Laurie Spiegel interview   **September 28, 2006**

Alright—what can I tell you that you don't already know?

Well, it's interesting—in going back and listening to more of your music and reading a lot of stuff online, it actually opens a lot of doors for me that if we can expand this into something for the site I told you about, Perfect Sound Forever, that would be great.

If only it weren't such imperfect sound—but forever is a nice idea. I'll go for forever. In this day and age, nothing is forever.

True. But for my purposes now, for *Remix*—

Yeah, which is a short thing. You're already overloaded with things, which wasn't what you were planning to do. I hijacked your agenda.

That's okay though, because if this gets into a long form that I can present, [then] everything you've given me will be useful for that. But for now, there are basically just two really broad, simple and general questions that I wanted to ask you. The first one would be your assessment of how the degree of interactivity between people—composers—and computers has changed since you first started working with computers.

Interesting question. I would say that it's not just a question of degree, but the *types* of interactivity have changed. The level of control that you had over the computer by interacting with it at its more fundamental levels by programming—and the fact that it was just the standard practice that everybody who was using a computer for music during that era was either programming it themselves, like most of us, or working closely with a programmer (for those few who weren't programming themselves)—gave you a level of ability to interact with the machine which was far more profound. It [gave you] a much greater sense of freedom and *understanding* as to what the computer could do, as opposed to interacting with some arbitrary, human-designed interface that had been approved by a marketing department.

Like we have today.

Exactly—exactly. Other than that, the level of interactivity—of course, you have much more flexibility now because you can attach any number and kind of input devices. We had bottlenecks galore in those days because you had to actually rig up a digital-to-analog converter or analog-to-digital converter and do all kinds of calibration just to get a knob connected to a machine that you could turn in real time. And then you had a sampling rate—I think we were using typically 100 samples per second—to sample turning a knob. I used 60 typically, because I wanted to be able to sync up with video, and I wanted to use a multiple of the video frame rate.

But in terms of human interface, and how I interacted—this is something I wanted to say, which you didn't ask, and we'll get to your second question—but when you say *The*

Expanding Universe, there's the piece of that title and then there's the album of that title, which are not the same because on the album, there were two different programs that I wrote that I used. One of them—the one that was used on the "The Expanding Universe," and I think I used it on "Old Wave" and—what was the remaining piece on that album?

Do you mean "Pentachrome"?

"Pentachrome," yeah. Those three pieces all used the same software with different variables and different—basically they were different improvs using the same human interface. "Patchwork" is a completely different program that I wrote that was structured quite differently. And maybe the differences [between the two programs] might give an example of how different the human interfaces could be.

I had a normal—well, it was Bell Labs…always the fun company—touch-tone telephone pad. Basically it was a four-by-four pad in "Patchwork," and I programmed each button to give me a different ability to vary a pattern that was playing back in real time. So I had all the standard contrapuntal options—retrograde, invert, augment and diminish—I can't remember exactly what they all were. But I had that little button pad—and I should have researched this and gone back and looked at it—but while patterns that I had stored in arrays in the computer were playing back, I could do these manipulations just by hitting a button, and it would flip to invert or this or that.

And it would happen in real time.

Yeah, and the reason of course for that is because it was computer-controlled analog. It was not possible to do any of this kind of stuff with real time digital yet. Digital was not "real time" enough to interact with—I mean, digital synthesis was something where you put in all the parameters and you let the computer churn away over the weekend, and you came back and found your 30 seconds of audio having been computed in the output buffer.

Much different now.

Oh yeah. Very different. But using the computer just to output the control data for analog oscillators and analog filters and stuff, it was possible to interact in real time. But there was this bottleneck of there only being 14 output channels, and if you used five of them for controlling pitches and five of them for controlling audio, and you had to write your own envelope generators and stuff like that, so that you really—it wasn't like you triggered a note. You had an oscillator that was just constantly on, and on that pattern, you synchronized when you changed the pitch with when you started to compute an amplitude curve for the envelope of the sound.

Every note was made from a single tone?

Yeah, but by being enveloped and having pitch determined, you basically had oscillators that were just on all the time, and you sent control data at 100 times a second—or in my case, 60 times a second—so you sent a new amplitude that comprised part of the

envelope curve added to the mix curve. And then those were the five channels of audio—I mean, the ten out of 14. On top of that I reserved one D/A converter for computer-controlled reverb, and what that was, it just did a mix between the straight signal and the reverbed signal that is cross-fading back and forth between two pre-patched signal routings—one that had reverb and one that didn't.

Was that a stereo cross-fade? Sometimes I can hear that when I'm listening on headphones to your mid-'70s material.

