. Schwartz

Interviewed by:
Chris Garcia with Jon Plutte

Recorded: August 21, 2013
New York, New York

CHM Reference number: X6924.2014

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Garcia: Alright, it's August 21st, 2013, we're here in New York, New York. And we're going to be today interviewing...

Schwartz: Lillian Schwartz.

Garcia: Excellent. Okay. So let's start with the very basic. Where and when were you born?

Schwartz: I was born in Cincinnati, Ohio on July 13, 1927.

Garcia: Okay. What did your parents do for a living?

Schwartz: My father was a barber; my mother was a housewife, mother of thirteen children.

Garcia: Wow. Okay. And now, when did you first start showing an interest in the arts?

Schwartz: My siblings and I arrived approximately three years apart. My brother Albert was three years older than I and Julian was six years older. My mother, Katie, told them to look after me. The older ones in the family took care of the younger ones. I always tagged along with them. One of the things that amused me was to draw in the dirt with a stick while they played with marbles. I also used chunks of chalk to draw on the sidewalk. My sister Belle, eleven years older than I, often went on dates to Coney Island, outside Cincinnati. The chalk statues she came home with would invariably break. She gave me the broken colored chalk.

Garcia: Hmm. That's a pretty basic way to start <laughs>. That's how all art started, that or we'd write on cave walls. And what about your schooling?

Schwartz: I went to public schools.

I came from a very large family, thirteen children. But with so many serious illnesses, I grew up with two sisters and five brothers. My father, Jacob, had his first heart attack at thirty-six years of age. We all went to work at very early ages in order to bring in money to contribute to the family. My first job at age 13 was to work in a dress shop owned by my oldest brother Morris and his wife Irene. The dress shop was located in Newport, Kentucky. I worked on Saturdays from early am until 9pm when the shop closed. This meant I traveled by street car from Clifton, to downtown Cincinnati to the bus terminal to catch a bus to Newport. This was my first exposure to discrimination against blacks. Once I boarded the bus to Kentucky, I sat in the front of the bus while black people had to sit in the rear of the bus. I felt very uncomfortable. One time I moved further to the back of the bus since all the front seats were taken. The bus driver made me get off the bus.

My work at the store was to help dress the window which I enjoyed doing. Inexpensive jewelry was also sold in the store. Since the fake stones were always falling out, another job for me was to glue them back into their casings. I liked repairing the jewelry. In fact, I changed the designs when I re-glued the stones. Another job was to clean up the dressing rooms, hang up the dresses and put them back on the racks. I had a ½ hour for lunch which I usually spent playing the slot machines that were in all the stores, Morris and Irene would take me to a night club to have dinner and watch a show, usually dancers and singers. I loved the use of colored lights and exotic costumes. I also bought my clothes at the store and paid them off with part of my salary. I know Irene charged me very little for the clothes.

My family moved frequently. Unfortunately, in Cincinnati, anti-Semitism was rampant. There were suburbs where one could buy real estate but were not allowed to live in the house. When my father became too ill to work, we had no choice but to move to a house he had purchased in Clifton, a suburb in Cincinnati. We moved during the night. The neighbors soon found out that we were Jewish. Our dog was killed, "Jew dog" painted on his belly. This was the same time period as the holocaust. There were a lot of horrific things going on all over Germany, especially towards Jews. Anti-Semitism permeated the world.

My father, Jacob, was very involved in politics. He was so happy to be in the United States. He was born in Russia. When he was twelve years old his mother said, "Go, go to America." The Tsar was taking young kids into the army. My father felt, of the two evils, that he might make it to the States. And, he did. By himself. By way of trains and help from kind people. He ended up in England where he learned the barber trade. He was very tall for his age. He would go down to the docks at night and wait for a ship. The sailors helped him. His English was poor but he could say, "America, America." He worked quite a while as a barber.

One night, while trimming a man's beard, my father noticed blood running down the man's neck. He thought he had cut the man's ear off. Most men at that time wore very heavy beards. My father probably nipped the edge of the man's ear. He was so scared he ran out of the shop and to the docks. He told the sailors what happened. Just that night there was a ship going to America. The sailors helped him to board the ship and stowed him away in the hold. He existed on pickled herring stored in barrels, his food and companions for two weeks. Pop did go to America but ended up in Nova Scotia. With just a few words of English, he made his way from Nova Scotia to Chicago. Sometime later he moved to Cincinnati.

My mother was born in Liverpool, England. She spoke a bit like the Beatles. An interesting couple. My father had a heavy accent and my mother, a mild cockney accent. They married when she was fifteen years old. My father was nineteen years old.

My memories of living in Clifton exposed me and my family to many horrific experiences. The first week we lived in the house on Senator Place in Clifton. My brothers and I were beaten up, going and returning from school. My father used his contacts in politics to change the hours for the public school. We had fewer beatings once our public school opened earlier and let out earlier than the religious school that was a block away. In addition, my mother decided that we should stay home one day a week. She couldn't stand our getting beaten up. She wrote the notes to excuse us from school. We all had the usual contagious disease like measles, mumps and chicken pox. Mom would post the quarantine notices on the front door for the truant officers to read. I must say we were all smart and did not suffer from staying home that one day a week.

The extra day gave me a lot of freedom in growing up, and I do believe nurtured my creativity. Since the wallpaper was hanging off the walls my mom didn't mind if I pulled the paper off to draw on the walls. My first sculpture was formed from dough that was left over from bread my mom was kneading to shape into bread to bake. If I made two trays of parker house rolls I could have a lump of dough to make a sculpture.

Another brother, Barney, nine years older than I, actually went to art school. We all sat around the dining room table, worked together, or separately, and munched on wonderful food my mother made. She was very interested in culture and wanted each of us to enjoy whatever was available for little or no cost. For example, she thought I would look good playing the violin, not knowing I had no intonation. I did take violin lessons; I believe the cost was twenty five cents. My sister belle bought me a violin. Holding, playing and handling the instrument prepared me, years later, in building a prototype violin for Max Mathews. Max had created a violin that didn't require an acoustic box. Because he knew I played the violin, we sometimes played duets. Since Max had no intonation either, we thought we played in tune <laughs>. Sometimes I played the piano to accompany Max on his violin. This was when I learned he did not have good intonation. Unlike Max, though, when jack accompanied me, I could hear the note played on the piano and correct the position of my fingers on the violin strings.

Max was a great inventor, but not a great composer. The prototype I created for his violin actually exists. Max was going to have it built but unfortunately things changed at bell labs. The new instrument i designed was not built. The beauty of max's new violin is that the same instrument could be played as a horn as well as a violin. It looked like a flattened violin.

Back to my early years at the dining room table: Barney ground his own oils and stretched his canvases. He also cut masonite boards to paint on, cheaper than buying canvas. He made everything available to me. I was very young when he taught me to use Conte crayons, charcoal, pastels and many other materials. My canvases were usually made up of old or torn clothes from my siblings.

Garcia: Oh, okay. What led to you becoming a nurse?

Schwartz: I wanted to go to college. Since I was one of so many sibs there wasn't any money for continuing education after high school. My sister had arranged for me to work as a secretary in the bankruptcy court where she was working. The best part was going to work with Belle and having lunch with her. Belle often took me to the Cincinnati art museum on her day off.

My brother Julian read about an opportunity to go to college free. We were in World War II. There was a shortage of nurses. Julian read that if one signed up to become a United States Cadet Nurse that the government would pay the tuition and, in turn, the recipient paid the government back by serving two years of duty. I had just graduated high school. Julian persuaded me to sign up. I was promised tuition to go to the University of Cincinnati College of Nursing and Health. I was also promised I would take non-nursing courses on UC's campus.

We lived very near the university. After signing up and moving into the nurses' home on the grounds of Cincinnati general, I learned I would be taking one course at UC, the history of civilization. That was a disappointment. However, in my third year of nursing I was permitted to take a night course on free-hand drawing held on UC's campus, my first formal course in art.

The nursing education did have a wonderful program for an artist. We studied anatomy with the medical students and actually sat in on the lectures where cadavers were used to demonstrate all aspects of the body. I could not stand the smell of formaldehyde but got through the course by imagining that I was Leonardo da Vinci. There were other courses we also shared with the med students, which I enjoyed. We studied pharmacology where we learned to mix solutions which often had pretty colors. We had to go through every aspect of a nurse's training. My knowledge of anatomy was enhanced by being a scrub nurse and assisting the surgeons in the operating room. This freedom to decorate the walls helped towards my being more creative.

One of the best benefits of being in the cadet program was meeting my husband Jack. He had entered a similar government program which paid for his medical education. He graduated from the medical college of Virginia and was interning at Cincinnati general hospital.

I joined the US cadet nurse program, not realizing I was an artist and very sensitive. Nursing was very difficult for me. The doctors and head nurses soon realized my squeamishness. I did well with the classes but not the actual nursing. I ended up painting pictures on walls, especially at Christmas time.

I met my husband when I was in charge of the pharmacy. Jack came in and asked me for Chaim's [sp?] Solution. He laughed when I handed him the solution and pronounced it as if it were a Jewish word. We chatted a bit. He was surprised that a Jewish girl was in nursing, not a common profession for Jewish girls.

We met again when he heard about my difficulty with caring for sick patients. He found out the floor I was working on and visited to tell me not to touch his patients because I was, <laughs> I was just, I wasn't a great nurse. We did start to date after that. When our eight hours were up, nurses had to account for medicines, number of diapers when we started our shift and the number when our shift ended. There were many supplies and drugs which were counted before leaving the floor we were working on. Jack would come by to help me prepare for signing off since often, especially on pediatrics; I would be short a syringe or a diaper. I have no idea where he scavenged up the missing items.

Garcia: Wow. Now how did you end up in Japan?