I had actually written an algorithm for stereo placement so that the next note would come in on the channel that had the fewest sounds on it at the moment, in order to try and maintain a fairly even stereo balance. But then one of them [the 14 channels] was for filter cutoff, and one of them was for filter cue. So those were 13 of the 14 available lines.

And then the last one—did I do this in "Pentachrome"? There was a sort of percussive element on that one—yeah. That one was using an actual analog voltage pulse that triggered a very hi-cue analog filter to resonate, which gives it that little percussive tone. So that was how I used my 14 A/Ds.

Okay. And then from there you went to a two-channel reel-to-reel tape deck to record everything?

Exactly. We had Sculleys. And I'm trying to think—it was complicated, because the tape decks and all the audio equipment were at the other end of the hall, and we had to set it up so that you could trigger the playback starting in one lab, and then be there to hit "go" on the record deck. So you had to have a way of basically starting the playback of the computer—it was just complicated. It was like, disconnecting the oscillator that allowed the computer to do things over time, and reconnecting it and that kind of stuff [*laughs*], so that you could set the thing up and start it running, and then dash down to the other end of the hall and hit "record" in time.

It was—I would say barbaric by modern standards, but it had a level of excitement, which is probably rare by modern standards, at least that I don't find with all these so-called products. I hate to say that because I know that in every company that does music software, there are people who truly love the medium, but it's just not like—you know, against the advice of everyone you know, going in and just doing all-nighter after all-nighter, working through the examples in the FORTRAN IV college textbook that you bought used, and trying to figure out how to program a computer, in order to get to try something you want to do musically that everybody thinks you're nuts for wanting to try doing. It's so different. But in any case—your next question?

Well, it's funny again because everything that you just said leads me to *another* question—and I'll try to keep my time with you as brief as possible.

That's okay. This is probably gonna be, like, the high point of my day. [*laughs*]

[*laughs*] Should I be sorry to hear that?

Well, after this I have to go on hold with the phone company about arranging some telephone lines in Chicago to be switched around, and then I have to deal with a complicated legal situation for my sister in Chicago, and it's just like—this is the fun part.

Okay. Well, what you just brought up leads me to imagine that it was rare and unique at that time for Bell Labs to be involved in giving composers like you such creative freedom. Is that accurate?

That is a really important and interesting topic. Obviously it was one of the major audio and acoustic research labs in the world—pure research—but it was a regulated monopoly that was only allowed to do work which was in the interest of public communications. That is, it had this regulated monopoly status before the divestiture which was halfway between being a non-profit or government entity devoted to the public benefit, and being a profit-making corporation trying to do state-of-the-art research to put out nifty new things. But it was *pure* research—it didn't have to be product-oriented.

However, the arts were not exactly within the province of improved telephone service for everybody, or so many people thought. So the way it was worked out was that Max Matthews, who was a major director of research there—he had droves of departments under him. He was actually a hell of an executive despite the fact that he wore hiking boots and rode a bicycle to work and had string quartets scheduled to play in the conference room every Wednesday. But basically we who had what was called "resident visitor status," working in the arts—and I can't remember how many years I had been doing this music and image work there—but at one point, Max's secretary said to me, "You know, all I've been able to find out about the work you're doing for the lab so far is that it's so secret, it can only be done in the middle of the night."

That's hilarious. It was probably convenient for you to let people believe that, right?

We had to really—you know, we didn't talk about it. *I* certainly wasn't going to say anything that Max didn't say. But the thing is, I was actually doing music and going out and putting it in concerts and stuff like that, but the idea that anyone might profit at creating our own intellectual property that had nothing to do with the lab and putting it out in the world independently—not that I made any *profit* on it—but it was not stuff for the benefit of your average telephone customer.

Even though—during one period that was recognized, [which was] during the period when I worked on the Hal Alles synthesizer project in 1977, *that* was an official—

I have video of that, on the *OHM* DVD.

[Well...] I signed a license with 1750 Arch Records in 1977 for them to put that "Appalachian Grove" piece out on an LP, and since that time, it's been assigned from one record company to another, and even though I had a provision in my contract with Tom Buckner at 1750 Arch that the rights were all mine and this was just for that one use on

that one LP only, everyone else has assumed that they had full license to use it however they wanted without my having any rights to the piece ever since. And it does irk me a little bit because I really just do not make *any* money from my work, and all these other guys with steady jobs where they get a paycheck for working for the record company are supporting their families through the work of people like me. At the very least, you would expect that they would at least send you a free copy of something so you don't have to go out and pay for a copy. It's an insult otherwise…

In any case, that was a total digression. But it was kept secret that we were doing artistic projects at that time at the lab, although it was widely known amongst people working in the arts and technology that this was happening. After the divestiture, when they broke up AT&T, things did change. I went back there briefly in '84 working on a project for John Pearce having to do with overtones—with figuring out a system of harmony for a different frequency…well, never mind.