Schwartz: My husband was stationed in Japan in August, 1948. I joined him seven months later with our older son Jeffrey. This was pay back time for the government. It was 1948, after the war, and after the bombing in Japan. The US was occupying Japan. Troops were sent over and needed medical care. We were stationed in a small town called Fukuoka, situated between Nagasaki and Hiroshima where the two

atomic bombs were dropped. That proved to be disastrous for me, my family, and hundreds of other US military personnel. No one was aware at the time about the dangers of radiation.

You met my younger son Laurens when you interviewed him. He is much worse off than I am. You may not have known what he is going through. It is terrible. My older son, Jeffrey, who was hospitalized a few months ago for taking too many pain killers, suffers from neurological problems as well. He has found doctors who are using a specific method to help his pain. He is now off the NSAIDs which were damaging his liver. It takes 30 to 40 years for symptoms to appear. Jeffrey was with us in Japan. Laurens and his daughter have the neurological problems since the radiation issues are transmitted through the genes. Laurens' daughter, Dahlia, who is in her late 30s is wearing a back brace for her disc problems. She has a nine year old son, Nicholas. I just hope that her son, my great grandson, isn't hit by this.

We were back in the states in the 50s when I developed an adenoma on my thyroid gland. At that time no one knew that was one of the signs that one has been radiated. This was followed by an eye disease in 1955, Chorioretinitis, which has left scar tissue. No one knew the cause but today, some eye doctors feel it's related to the radiation. Because I lost depth perception from the scarring left from the Chorioretinitis, I began selecting colors to use for my palettes that would show more depth. This was the beginning of my working in pushing 2D to look more 3D.

Garcia: And, okay. Alright so, now while you were in Japan you contracted polio?

Schwartz: Nine weeks after I arrived in Japan, the incubation period for contracting polio, I had polio symptoms. We were not told, "Don't drink the water unless it's boiled." Polio was endemic in Japan. This was before the vaccine. Unfortunately, the place that we shopped for groceries was a distance away from Fukuoka. Driving time in a jeep to Itazuke air force base was close to two hours... We were not living on an army base but in a house, not in an army compound.

The hospital was a converted post office. It was on a trip to Itazuke that I began to have severe neck pain, stiffness and backache. By the time I got back to Fukuoka, my neck was in the position that is the sign of one of the symptoms of polio. It was polio. Eventually I was paralyzed from the waist down and my right arm. I was placed in quarantine in the converted post office it wasn't well staffed. The army hired Japanese people to work in the hospital. I had a night nurse, Tshiro, who soon knew that I was an artist. My right hand wasn't moving at all. When I began to get some feeling back, my husband bought me the largest Chinese brush he could find, I always intended to paint with Chinese brushes. I had hoped to study calligraphy while in Japan. Tshiro was wonderful. I was very depressed. I could not move. I would hear Jack crying outside the room. I did not see my baby Jeffrey. He was being taken care of by a Japanese family since the Americans stationed in Fukuoka were afraid they might catch polio. When I finally was released from the hospital, Jeffrey was speaking Japanese and eating with toothpicks, handling them like chopsticks. The worse for me was that he did not know me and called me Mama-chan.

Tshiro taught me a lot about meditation to get me through these hours and hours. I watched as parts of me BECAME paralyzed. A leg WOULD fall off the bed and I couldn't put it back on the bed. A very frightening time. And then with my art. I wasn't going to be able to work. For me, art is like eating and sleeping. I have to have it – it's a three legged stool. Arno Penzias, who was Vice President of Research at Bell Labs during a period when I was there, talked to me one day about a three legged stool and how important it is; one leg is yourself, another leg is your work, and the third one is your family and friends. If one of those legs gets shorter than the other, you're out of whack. I was really out of whack <laughs>. I told Tshiro of my interests. The brush was sitting there. I couldn't use it yet. He worked with me to use my head to create and move objects by just visualizing every move. With Chinese brushwork, once you start painting one has to keep the brush on the paper. If one pauses with a brush filled with ink the result will be an inkblot.

Creating in my head proved to be a valuable technique for me years later when working with computers. In the beginning there was very little software and hardware for graphics.

I first created 2d graphics. Later, when I realized that by changing one instruction I could create a variation of an image I began producing frames for animation. I had very little footage to work with. One magnetic tape held about 85 frames. 24 frames equal one second of film. It was obvious I had to use other methods to increase the number of frames. You can imagine the stacks of magnetic tape I would need for one minute of film. The final films were made away from the labs.

35 mm black and white microfilm was not a good material to work with. The first step was to take the 35mm film and have it copied in a film lab to 16 millimeter color film. Fortunately I met Bruce Cornwall who had his own optical bench. An optical bench is set up with cameras and projectors to permit reshooting footage, creating color filters, freezing frames of film and many other effects. Bruce and his wife Kathryn used computers to create films for mathematics. They lived in Brooklyn Heights. I would travel there prepared with a list of shots and other techniques I needed Bruce to follow to create a final 16mm film. It would take hours and hours and hours to reshoot the color filters I needed to create the film. The costs for Bruce and the film labs was in the thousands which my husband paid for.

The films were created completely in my head [that's how the Japanese experience helped me]. When I felt satisfied with the film in my head I then wrote out sheets and sheets for Bruce to follow to create the new footage that resulted in the final works I produced in the early '70s.

The optical bench provided the footage I needed to return to my editing studio in my basement. I still had a tremendous amount of editing and syncing of image to sound before returning to a film lab to have my edited a, b and sometimes c rolls, reshot to make the first answer print. An answer print is the first step where all the elements are now on one strand of film. This step is used to check the colors and synchronization of picture and sound.

Garcia: All right. We finished the first page. So do you feel an affinity for Picasso?

Schwartz: I used to love Picasso until my right eye now sees nothing but Picasso images which is due to the scar tissue that was left from the Chorioretinitis eye disease I developed in 1955, The macula, which is the center for one's vision, was scarred in such a way as to create a chasm down the center. The macula in my right eye is not only divided in half but is shifted. I've now developed macular degeneration in that eye as well. I had surgery on that eye in 2012, not to correct the scarring, because they haven't found a way to correct it, but to remove a cataract with sticky stuff on it, cataracts and lenses were replaced in both eyes. Parts of the retina had to be reattached. Unfortunately, the left eye, which was good, was taken over by the diseased eye, which is now dominant.

Since my vision provided me with Picasso-driven images, I used this vision, in the 80s, to create a film "Beyond Picasso" with a soundtrack composed by Leonard Bernstein. His "Overture to Candide" is the soundtrack on "Beyond Picasso."

I often play music when I am creating. I was listening to "Candide" most of the time and found it to be a match with the final cut of "beyond Picasso".

I wrote to Bernstein's agent who arranged for Leonard Bernstein to see the footage. I was thrilled when I received the letter giving me permission to use "Candide."

However, when I started editing the images and the sound I found a few areas in the sound that needed editing. I wrote to Bernstein's agent again and was delighted when I was given permission to edit his music!

My husband helped me with the edits. He was a great musician, played classical but loved jazz. He couldn't stand my violin playing <laughs> because of the intonation. So, yes, I love Picasso and I did study his colors to use in my work and in the video, "Beyond Picasso".

In the 80s, a group at Bell Labs, working in artificial intelligence bought a Symbolics machine built by MIT. The AI group at Bell Labs switched to SGI machines and software names LISP. I used the Symbolics

hardware and software for a number of months before the machine was given away. In fact, this was the way I usually gained access to most hardware and software. Namely, when the scientists switched to other hardware/software I often had access to the old machinery for a while before it was thrown or given away. In working with the Symbolics machine, I input lists and lists of images instead of words. I am currently using 2D images I created on the Symbolics machine to texture map onto 3-dimensional models to create my recent digital animation.

Currently, now 2014, I am again working with a student, to recolor images and shapes from "Beyond Picasso" with the palette I devised to create 3D videos. This time the Picasso-inspired images will be stretched, texture-mapped over three dimensional models and animated.

Garcia: Later. Okay, has your time in Japan influence your art?

Schwartz: Oh absolutely, I had a nightmare last night. I will always remember the impressions of bodies on the walls and parts of human features that were gone on faces. I have many sketches based on these dreams. I tended to keep away from realistic images in my films. They might start out with a memory from Japan but then I would smear the drawings to make them abstract which I continue to do. And it also brought up a lot of the holocaust. I had a sister Sylvia who died at age 18. She was thrown down the iron steps in school and fractured her spine. She eventually died of pneumonia. And then when my husband and I came out of the service and moved to New Jersey where he was born, we didn't know that there were areas restricted in NJ. We had served our country but faced the same anti-Semitism that my father and my family dealt with regarding where Jews could buy, and or live. Jack and I looked around in Short Hills, New Jersey, and found a house we wanted to buy. We were told we could buy it but not live in it. It is different today. Yes, the Japanese experience keeps coming up with constant reminders when I see my children in pain or what is happening to me. I can't erase that period of my life.

Garcia: Can I ask you to rephrase that, did you visit Hiroshima or Nagasaki? Or both?

Schwartz: We were in Fukuoka between Nagasaki and Hiroshima, situated between the two bombed cities.

Garcia: Did you go to see the results of the H-bomb explosions?

Schwartz: No. We were not permitted go there at that time, but we were in this little town, Fukuoka, which was close enough to be affected by the bombs. We did go to other parts of Japan like Kyoto on our own, or when they brought Hirohito, the Emperor, into town, we went to the street where he was walking. Macarthur wanted the people to realize that Hirohito was not a god. Hirohito was ordered to march down the streets in Fukuoka to literally have his feet touch the same ground as the people. We were told not to go out that day but we couldn't <laughs> resist going and taking pictures. We were allowed to go to certain places and not others.

Garcia: Okay.

Schwartz: My husband, as a doctor, was sent out at night to different places that he wouldn't or couldn't tell me about.

Garcia: Okay, and when you returned from Japan when did you continue your arts education?

Schwartz: After returning from Japan we settled in St. Louis where my husband continued his training at St. Louis Children's Barnes Hospital. I studied oil painting with Val. Other than my brother Barney, who taught me how to handle oils, I had never really taken formal classes except for the freehand drawing course at UC when I was a student nurse. Val was highly recommended. So I did study oil painting with her for a while.

Garcia: Okay. And you were working with mostly oils at that point or were you starting to... Stand out?

Schwartz: I never really could stay with one medium. I would always learn the traditional method and then try to push the medium to find other ways to use it. When we returned to New Jersey, I went to the Montclair Art Museum to study with Michael Lenson. He was teaching in the traditional way, which I had never learned. One prepares the canvas with a coating of gesso. When it is dry the artist draws the desired image in charcoal. Next, thin layers of black and white or brown and white oils are painted on the canvas. Colors are applied in thin layers, called glazing. After learning this renaissance technique I left Michael and worked in my studio to change the techniques into my own method for painting.

When acrylic paints became available I purchased all available colors. I soon realized I could drop a glob of acrylic on a surface such as canvas, plaster, wood or plastic and push objects into the glob. I began making collages. I did spend a fair amount of time experimenting with acrylics. I believe I tried every medium available. Barney had a major influence on my way of working. He liked experimenting, making things out of found objects and taught me to wire lamps when they broke. I do feel this had an impact on my kinetic sculptures.

In later years, I studied with Joe Jones to learn his methods of using watercolors. After learning the traditional methods for using watercolors, I went off on my own and combined sand from the beach with the watercolors.

Garcia: Excellent. Okay, and so what was EAT?

Schwartz: EAT, Experiments in Art and Technology, was a fantastic organization which encouraged artists to work with technologists. Those who worked only in technology sometimes referred to themselves as “electronicists.” The meetings were held in a loft in the village in New York. We all sat on purple cushions. We exchanged weird ideas and happenings going on at that time. It was just an incredible place to meet other people that one might want to work with.

However, one of my best contacts was Paul Steck who had a metal fabricating factory on Route 22, in New Jersey, not far from our home. I was already working at Bell Labs where work was being done on plans for building Telstar. Paul’s factory was so close to the labs that he did much of this kind of work for the labs. I heard of him from someone at the labs. I needed help in constructing the housing for the water sculptures I was constructing.

I was a major garbage collector. A few chemists at Bell Labs gave me plastic tubing. These tubings, along with other tubings I picked up from a plastics factory and left-over motors for fish tanks that my older son Jeffrey abandoned when he went off to college, were the beginnings for a series of water sculptures that I built. Jeffrey raised beautiful saltwater fish.

Garcia: Good, okay. Now, also who were the founders of EAT?

Schwartz: Billy Kluver, who worked at Bell Labs, was the founder along with a few others. I believe Billy mentioned Fred Waldhauer, Rauschenberg and Robert Whitman.

Garcia: Would you say he was one of the founders of EAT?

Schwartz: I met Billy at Bell Laboratories, he was a scientist and very interested in the arts. Billy invited me to the EAT meetings. In fact I went to a few meetings with him. The nine evenings showing, which was held at the NYC Armory, I believe sprouted from EAT Rauschenberg had tennis rackets wired up that would give off a sound when hit by the ball. I think Billy did the wiring or had Bell Labs people do the wiring. The labs also entered a work. A very exciting evening.

Garcia: Okay. Well now we’re up to Proxima Centauri. <laughs>

Schwartz: It was the late 60s and I was working on a major sculpture, “Proxima Centauri,” to enter into a competition the New York Museum of Modern Art was planning called “Machines at the End of the

Mechanical Age.” One rule was to have a licensed person do whatever wiring was required. Paul was a big help in introducing me to people to help. I also worked with a number of the scientists from the labs who offered to build small computers that ran some of my other sculptures. The museum was concerned about fires.

On one of the days I visited the plastic factory to find more material for my water sculptures I spotted some large white plastic domes. The owner of the factory told me they were rejects from an order for domes for street lamps in Los Angeles, California. The two “Proxima Centauri” sculptures each has such a dome at the top of the sculpture.

Eventually, I became friends with the owner of the plastics factory. He permitted me to work with one of his chemists to disturb the catalyst that was used to create sheets of clear plastics. This factory produced clear sheets for showers. I spoke to the owner and told him about my artwork. At that time I was doing a number of bronze casts. He made a deal with me that I now regret. I traded my early bronzes for time to work with his chemist to disturb the plastic to make bubbles and patterns on the surfaces. I didn’t want to make clear plastic. That didn’t interest me. I wanted to see what I could do to the material to create new surfaces. He allowed me to do work in his factory as long as I gave him my bronze sculptures. This went on for about a year. I continued collecting other rejects besides the domes. The domes eventually became the tops of the bases for the two “Proxima Centauri” sculptures.

The domes sat my studio for a long time. When I read in the New York Times about the exhibition that was going to be held at the Museum of Modern Art, “The Machine at the End of the Mechanical Age,” it came to me what I should do with the domes.

I have always been interested in astronomy. The news about the possibility of men walking on the moon provoked me to think of ideas for a sculpture to enter into MOMA’s show. I decided to hand paint images on two-by-two glass to use as slides to represent space. The slides were to be projected onto the insides of the domes. I had an old Singer sewing machine that I inherited from my mother. I used part of the motor contraption to move the inner shelf up and down. After making a few sketches I had a carpenter build a wooden rectangular box which was covered in black micarta. I also had him build another base to position a 35mm slide projector on. A second shelf that rested on four short wooden blocks was used to attach motors, electronics and two large color bulbs, one red and one blue. The electronics were wired to randomly move the inner structure up and down, turn the red bulb on when the unit moved down and the blue light when the inner structure moved up. I then positioned a mirror so that the slides would project onto the mirror and then up to the inside of the dome. I then purchased four proximity detectors, which were simply the pads one would buy to put under a carpet to detect a burglar walking in your home. When the viewer came up to the sculpture and stepped onto the pad the dome was triggered to recede into the base. Electronics and timers were put together in such a way as to move the dome up and down into the base randomly. The viewer could also trigger the movement by stepping onto the pad. I always tried to find a way to make my kinetic sculpture work in a random fashion. The slides were always being projected on the dome. I also achieved a ripple effect on the dome by building a small rectangular plastic box that contained water. The ripple tank was attached to a timer that caused the tank to move randomly up and down. This added an additional effect on the surface of the dome. The images would continue to change but the surface would appear as if softer than the hard plastic and create motion at random intervals. The randomness was important to keep the viewer’s attention for longer periods.

“Proxima Centauri” was one of nine works of art selected for the MOMA show.

When the second edition of “Proxima Centauri” was exhibited at the Brooklyn Museum exhibition “New Beginnings,” where the works that were not accepted for MOMA were shown, many people used my sculpture as a wishing well. Unfortunately there was a fire in my sculpture. When the dome receded into the base some people threw coins into the sculpture, I imagine to make a wish. When the dome receded there was room around the edge to toss coins into the unit.

The motion for the second edition was triggered by infrared. I was able to get rid of the pads but I wasn’t happy with the small holes I had to have drilled into the base in order for the infra red to function.

Garcia: Oh wow. And how big is it?

Schwartz: The base for Proxima was 55" high x 30" wide x 30' deep. The unit was high enough for me to lean on the ledge of the box. Besides the MOMA exhibition the Brooklyn Museum exhibited duplicates of the nine works accepted, as well as all the works rejected to include in their show "new beginnings".

The Moderna Museet asked if they could exhibit my sculpture after the exhibition closed. Pontus Hulten also selected a graphic, "Studies in Perception". The concept for this graphic was by Leon Harmon, a scientist who worked in visual perception at AT&T Bell Laboratories in Murray Hill, New Jersey. Leon attended the opening at MOMA. He was very interested in my work. I was familiar with many print media but I could not figure out how Leon's work was created. I could see that the large nude was made up of tiny engineering symbols and either printed or photographed for the final work. We began questioning each other about each other's works. This interaction led to an invitation by Leon to me. He asked if I would like to try the program. He told me how the print was made and his interest in how much information one needed to perceive an image the first image that he tested his ideas on was Abraham Lincoln. He used the computer to scan in a photograph of Lincoln and then broke up Lincoln's face into blocks of different sizes. He ended up with a photo made of quite large blocks. When one squinted you could actually recognize the face of Abraham Lincoln.

Garcia: Wow. Excellent. Okay, so... So how did that lead to your introduction to the Lab?

Schwartz: At the opening night of the exhibition, Leon asked if I would like to come to Bell Labs and try out the program. Of course, I said yes. He told me to call him when I arrived at Bell Labs and he would send his assistant John Volaro to sign me in.

Schwartz: Pontus Hulten, from the Moderna Museet in Sweden, was the guest curator for the "Machine at the end of the Mechanical Age" exhibition, a major show mounted at the New York Museum of Modern Art. He selected nine works of art from the world to be included with Leonardo Da Vinci and other artists from the past, who worked in art and technology. I met Leon Harmon at the opening reception. His work, "Studies in Perception" was one of the nine works chosen by Pontus. It was a photograph of a nude that was viewed as a nude from a distance and up close one could see little icons that made up the nude. Leon was curious about my work of art, "Proxima Centauri", and I'll interject here that when the judges came to the house to see the work, just that day the motors were not working. My younger son Laurens climbed into the box, we took out the innards, and he, by hand, pushed the globe up and down and turned the lights on for the projector. Pontus and MOMA's curators didn't know this at all. Of course they stood and chatted too long. Laurens was exhausted. They were thrilled with the kinetic sculpture. Laurens saved the day. The work was selected for the show, thanks to Laurens. At the opening Leon Harmon was so intrigued with my work and what triggered me to create such a piece and I, in turn, had asked him multiple questions about his computer generated nude. He said, "The code exists, we're not going to do anything with it, would you like to come to Bell Labs and try it?" And I said, "Fine, sure." And within two days, I called Leon and went to Bell Labs. I was so excited. We all knew about Bell Labs Research in the area. I drove by it so many times. We didn't live that far away, actually about ten minutes.