No, it's okay.

Well, in any case—yeah. In 1977, when I was working with the Hal Alles machine, that was a project at which it was officially recognized that the arts were *okay*, and it was done above-board at Bell Labs because it was sponsored not as research but as a project of the PR department for the lab. We were invited to do something [*a fire engine passes*]—oh, listen to those sounds in the background!—but it was the 50th anniversary of talking pictures, which had been a Western Electric, later to become part of Bell Labs, project. So fifty years from Al Jolson and *The Jazz Singer* coming out, Bell Labs was invited to put some state-of-the-art, music-related audio stuff into this big bash at the Palladium in Hollywood, run by Jack Valenti and the whole Motion Picture Association.

And so the Bell Labs publicity department actually hired me, and put me visibly and publicly on salary to be doing software and composing a piece to be in that festival. And there they were out in the audience—Robert Wagner, Olivia de Havilland, you know, *all* these people—kind of looking puzzled and saying to each other after, as I was told, "Well, it just sounds like a big old organ." But that was the piece that I'm playing on that DVD.

And they stupidly put it on a big revolving platform at the Palladium, full of flashing lights and mirrors, and as the thing slowly revolved, the cables slowly entwined around the base of the platform, and they stopped it in the nick of time before it either would have pulled out all the wires or pulled the unit off the table—whichever gave way first. It was a wonderful fiasco, the whole thing. We were backstage before the thing started up, drying the condensation from being very cold in the airplane hold off of the circuit boards with hair dryers, saying, "I hope this thing comes up in time," in putting the thing back together.

Wow [*laughs*].

But that was the only project I was involved in where it was above-board, and that was not considered research—it was PR. However, people in that department, which was not Max's research lab group but the switching-circuits department—some of them got very

turned on by the idea that artists, musicians in fact, are the ultimate test. Nobody is gonna generate as much information—time-critical information—in as many different kinds of temporal curves and media and stuff as a musician playing in real time. And they realized that musicians are great for testing technology, and that artists will present challenges to a model that they've developed which reveal limitations in their own thinking, because we're dealing with such multi-dimensional material and so many timescales at once, and so many channels and so many shapes of information. And there were people there who really got that—however I don't know if much came of it after that.

But Bell Labs was a great place and an incredible learning experience, and I was extremely lucky to be there—not just because there were very few of us composers there, but because Max Matthews had certainly one of the least sexist departments in the entire lab, and I really doubt that in any of the university computer music studios of that era, I would have gotten the level of acceptance that Max and his staff gave me. Just because I was—you know, I was a young girl with just about no programming experience. I didn't have a computer science background or anything, and he trusted me to work through all the examples in the FORTRAN book and learn how to program that thing, and go with it and do something meaningful. He trusted me to do that. Of course, he gave me a three-month trial period first to see how it worked *out*—

Right!

But basically I think that it was—at that point, I was not the only woman who was doing music with computers during that era, but we were few, and it was the intersection between a technological field that was very male-dominated, and composing, which was also at that time still very male-dominated. I took some flak for that when I was studying also. I had teachers tell me it was amazing that I wrote an entire piece of music, because people of my gender didn't seem to be able to *do* that. And you know, this was pre-feminist—we're talking '60s and early '70s. Today's young folk probably really do not have a clue how much things have changed culturally. Not that things are perfect, but it's a far cry from when I took vocational aptitude tests in high school, and they had a completely different form for writing the girls and the boys in—they had "lawyer" for the boys and "legal secretary" for the girls, and "doctor" on one and "nurse" on the other, and it just went like that, and you just could not—like "scientist" and "lab assistant". It was like that just all the way down, and that was considered as it *should be*.

So I mean, I'm not a raving lunatic, but I feel that I was extremely fortunate in Max having supported my work by giving me access to those labs. And I'm eternally grateful to him not just for that, but also for the education I got learning from him and the other people that worked at the lab, who were quite a large number of really brilliant people doing truly interesting things.

Were you in touch with some of the other women at the time who were doing composing in the same type of field that you were? I'm thinking maybe Pauline Oliveros—

I didn't meet Pauline until later, although we became friends and I think we both think very highly of each other and like each other a lot. [But] at that point, I was more active in the downtown new music scene in New York. I was friends with—oh God, there were women doing electronic music. Suzanne Ciani was still in the avant garde at that point. It hadn't occurred to her that she could be commercially successful yet, I don't think, so she was still playing loft concerts, and there was Liz Phillips, who was doing audio installations, and a bunch of other—well, Annea Lockwood and Ruth Anderson. There were other women around.