Leon told me to call his technician John Volaro when I arrived. Non-employees had to be escorted into the labs.

John took me to Leon's lab. Leon and I chatted briefly. John led me to the small computer terminal and taught me how to use the computer. I first read into the computer a paper tape to start the machine to run the software to build ten by ten icons. It was thrilling. In between John's teaching me and my working, we took coffee breaks. Leon would talk to me about visual perception; he lectured me on how we perceive colors, the brain and the eye. He went into great detail when I told him I had lost depth perception in my right eye and the scarring that was left. I told him about my changing the colors in my palettes for my paintings to try to get back depth perception. He spent hours lecturing me about the brainwaves, and where you see blues and reds and greens. It was a wonderful collaboration and learning experience for me.

I used that same palette when I went on to make computer generated films. Eventually these became 3D films because of the way I used the colors. John was the one who taught me how to use the computer and the software that existed. It was a tedious job but I didn't think of it as tedious. It was so exciting to be able to work in a new medium.

The first image that I created by computer I named "Head." I first drew the head on graph paper. I deliberately marked off the number of boxes that corresponded to a keypunched card. I believe it was 60 by 80. I drew the picture to match the number of punches available on a card. The next step was to design the icons that would make up the image. Step three was to transfer the icons by using another program. The final step was to use a Stromberg Carlson microfilm printer to print the image onto black and white microfilm. I used the computer to print the final image in both positive and negative images. The last step was to go to a silk screen factory where the 35mm film was blown up photographically to the desired size. I printed in two colors, one silk screen for each color. Columbia University acquired the three stages for the final work; the last panel was printed in color. Joe Traub, who was then head of Computer Science at Columbia University, saw the set which now resides in his home.

Garcia: Wow. Now this is also about-- so first did you have an official post at Bell Labs? Or was it sort of ad hoc, or...

Schwartz: In the very beginning John Vollaro always sent to sign me in. I would be given a day pass to wear. John also signed me out at the end of the day. Leon was a very early riser. He and John arrived at the Labs at eight. I was sometimes already there, waiting in the lobby. My badge had written "Resident Visitor" on it. While I was not permitted to wander around by myself, I was allowed to go to the Ladies Room <laughs>. I was permitted to go to the dining room, which in itself was an incredible experience. The tables, at that time, were round. One could sit wherever there was an empty chair. I met many scientists in the lunch room. We all interacted. I learned a great deal by just listening. I soon joined in and asked questions. Sometimes I would be invited to a scientist's office to see and hear more about his or her work. I read that Steve Jobs patterned his building on the Labs, with its long hallways and open doors, so that people met each other more readily than in other office arrangements.

Shortly after creating a number of still graphics I felt the limitations of the software. I was getting bored. As with all other media, I felt I had pushed the program to its limits. I mentioned to John that with a little change in instruction I could get a variation and possibly do some animation. I had bought a book on filmmaking for a dollar. I was already doing still photography and had shot, with Laurens, a documentary, "Mayan," on a 16 millimeter Bolex. So I was familiar with filmmaking but not animation. About this time I met Max Matthews, a director at Bell Labs, and the father of computer music. He had heard about me. Leon introduced us.

Since Max was inventing computer music, and was eager to have films to put to his music, he was happy to learn that I was thinking about ways to create films. Even though Stan Vanderbeek was there before me, Max did not ask him to work with him. Stan's interest in the labs was to have his poems converted into computer animation.

Stan told me he would drop his WRITTEN poems off at bell labs with the same computer scientist who did the software for "studies in perception". He used a program, I believe was called Beflix, to translate Stan's poems into black and white magnetic film. Stan would then take the strips of 85 frames of film to a film laboratory where he instructed them to add titles and color. He called himself a "technological fruit picker."

Garcia: <laughs>

Schwartz: ...STAN said that he had no interest in working with computers. He was amazed that I got so involved with the machines.

Since I wanted to become more familiar with computer jargon, I signed up for a course at the New School in NY. Besides the vocabulary, the course covered all aspects of working with computers including computer math, true-false statements, logic, some programming etc. My younger son, Laurens went to the New School with me. I forgot what course he took since it was a night course. My husband Jack felt safer for Laurens to accompany me. <laughs>

It was a number of months after I started working in Leon's lab that the computer scientist, who worked with Leon on the MOMA print, stopped by to chat with Leon. That was the first time I met him. I had already completed a series of my still graphics. I was talking out loud to the computer, not uncommon with computer users. Besides talking to the machines, users could be seen kicking and hitting the computers, out of frustration. I was complaining and saying, "I wish I had more software here," and then I heard a voice, "Well what would you want?" It was the same programmer that introduced me to Stan.

He invited me to his office where we spent hours while I rattled off all the things I would like to be able to do on the computer. He wrote my ideas on the blackboard and scribbled some of his. At times he would interrupt to say, "Well I can do this, but I can't do that." He wrote a very simple language called EXPLOR which stood for "Exquisite Patterns, Local Operations, and Randomness". This resulted in my learning the lines of code where I could substitute numbers to change sizes of rectangles, whether they overlapped or not, change the number re something happening or not by using the random number generator and a few other operations. This was the beginning of my working on computer generated films. These early films provided short strips of black and white microfilm, not unlike what Stan Vanderbeek went off with.

BY this time AT&T Public Relations heard about my work. Since they had a poor public image because they worked with the military, they commissioned me to do two films to show in universities. They hoped to change students' image of AT&T by way of my lecturing and projecting my abstract films. <laughs>

"Pixillation" was the first film I made. Since i had very little computer footage to work with I looked towards more traditional methods to create more footage. I set up an animation stand with my 16mm Bolex camera attached. I poured different colors of paint onto a glass plate. I used the camera to shoot frame-by-frame. I deliberately drew images that resembled squares to resemble the squares made by the computer. I created many other images to extend the film and to simulate a more liquid appearance. The rectangular images from the computer were not interesting enough by themselves. In the final film, the images I created, along with adding color to the computer images, produced more variety and interest.

"Ufos" was the second film I made for AT&T. Again, I had so little computer footage that I was scrambling for more footage when I met George Gilmer, a chemist, who was making a film on atoms and molecules. He gave me the footage he was not going to use. In fact, he was about to toss the film into the garbage when I yelled, "STOP!" They were wonderful images of circles that moved around the frames. This footage became the main source for "Ufos."

I made sheets and sheets of notes for Bruce Cornwall, who owned an optical bench, to use to reshoot these few frames to extend the footage and add color to what became the first 3D film.

For the next films I used laser beams with don white's assistance, worked with statisticians like John Chambers and changed his mathematical equations to create abstract images. There was never a time when I could create a complete film using a computer and still. Now 2014, have to do a tremendous amount of editing, color corrections, and almost always inserting footage I shot outside the computer.

Garcia: Definite multimedia approach to <laughs> doing early computer animation. So let's see, what do we go for here? Because we've gotten. Okay so what were some of the key moments for you during the 1968 to '75 period? At Lab.

Schwartz: Well first of all, I never said, "Thank God it's Friday.."

<laughs>

Schwartz: ...I loved the labs. My husband's specialty was Pediatrics. He worked long hours and was probably one of the last physicians to make house calls. We eventually built a home and office with a large studio for me, the length of the house. When the practice became very busy we decided to move. This was in the late 60s. I had already started working at the labs. I wanted to be closer to the labs. My husband's only request was that we would be within 20 minutes of the hospitals and his office. he had a patient who lived in Watchung, NJ. When she heard we were looking for a home she suggested we move to Watchung which was 10 minutes from Bell Labs in Murray Hill. It turned out that Jack could get to his office and the hospitals in less than 20 minutes. The patient also heard of a house for sale on her street. we moved. When jack dashed off to see a patient, and, he did make a lot of house calls, I dashed off to the labs to experiment and work. By that time Max had seen to it that I could get a badge that would allow me to go in and out of the labs without an escort.

Max introduced me to many composers he invited to the labs to try out his software and hardware for creating music. Most of the compositions that accompanied my films were created by these musicians.

Jean-Claude Risset, from Marseilles, is one of my favorite composers. We are still collaborating. he continues to send me DVDs from France for my new digital animations. I just completed a new work with his music.

The late Manny (Emmanuel) Ghent also composed sound for my early films. He was a psychiatrist by day and a composer at night, we met at the labs. There were so many others. The list included Gerard Schwarz who used max's conducting program for my film "fantasies". Betsy Cohen also worked on this project. The notes were fed into the computer by Betsy. Gerard conducted by using a small joy stick.

Pierre Boulez, the then conductor for the New York philharmonic orchestra, was invited to the labs by max to conduct one of his own compositions "rituel". I later arranged to escort Pierre to the Holmdel labs to make a video of him conducting "rituel". He brought along a tape that had been produced by him and the philharmonic. I used Barry Haskell's picture phone set up to video-tape Pierre at Holmdel's bell labs. Pierre brought along the score and used it to conduct an invisible orchestra. My colleague, charley Rubinstein, took still images of Boulez which I later enhanced by computer to increase the visuals to cover the 29 ½ min. composition.

Albert miller, who was in charge of the auditorium activities at the labs and had his own band, performed works he composed while I used Haskel's hardware and software, that was being built and tested for conference calls, to record him and his band. I could save a frame in the computer and combine it with another frame by superimposing or attaching them.

Albert's music accompanies some of my later work made in the mid 70s using this same setup. One is called "on line" and is supposedly the first rock video. I post-produced these videos at channel 13, where I was an artist in residence, to add color and other effects. This was around 1974. Nam June Paik was also at channel 13 working with an engineer to build his color synthesizer. Bill Etra was also there working on a digital synthesizer. I was fortunate to use both synthesizers in the post-production of my videos. I worked with an editor named John. I cannot remember his last name. We spent a good deal of time on each video since the original footage was in black and white and on 2" video.

During that period, Ursala Lequinn's "Lathe of Heaven" was being produced by David Loxton, WNET ch. 13 and WGBH in Boston. I ended up doing special effects for this work. Ed Emschwiller was in charge of all effects. He asked me to do a section that would simulate what a young man's brain would look like when asleep and in a state of rem. these images were used in the final production. My youngest brother, Robert, was head of neurology at bu. he gave me some input for imagery that might be representative of the REM stage. Bob added that no one really knew what the images looked like. There were many people in my projects besides Albert who worked at bell labs who participated in these videos.

Max also invited Vladimir Ussachevsky to the labs. Vladimir helped set up the Columbia/Princeton music center. Vladimir also provided me with wonderful tracks for my films. The '60s and '70s were fantastic.

Also, in the mid 70s, the labs bought a DPD 224 that was set up with a color monitor hooked up to a 16mm. film camera. It was then that I met John Chambers, a statistician. By that time, the scientists realized that I could give them input. For instance I changed colors for his mathematical equations so that he could get more information from his contour plots. He gave me access to the equations and explained which code I could change numbers to create different images. This resulted in two films. One film, an art film, called "Papillons" and a science film, "Contour Plots". Max created the music for "Papillons". He arranged for a screening of both films at a science meeting held in a New York hotel. They were shown side-by-side on large screens. From the applause, this performance was a big success.

<laughter>

Schwartz: I worked on other projects using Picturephone which was meant to be used for teleconferencing. This would be the first time I would be able to use live people and record in real time on black and white 2" video. I was restricted to a four by four area where I could position dancers, musicians and a mime, for different programs.

For the film, "poet of his people", on Pablo Neruda, the Chilean poet", my son Laurens located dancers and arranged the choreography for this mini- documentary.

The technique was to shoot a frame and average it with a frame stored in the computer. Barry programmed the keyboard so that I could play it like a musical instrument. In addition to the characters I could combine other images with these videos from my website and other sources. This is the same method I used in recording Pierre Boulez.

Garcia: Oh, okay.

Schwartz: It was wonderful to actually get some footage that had some length to it that I could really edit and make into a program.

Garcia: So let's talk about Max in specific for— and some of the projects that you actually did with him and the films that he scored and how that sort of worked together, the two of you.

Schwartz: Max liked to work alone. He preferred I edit a film and give it to him to work from. He wrote a score for "Olympiad" and for "Papillons". He also wrote scores for other films which did not always work out. I worked differently with the different composers. Sometimes I heard the music first and then did the images like Jean-Claude's "mutations", the film has the same name, or Leonard Bernstein's "Overture to Candide".

Plutte: Start with his full name and context.

Schwartz: I met Max Mathews soon after joining Bell Labs. He was the director of the department that Leon worked in. when he heard that I was working in Leon Harmon's office, he located a little space for me in a separate office on his floor. I shared the space with many of the composers that visited. Max was happy that I was extending the use of the computer for art and eventually films. I believe max told the public relations department about my work. The PR group began bringing visitors to see my work. The visitors were mainly stockholders who didn't know much about science.

One story, which I find wonderful, is Max's concern that one of the visitors might ask what my specialty was. He wouldn't want me to say nurse OR artist, because nowhere in the bible at AT&T Bell Laboratories was there a slot for such a title. HE decided, after thinking a while, that I would be called A "Morphodynamicist." And sure enough one day someone did ask the question. The PR fellow immediately swooped the visitors away by saying, "it's time for us to go off for lunch." Max was right in giving me that name.

After Max assigned me space in the office, 5D503, he took me to the stock room to sign out whatever materials I might need to work with. We chatted as we walked. He learned about my playing the violin and the piano, which my sister belle taught me. He told me he also played the violin. Sometime later I played the piano to accompany max on his violin. We became very good friends. One of the marvelous things about max is that even though he was a director, once he learned that one was a creative thinker he respected you no matter what your background was.

Max and I had long discussions. He told me that one of the things that always bothered him was lifting up a telephone and holding it. This chat resulted in my building a prototype for a hands-free telephone. I started the project by using pipe cleaners, twisted them together to bend and wrap over max's shoulder to get his measurements. I then went to the shop. Max had already introduced me to the people who worked in the machine shops. Max also had his own machine shop on the top floor where he allowed me to use his machinery. One of the people who worked for max was Joe Kohut. He helped me bend a thin hollow pipe cut and bent to match the curve I made with the pipe cleaners. Joe also did the wiring for the hands-free telephone which had a snakelike appearance. The microphone was placed right at the tip of the piping close to max's mouth. I drew a picture for Joe to build a black rectangular base to house the speaker. I tested the position of the snake-like phone so that it rested on a small rectangular indentation where max could hang up the phone. We tested the phone on max before completing it. He was thrilled. Max could grab the phone, whip it over his neck and walk around the room and talk. When he completed the call he could then put it down to rest in the indentation which served to disconnect the call. When max was not using the phone it looked like a beautiful sculpture sitting on his desk. Max took it to western electric in hopes that they would produce the phone.

Garcia: Okay, now in the late '60s, early '70s, how did the art establishment react to your first computer works?

Schwartz: In the early years of my computer work the artist friends that I had were very anti-computer. I was so excited that I could not resist talking about this new medium. Their reactions were that of boredom. I soon lost them as friends. I was also spending more time at the labs meeting and making friends with the scientists. One was don white who worked in lasers. Don invented the 360' hologram. He eventually arranged the lasers to project onto a white wall in his office. I filmed these images to create the abstract images that I edited into my film "mutations". I first heard the composition "mutations" by Jean-Claude Risset in max's lab. Max and some of the composers would work with me, but with Max Matthews, he would like to take the film. Go off to his lab to create a track. He did not work with me while he was composing. This method of working always required a good deal of editing to sync the picture with the music.

"Olympiad" is a man made up of octagons. There is either a single man or a group of octagon men running back and forth across the computer screen. Since the software limited what I could do I, again, resorted to working on an optical bench to reshoot the footage to add color and extend what little frames I had to work with. Unlike most of the composers I worked with, max was not pleased if I edited his score. Many of the other composers I worked with were perfectly happy if I felt I needed to make some adjustments. Eventually I edited a bit of max's music which he didn't pick up. I was so excited to show him the finished work in color but did not know until much later that max was color blind. He seemed pleased with the results. I believe I mentioned that max created the score for "Papillon" that I made by changing the numbers in John Chambers' mathematical equation that was the basis for "contour plots". These two films were the ones max arranged to have screened at the IEEE meeting in a NYC hotel.

Max kept a list that he titled "firsts by Lillian Schwartz". The list contained work I did at Bell Labs for scientists. Some were about the films I made explaining scientists' work. Laurens wrote the scripts based on interviews I recorded of the scientist's work and the published papers written on the work. Max listed the hands-free telephone and the prototype I built for his new violin. He also wrote about some of the meetings I had with scientists to chat about their work. Word got out that even though I did not know a particular scientist's field that I was a good listener. They might discuss the problems they were having. My response such as, "well why don't you try... whatever?" some of these firsts are listed on my website.

Max kept quite a list which was fortunate. In the mid-eighties I was very involved in art analysis and discovered the identity of the models for the Mona Lisa. When the news broke about my discovery Ian Ross, the then president of the labs, received phone calls about this person at bell labs that he had never heard of. People from the press and television were calling; they wanted to film me at the labs. Max was either contacted by Ian's office or visited Ian to explain my presence at the lab and my contributions. Max was sort of my... taking care of me.

<laughter>

Schwartz: Max evidently spoke to Ian. Max called me to his office and gave me the list to prepare me for the meeting with Ian. I thought that was going to be the end of my relationship with bell labs. It was now 1984 and I had been at the labs, thanks to max, since '68. When I walked into Ian's office he said, "You're not even in the phonebook. I mean, you've been here since '68." he was very upset. He had a copy of the firsts list which he then started to read. "Well, you're going to have to meet with the lawyers." I didn't know what that meant. Ian told his secretary to make an appointment with one of their lawyers. I was really shaken. I did not think for a moment that I was being sent off to get a contract. Max handled all this for me. Later, when we chatted about this, max told me it was for him too, to protect his continuing his music projects.

The lawyer was very friendly. I got my own badge with resident visitor written on it. The contract read that I was a consultant in computer graphics. From then on I was safe. I was changed to a larger room and with a window. The interesting thing is that those who had PhDs would get a window in the room, and I had a window <laughs>, which was quite thrilling. I did share it with Elizabeth Cohen, who was one of max's people. She continued composing and helping max feed notes into the computer for various conductors to use max's conducting program. I didn't work with Elizabeth. She told me about the tedious work inputting the music note by note.

Garcia: Alright. And just as a side note, did you ever run across or work with John Pierce?

Schwartz: Yes.

Garcia: I have a personal affinity for John Pierce, I love that man <laughs>. Loved.

Schwartz: I first heard of John Pierce through a story that some people say is true and some say it isn't. I don't remember who told me the story. I believe it was Joan Miller, a programmer who worked with max and Bela Julesz, a scientist in visual perception, who taught me so much about vision. I must mention John Krauskopf who also taught me about color. I was a subject for many of his tests.

The story is that max and john, who were very good friends, were at a concert at the NY philharmonic. john reached over to max and said, "why can't you use computers to create music?" I don't know if that's a true story or not but that's what I was told was the beginning of max starting his work with computers to create music, and eventually his conducting program and software to analyze music.

I met John Pierce at max's home. My husband and I had become good friends with max and his wife, Marge. John Pierce was an incredible man. He told story after story. His wife was an excellent pianist. But I didn't work with john on any project.

Garcia: Yes, one of my favorite— I actually got to meet him before he passed, and he was very ill for the last six months of his life...

Schwartz: I know. Max kept us informed.

Garcia: ...and he was in Sunnyvale, and he actually tells the story that, "I did two great things. I made Max Matthews make computer music and I named the Transistor." <laughs>

Schwartz: That's right. That's ANOTHER story I HEARD. That John Pierce named the Transistor.

Garcia: And he wrote some darn good science fiction. <laughs>

Schwartz: Oh, of course, of course. I read some of Pierce's science fiction.

Garcia: Oh, some of that stuff was great. So a couple that we haven't mentioned; "Pictures from the Gallery". Can we talk about that for a little bit?

Schwartz: The year my mother died, and I was really broken up as I am when I lose close family members. I collected a number of photographs of members of my family and decided, as a tribute to both parents, their children, grandchildren, and great grandchildren that I would make a film just from the photos of my family.

"Pictures from A Gallery", is made up of as many photographs of my family that I could find. I was still using the software which limited me to squares and rectangles... I was dying to have diagonal lines? The programmer obliged and wrote diagonals into the software. "Pictures from a Gallery" was the first movie where I was able to create in a divisionistic manner which provided me with more visual possibilities. At that time I was doing a good deal of work at the bell labs in Holmdel. This was in the seventies when I was using the Picturephone technology to create all the black and white live action that Barry Haskell provided. I had help from a wonderful fellow who set up a scanner to scan the photos, one at a time, into the computer. I was still limited to using the microfilm printer which required hours of work away from the labs. Again, I met with Bruce Cornwall to work with him to reshoot the footage and add color. Dick Moore, another assistant for max, created the soundtrack. He suggested the music "Pictures from a Gallery". I ended up using the name for the title but not the track.

Garcia: Excellent. And then, I seem to remember you winning an Emmy Award for the Museum of Modern Art commercial?

Schwartz: In the mid-eighties I was called by Luisa Kreisberg, From the New York Museum of Modern Art.

Garcia: Okay, so about the Museum of Modern Art. Oh wait, I forgot. I have to wait. Okay, so Museum of Modern Art. Tell us a little about that.

Schwartz: In the mid-eighties the Museum of Modern Art was reconstructing its main building and galleries. Luisa Kreisberg called to ask if I would be interested in creating a poster and a public service announcement to advertise the newly renovated MOMA. The call was followed by a letter stating that MOMA wanted to be in the forefront of the art world. I was commissioned to create a computer - generated poster and public service announcement to announce the opening of the newly renovated museum. As always with a museum, a sponsor is needed to fund such projects. I spoke to Bell Labs. They declined because they were afraid of the publicity since an anti-trust suit was pending. IBM heard of the commission or Luisa may have contacted them. Jim Damon from IBM responded immediately.

Jim arranged a meeting at IBM's Yorktown research lab. He introduced me to Richard Voss, a low temperature physicist, who volunteered to work with me. While his interest was not related to computer graphics or animation, he assembled the hardware and software that I would need. I also needed to scan into the computer a number of images that MOMA provided. The scanning and the final filming were done at other IBM facilities. Dick arranged for me to get a pass to allow me to enter all three facilities. Dick did a lot of the work that was essential to the project, such as scanning and printing tests. The commission took almost two years to complete.

The first working meeting with dick was held in NYC at IBM's gallery which was then on Madison Avenue. We discussed the project that I hoped to accomplish. I gave him a list of computer hardware and software I would need. As with working with people at bell labs, we bartered. I would say, "well I would like this,

this, this and this.” and dick would come back and say, “well, I can give you this, this and this but not that.” and so it was always a compromise. I felt that I would make it work. I went off to IBM, Yorktown. I was provided with an office, a computer and software to create graphics. I also had access to a printer to check the images.

At that time dick was working for Benoit Mandelbrot. Benoit was editing his book on fractals. Eventually Benoit asked me to help with the layout of the book. We became friends and socialized. My husband and I were invited to his house and we, in turn, invited Benoit and his wife to our house. Later, I created a short film using fractals with software that sig Handelman, another assistant to Benoit, helped me with. Unfortunately the film disappeared somewhere but it was unique. Even though the trip going back and forth to IBM was over 2 hours each way, the experience of being at IBM Yorktown and working with IBM scientists was inspirational.

I kept a journal in a large black drawing book. I filled it with sketches for the poster and notes for the PSA. I wrote other ideas I had for future projects. Someday I hope to get this journal returned. Unfortunately it's in Ohio State right now. The book contains everything that would tell the entire story of the day by day activities and descriptions of ideas that were inspired by this experience. Fortunately there was a man who worked at Yorktown who offered to drive me every day; sometimes if I worked late I slept in a motel not far from the IBM labs.

I completed a poster that I thought would be great. Peter Moore, a photographer IBM hired to work for me, took many photos of Gaston Lachaise's sculpture of a big woman. He photographed the sculpture, which was then temporarily reinstalled at the metropolitan museum of art while MOMA was being renovated. MOMA also supplied me with photographs and allowed me the freedom to select postcards of images that described each department in the museum.

One idea was to make a collage of all of the different departments in MOMA to rebuild Lachaise's woman. All the curators and IBM folks loved the final work. But, unfortunately I positioned Marilyn Monroe in the crotch of “big MOMA”. While this image was not used for the final poster, large 5' high cibachromes were acquired by many people involved in the project.

The image that was selected for the poster was a computer drawing I made of the new MOMA building with beautiful bands of color. This image was the last frame of the PSA. When the IBM folks saw the PSA. They suggested I should submit it for an Emmy. It would be good PR for them since IBM was printed quite large across the bottom of the poster as the sponsor. What a wonderful surprise when it was nominated for an Emmy. The best part was that it won an Emmy! And, my family was there screaming from the balcony. A memorable evening.

Garcia: So the other one.. Alright. Tell us about your da Vinci.

Schwartz: I was always in love with Renaissance art. Before I used computers I took a course with Michael Lenson at the Montclair Art Museum. He opened my eyes to a great many of the artists from the renaissance period. My two favorites were Leonardo Da Vinci and Piero Della Francesca. I studied Leonardo on my own, covering his interest in art and technology, constructing and using machines, his manner of thinking in defining a canon of proportions he used in drawing and painting faces and figures, and his notebooks became my bibles for my art, and continue to be so.

I read that Leonardo was enthralled with Vitruvius, whose canon of proportions became the basis for Leonardo's work. This information helped me to identify the face on the Shroud of Turin. My analysis proved that the face was the same as Leonardo's “Vitruvian Man”.

And Leonardo's Grottesques, which I believe I mentioned in solving the question of whether Leonardo painted the faces from life or not. I found that Leonardo created the faces by using his canon of proportions.

In the mid '80s I was fortunate to gain access to a symbolics machine built by MIT and purchased for the scientists working in artificial intelligence at bell labs. The AI folks used it for making lists and list of words. I used it to make lists and lists of shapes. I started with Picasso shapes, compositions and palettes. I can still say that today, March 15, 2014 that the symbolics hardware and software was the best technology I ever used for my creations. Besides using it to make the video "beyond Picasso" I created hundreds of still images which I am using today in realizing 3d digital animation. I can still state that the symbolics environment was the only one where I could work as an artist in an intuitive way. The software permitted me to lay out my palettes as I did when I worked with oils, work in 2d, save previous images to compare with new ones, and other amazing tasks. After examining Picasso's palettes and shapes I became engrossed in all aspects of other artist's works. I was always enamored of da Vinci's works and writings. I used his canon of proportions in creating heads, which later led to working with the art historian Patricia Trutty Coohill to analyze Leonardo's grotesques.

I spoke earlier about scientists calling upon me for various tasks. The scientist, Gerard Holzmann's avocation was photography. He used his skills to write software to accompany a book he had written on digital photography, "the digital dark room". After Gerard completed the software, images could be scanned into the computer, sized, aligned, different measurements taken, colors adjusted or changed and many other tasks one could do in a darkroom, he called me to ask if I had two faces on magnetic tapes to test his software.

Like many artists, I was intrigued with the "Mona Lisa" and Leonardo da Vinci. I went to Gerard's office with the two mag tapes. Both images were painted in a $\frac{3}{4}$ profile but facing opposite directions. I scanned both images into the computer. Gerard explained the software. I chose to flip one of the images, and sized them by aligning the inner corners of their eyes, (the inner canthi). Gerard started the program to display the images on the monitor. Since this was a slow process he told me he would call me when the images began to appear on the screen.

Gerard called within the hour. When I entered his office the image had just started appearing along the top of the screen. The hairlines were lined up. At that time, we thought it was great because one could see an image in real time, even though the movement was very, very slow. I watched the two images, now connected as one. The eyebrows began to take shape. Even though they were very different they matched up. Next came the pupils, which lined up. The noses appeared and again there was a match even with the disparity. I let out a scream. Gerard said, "oh no, something's wrong with my program." <laughs> "no, no, no! Look at this!" more of the combined images were appearing on the screen. Even with Leonardo's beard there was a strong semblance where the lips matched. Gerard was unaware of the controversy over the identity of the model for the "Mona Lisa". I was shouting, "look, look Gerard, there's a match." Gerard was more interested in whether his program worked or not. I asked him to print out the image or save it to tape and ran off to start the historical research.

The late art historian Eugenio Battisti was in Philadelphia at the time. He later told me the best art history book collection was at the Philadelphia library.

Following my analysis, and publication of my findings about discovering the model for the "Mona Lisa", Eugenio contacted me. He said he wasn't sure he agreed with my findings but invited me to San Sepolcro, Italy to hopefully solve a problem with one of Piero's frescoes. The "Mona Lisa" discovery also alerted Ian Ross to have his secretary call me into his office. The "Mona Lisa" is such an icon that even my granddaughter heard about the discovery in school.

While doing the historical research for Mona I read about Leonardo's "last supper," and the controversy over the perspective construction he used. There were a number of theories surrounding Leonardo's construction of his fresco, the "last supper". Many questions surrounded the fresco concerning where the spectator should stand in the refectory in order to see the painted fresco as an extension of the real room. The monks sat along the side walls to eat their dinner. Other priests and monks sat way in the back and yet there were comments that they felt as if they were eating in the room with Christ. Like all visitors, I went into the refectory through a door in the rear on the left wall. Everyone would walk into the room and stand in the middle and wonder what all the fuss was about.

when I returned to my reading I came across a quote that stated that when King Francis the first walked into the refectory through a small door that was positioned to the front and right of the fresco, (no longer in that position) that when one looked up to view the "last supper". "It was as if the hand of Christ was reaching out towards him in a gesture of welcome". I knew I needed to build a computer model of the refectory as it was originally constructed. Eugenio obtained a copy of the original drawings for me to take back to Bell Labs.

And so that led me to rebuild the refectory in the computer based on copies of the original drawings of the refectory and the position of the fresco. At that time there were two young people, Don and Donna Mitchell who worked at Bell Labs. They built a wonderful machine called the Pixel Machine. One could make three dimensional models in a very short time. It took a week to build the model of the refectory, make the windows and position them as in the architect's drawings and texture map the "last supper" on the front wall. Donna helped me a great deal. The results of my analysis were published.

The spectator needs to stand on either side of the refectory to view the fresco as an extension of the real room. Leonardo was very clever in painting orthogonal lines in the ceiling to direct the viewer to Christ's head. He used the tricks of the theatre to pull the monks into the space that Christ occupied. The small door that King Francis entered was on the original drawings. The door at the rear of the refectory is not in the current structure.

Following the analyses of the identity of the "Mona Lisa" and solving the perspective construction of the "last supper" opened up many doors and requests from art historians surrounding other mysteries.

The art historian, Patricia Trutty Coohill, contacted me about Leonardo's Grotesques. She wrote to me about the unsolved question concerning Leonardo's grotesques and whether they were drawn from life or did he construct them? My research demonstrated that he did use his own canon of proportions to build these faces. Consequently I found that I could replace features from one of his grotesques with features from other da Vinci grotesques. It was thrilling to see that by using his canon of proportions that features from one face would fit perfectly on another face. My love for Leonardo started before this work and continues strong as ever

Garcia: Excellent, great. Now Mask of Shakespeare is another one that is well-known around the universe.

Schwartz: "The Computer Artist's Handbook" was published in 1992 by W.W. Norton, Inc. since I had problems transitioning between my personal and artistic experiences; I sought the help of my son Laurens, who is a great writer. Laurens first tried writing changes in the margins of the text but eventually took over writing the entire book and positioning the illustrations such that one could view the image that was being written about.

While working at Norton, I saw a copy of Shakespeare's Folio 1 of on my editor's desk. I believe Norton was publishing a new edition. The editor noticed my interest in the book and asked if I would like a copy. I was thrilled. I had taken a course on Shakespeare in junior high school and my husband studied Shakespeare at Cornell. We attended many of the Broadway productions. I was intrigued with the face on the cover.

The face on the Folio 1 is a strange head with a round bulbous forehead. It is well known about the on-going controversy over who wrote Shakespeare. I decided to do an analysis of the face on the folio. Again, I turned to Leonardo and his canon of proportions. There were some peculiar measurements on the face on the folio.

My research began by collecting photos of all the candidates listed as a candidate for the author of Shakespeare. My search included all the art shops, book shops including all venues for photos and names associated with Shakespeare throughout his life. All the shops, printing houses and publishers of Shakespeare had Queen Elizabeth's portrait. When I exhausted all the possibilities for a candidate for

author of Shakespeare I decided to try Queen Elizabeth. What a wonderful surprise. I found that the features on the folio1 and Elizabeth were a perfect match. The forehead was exaggerated and became more bulbous. My work was published in a journal called "pixel".

Garcia: Now one that I just recently saw that I wanted to sort of get about, which is pretty recent, is "Before Before".

Schwartz: I have to create. I need to be either thinking of a work or into a work. This constant activity, either in my brain or being executed helps me deal with the daily vicissitudes of life.

The Symbolics machine provided a rich environment for my art. I created hundreds of images. Many of these images now serve as the impetus to work in digital animation. I missed making animated films.

Shortly after moving to NYC in 2008 I contacted Bruce Wands at the school of visual arts. I taught at the school for a short period when I was still at the labs. At that time Tim Binkley, who wrote one of the forewords for "The Computer Artist's Handbook", was my contact at the school. Shortly after meeting Bruce he graciously gave me the title of visiting scholar. Charley, who works for Bruce, gave me a tour.

Many of the students were working with 3d digital animation. Maya along with other 3d software were the preferred tools. I decided to try to learn Maya and downloaded a version to test out. Unlike the Mitchell's pixel machine, Maya proved to be very cumbersome and time consuming. After constructing a lamp and a table and not getting the lamp on the table, I decided I needed help. I posted notices at SVA for students who knew Maya or other 3d programs. I was fortunate to get a number of very talented young people to work with me.

"Before Before" was the first digital animation I produced. To create this animation I found it best to have a number of students work on one project.

The procedure I followed was to have the student meet in my small studio, actually living room with three computers and a couch. I showed them the 2d images and had them select those that appealed to them. Even though I was working with palettes to help with depth perception I wanted more. I gave the students freedom to recolor my drawings where necessary to work with a limited palette of red, green, blue, cyan, magenta and yellow. Thin black lines were sometimes used to outline shapes to enhance the 3d appearance. I spent a good deal of time discussing with each student what my goal was for the final digital animations.

We set up drop boxes on my machines and their machines. I instructed them to make wire frame models of odd shapes to texture map my re-colored images on. We discussed the choreography of the models. After the student created a segment it would be put into the drop box where I could access it to view and critique. When we had 3 or 4 segments I had the student meet with me to select a sound track I thought might work. After a number of acceptable segments were created we met again to edit the images and sound and create titles and credits.

"Before Before" has quite a list of animators. Some more recent works may have just one or two workers. I do encourage the students to input their ideas. Up until yesterday I did not provide a story board. I wanted to work in the abstract. However, I find the new breed of students are interested in character animation. Since I have to work, I found a way to try to incorporate a method for the student to have more boundaries but still keep the non-storyboard way of working. If this next work is up to my standards it will be based on building three dimensional shapes from images in the video I created "Beyond Picasso". I gave each student a pair of chroma depth glasses to wear while working in order to assure the best color selection for the most 3d.

Garcia: Alright, so that's the big portion. And now we're on the general computer graphics question that we're using for the graphics movie, right?

Jon Plutte: Actually I only have one question.

Garcia: Okay.

Plutte: It almost seems to kind of [INAUDIBLE] but do you feel that... There's three parts to the question: If being a woman was impediment to your career...

Plutte: ...impediment to your career at all? Or did you run into obstacles because of that? Did being an artist create skepticism among engineers? And did you working with engineers create skepticism of your work. I know you kind of touched on that, but if you could directly address those three, I'd just love to hear what your thoughts are.

Schwartz: During my 33 years at Bell Labs, I cannot remember any incident where people were rude, or put obstacles in my way. I remember only positive feelings and reactions from the scientists and other personnel. However, for the past number of years I have had a horrific time with two scientists from Bell Labs who have been writing negative articles about me. The content is one of trying to take over the work that I did in creating works of art and claims that I stole work. I will not go into this further since it is so painful. The outside world was also accepting my work. In the mid 70s I had a film retrospective at the Whitney Museum. And then there was the commission from MOMA to create a poster and a PSA for their newly renovated museum.

When I eventually received a resident visitor badge which allowed me access to all the facilities at BL, I came in contact with non-scientists who handled the keypunch cards, ran the Stromberg Carlson to produce the mag tapes and secretaries. I also found only positive reactions. Some of the women in these areas were surprised I was doing the work I was doing and often went out of their way to help me. Some of these women thought I was working for a male scientist. There were very few women scientists. I did overhear some of their conversations concerning their salaries. It was well known that the women scientists were paid lower than their male counterparts.

A humorous event was my being questioned by some of the secretaries about my wearing slacks to work. Since I worked with paint and sculpting materials I always wore slacks. I continued dressing the way I always dressed when I went to the labs. One day, one of the secretaries came out of her office and asked me, "Who gave you permission to wear slacks?" I was surprised by the question. "Nobody gave me permission," I replied. Shortly after that many women came to work in slacks. Some wore fancy slack suits.

I had no problems at all. And, I had no problems being an artist. If anything, some of the scientists began calling themselves artists when I would have loved to have been a scientist <laughs>. But it was interesting to me that the respect at the labs was incredible, it was not even thought of, it was not even discussed; I never felt any discrimination at all.

The only discrimination was the bathroom. While there were men's rooms on each floor, the lady's rooms were on every other floor. After a number of months of climbing stairs, there were elevators but at the end of each long hallway, I drew up a petition for a ladies room to be built on each floor. I had no problems getting signatures from secretaries and other females who worked at Bell Labs. Eventually a bathroom and a lounge <laughs> was installed on each floor. So I was pleased about instigating that.

The only discrimination occurred outside the labs. I was invited to New York, I've forgotten where, to screen my films. When I arrived the audience was filled but the projectionist was not there. I said, "That's no problem, I'll project them." As soon as I entered the projectionist booth a young man followed me in and asked if I was a member of the NY Projectionist's Union. I was told at some point that women were not permitted to join this union. I haven't checked but I would imagine females are permitted to join the union today. It was following this incident that I became active in the feminist movement with Betty Friedan and other activists. I can't remember if the films were finally shown that evening or not.

Again, I never experienced any problems at all with the scientists that I met at the Labs, or with their not wanting to work with me. If anything, scientists sought me out because of discussions and ideas I would think of.

As far as my art was concerned, what was interesting to me was that the large test patterns for the chips that were made were beautiful. The ones that had defects were tossed in the trash. Again, I was a garbage collector. They all were beautiful graphics. Some of the scientists would print on the chip test in tiny script "to mom", or some other wording that had nothing to do with the chip. After I started collecting the chip images and hanging them on my walls I found the scientists started doing the same with the unusable printouts. .

Garcia: Excellent. Wow, good stuff. Alright, so let's start with the most basic question probably; how has the computer changed you as an artist?

Schwartz: In my early years of working with different media, it was almost like a seven year itch. Once I pushed a medium to its limits I needed to switch or add that medium to my vocabulary. Sometimes I incorporated the last medium I worked with into other media. This method of working would continue to provide me with richer tools to work with.

When I began to use a computer changes were slow. As more and more people began to use computers, companies competing with each other, the technology grew more rapidly. I pushed the hardware, software to the limits. In the very beginning I was using zeros and ones and very simple coding. I learned to work in machine language, which I found very easy. Then FORTRAN came along. I really hated it. It was not simple at that time. I liked to be challenged, to create images that had never been seen before. I know I am technology driven. I went from traditional media to plastics to constructing kinetic sculpture, found objects to incorporate into new work, everything and anything that I could manipulate and change into a different appearance.

Since computers continue to change, I continue to use them as my main medium. In fact, my cell phone is too complicated right now. I don't need or use many of the apps that come with it.

Since my eyes have worsened, I have had to rely on the assistance of students or graduates who work in 3d. One major problem is that most cg people need storyboards. Since I have so few who understand the abstract world, I have just turned to the use of a modified storyboard with one my new students. What's being taught in the computer graphics classes is directed for use in the advertising, commercial world. I tried learning some of the software but this takes away from my creative time. As I said, the Symbolics machine, that I used in the Eighties, was still the most intuitive software/hardware that I've ever worked with.

Garcia: Okay, and next. So talk about yourself as a technologist versus yourself as an artist. How do they contradict one another and how do they multiply one another?

Schwartz: I never thought of myself as being a technologist concerning my art work. I supposed when one uses the computer as a medium, artist/technologist are combined. For a while I used to say my medium was technological pointillism. This phrase still describes my medium.

If something went wrong, invariably I could fix it. When my kinetic sculptures became more complicated I would call upon people who could build computers to run the work or who had licenses to do wiring for sculptures that were exhibited in museums. This was a museum requirement. When I worked at the Labs there was a help line if the computer needed repair. Now that technology has become more complicated, I feel that I'm strictly an artist using it as a medium. The fact that computers are based on technology doesn't help me when there are major problems. I do not have the tools or knowledge to fix many problems. And that's very frustrating, even though companies supply help lines. Still, there isn't another medium that I would want to use at this time.

Garcia: Awesome. Let's see... Okay, so do you see any influence of computer arts on the mainstream of technology today?

Schwartz: Oh YES. MANY AREAS OF ENTERTAINMENT ARE AFFECTED BY TECHNOLOGY SUCH AS special effects In movies, advertising, sound, GAMES INCLUDING CHESS PLAYED BY COMPUTER, TELEVISION, ANIMATION AND VIDEO. I REMEMBER WHEN MANY OF THESE EFFECTS BEGAN AS RESEARCH IN SOUND AND IMAGES at Bell LABS. NO ONE KNEW WHAT THE IMPACT OF ALL THIS TECHNOLOGY WOULD BE. A LARGE number of the films ARE financed and PRODUCED because of the technology.

Garcia: Excellent. Now do you think— now this is my favorite question to ask of a lot of different types of people. Do you think there is any type of art today that is not possible with the use of computers?

Schwartz: THERE ARE MANY ARTISTS WHO USE TRADITIONAL MEDIA. FOR ME, HOWEVER, I WOULD HATE to think of what art there could be without computers. I'm not sure that computers make all art possible. I think computers can add to increasing and extending new visions. And I know that it adds to ENHANCING installations, which have become very popular. COMPUTERS CONTROL much of the technology, THAT ARTISTS USE IN CONSTRUCTING INSTALLATIONS AND COMBINING VIDEO WITH OTHER DEVICES TO PROVIDE NEW INTERACTIVE EXPERIENCES. SUCH INSTALLATIONS WOULD NOT HAVE BEEN POSSIBLE BEFORE COMPUTERS AND OTHER NEW TECHNOLOGIES. THE computer is not a hundred percent the backbone or the main medium anymore, WE HAVE MANY media and NEW technologies COMBINED WITH sound TO OFFER NEW EXPERIENCES IN VISION AND AUDIO. ART IS BECOMING MORE INTERACTIVE TODAY.

Garcia: Awesome, so what do you see as the next step for computer art?

Schwartz: It's very hard to prognosticate what that next step for computer art will be. It depends on what is being accomplished in the world of technology. and since it's becoming such a social medium, it's actually enriched the role of technology. We now have a more personal art that anyone can use. In some way we are closer to one another since we can contact each other so easily but the technology is also erasing much of the day-to-day interaction we used to experience. My husband and I visited NYC to take advantage of the cultural events such as the magnificent museums, opera, music and dance. We often talked to people during intermission. But now I find an entirely different environment. When I step into an elevator in my building, no one is speaking to anyone. Almost every adult or child has a cell phone, iPad or some gadget. For art to really flourish, the kind of creative art that I've been working with, one needs tools that will grow along with it. Today's tools are mainly geared towards an easier way to socialize but in a technological way, not in the humanistic manner that I grew up in. I parallel these changes with the fears of people having guns or other weapons. An unseen sign is everywhere. Do not talk to anyone, even the people I see every day or who are my neighbors.

Garcia: Now where do you see your influence being most felt today?

Schwartz: I feel very fortunate that I receive many letters from young people who tell me I have influenced them. They will send me their work. Sometimes I see in their work the influence of my work. That is very gratifying. But mostly I have had a tremendous number of young people who are coming here to interview me for their PhD theses, and wanting to know where I started, how it started and what might be happening in the future. And I think for all of art, for artists... and today march, 2014, the current digital technology is driving me. I'm now creating mainly 3d digital animation, with students who know the current 3d animation software but I'm using tools that exist and have existed. I continue to use the palette I devised for 3d viewing and even recolor some images that I created in the 80s to texture map over three dimensional models. I still use Photoshop to enhance or change colors and updated editing software to combine sound and image. I am using these tools, some new and some old to create new imagery.

Garcia: Do you have anything else you want to add? Jon does. He always does.

Plutte: Alvy Ray Smith and the New York Institute of Technology and the... Tubby the Tuba and that whole...

Schwartz: I was drinking WATER so I couldn't hear.

Garcia: Alvy Ray Smith and the New York Institute of Technology and Tubby the Tuba. <laughs>

Schwartz: The New York Institute of Technology, an amazing place on Long Island, (I believe it is in Manhattan now) where I met Alvy Ray Smith, Ed Catmull, Lance Williams, Jim Blin, Tom Duff, Pat Hanrahan, and Mike Kowalski. I believe I also met Frank Crow on one of the visits. I was asked by Tom Duff to visit NYIT. Tom was working at Bell Labs at that time. I believe it was started by Louis Schure. I never created anything there but it was wonderful to listen to the interaction and see some of the work. The lamp stands out. An animation of mother and child lamps interacting, all created by computer. Many of these young people are now running or working at well-known companies. I believe Tom is at Pixar. Pat Hanrahan would visit the labs occasionally. I think he was at Princeton at that time. It was an incredible experience. While I never worked at NYIT, I was provoked to create new imagery when I returned to Bell Labs. It was just a wonderful world. But that was what Bell Labs was for me too.

Garcia: And when did you first encounter NYIT?

Schwartz: I was at Bell Labs and one of the scientists there had heard about NYIT and was going to go just for the heck of it. I think this was in the 70s.

Plutte: Sorry, I'm just going to stop you then and just say...

Schwartz: Oh.

Plutte: ...you know, I heard about NYIT, and you know, use the names and then the... If you can remember specific names and people you met there that would be really great. Just to help us tie up the graphics with [INAUDIBLE] later. Maybe you could think about, was there a relationship between the work you were doing that had— and Bell Labs certainly, and New York Institute of Technology and were you sort of pushing each other a little bit? Or just aware of each other?

Schwartz: There was one of the scientists at Bell Labs who told me he was going to go to a meeting on Long Island held at the New York Institute of Technology. I had not heard of it. But I said, "Well, are there going to be artists there too?" And he said, "No, they're all technologists." But I was used to that because there weren't artists at Bell Labs like me either. And he said he thought I might enjoy it and would I like to go along, and I said, "Sure," and that's where I met Alvy Ray Smith and I met a lot of the young people who began so many of the companies that exist today, who were working at NYIT. We sat around and chatted over lunch the first time. Other times we went out to lunch. Eventually we met at a restaurant instead of the institute, because nothing was to be gained by sitting at the institute. But what was gained was the conversations, the excitement and listening to one idea after another. We would provoke each other. "Well, you can do that then I can do this." And then before long you had two or three people go off in a corner to come up with some amazing whatever. It was so incredible.

Garcia: That's great.

END OF INTERVIEW