In electronic music, in part I think it was a great equalizer, because while you couldn't get your hands on an orchestra if you were a composer, and you probably couldn't get sponsored to have studio time, if you had access to a machine, the machine was totally non-sexist. So a lot of women were able to get their music heard by the public because a machine would realize it for them, whereas if they had gone to an orchestra, they would not have had their score even *looked* at. So technology—you could go directly to the audience. The analogy that I used when I first started working with electronics was instead of writing notes on paper—it was really like instead of writing instructions on how to paint a painting, you just painted the painting and people could look at it.

And of course you have to remember this before the era of even cassette recorders, so the idea of people being able to just record something they were improvising onto tape at home, and put it out on a recording that they self-produced—very few people did that. It was expensive, it was difficult, you couldn't get access to facilities, they didn't want to deal with individuals—you just couldn't get access to professional-quality recorders easily. The whole technology was so very expensive and a highly business-monopolized medium. Even something like the now-nearly-obsolete cassette recorder that came in during the '70s, but before that, just the idea of being able to improvise something that you could make copies of and give out—to copy a tape was a major project. You had to have not only access to one good quality machine—you had to have access to *more* than one. So the technology was just way more scarce and hard to get access to, unless you were of course in a university setting, which a lot of us downtown independents weren't.

That's a whole other thread that I could explore with you at length, and it's something that I'm really interested in too.

Well, let's see—over the years maybe we can work up a history of electronic music that's more sociological. I don't know—it's interesting looking back. I just keep feeling that the degree to which everything has changed is so great that I feel very frustrated in how so many people today who aren't even that young really take for granted and don't understand the amount of change that has gone down.

I mean, people tell me that the liner notes for *The Expanding Universe* seem just idiotic because everything that I said was so totally obvious, but at the time, these were new ideas. People thought of computers as hostile, alien things that belonged either to the government or to large corporations. The idea of a computer being something that an individual had and was using for their individual personal purposes didn't start happening until the so-called PC revolution [*tape ends*].

[*begin side B*] But those were extremely few people, and everybody they knew thought they were some kind of totally off-the-wall nerd—except other totally off-the-wall nerds. And the idea of doing music with computers was just horrifying to many people who loved music, because they viewed computers as the antithesis of everything that was human and emotional and personal. It was really an image of this post-Vietnam and pre-Watergate government tool. You got the feeling that the banks had them, the government had them—these are not anything we want to have making *music*. And then couple that with the idea of algorithmic composition, which means the computer is actually picking the notes and making decisions about the content of the piece, and you have what most people took as the epitome of what we do not want to have happen to this art. They saw it as something that threatened absolutely everything that music was about.

But it was a human who wrote the algorithm—

Yes, and a human interacting with it, and a human who created the machine. So it was extremely controversial. That's something that I wish more people understood. If people went back and rented *The Forbin Project* and some of the other movies about computers at the time, where the computer's about to take over the world—even 2001: A Space Odyssey, which was post-McCarthy period—I just wish people understood how much resistance we had to deal with. None of this was met with, "Oooh, what a neat idea," it was met with, "We have to stop you from doing that to music." It took people like Steve Wozniak, and a whole lot of others who really believed that the computer would be great tool for music, to popularize it and to get that idea out into the mainstream culture through the counter-culture. It wasn't happening from the university studios, which were very elitist in other ways—and I'm saying that as someone who has sometimes taught at universities and sometimes studied at them. The academy is not necessarily know for being truly with it in terms of understanding the grass roots of our popular culture.

My second broad and general question: I wanted to know a little bit about your relationship with synthesizers over the years. With what I've been able to gather, you started out with the Buchla, at Mort Subotnick's studio, right?

Yeah, that was the Buchla. Synthesizers changed my life—the Buchla synthesizer, and the Buchla person to some degree because we had a period when we were fairly close friends. I had messed around with audio—we had one of the early tape recorders that were commercially available to ordinary humans back around 1950. Before that, I think my parents had a wire recorder. I still actually have two wire recorders, one of which works. It's actually a spool of wire that runs very fast, with actually a decent frequency response, amazingly. But I messed around with it [the tape recorder] and I remember discovering at some point when I was a little kid that if I cut the tape with scissors while my parents were out, I could go to the medicine chest in the bathroom and get a piece of adhesive tape, and I could tape the pieces back together in different orders.

So I independently discovered you could splice, just on my own. We didn't have, of course, sound-on-sound or anything like that. We had I-Core [?], which was from before

Webster and I-Core merged into Webcore, so that dates that tape recorder. And I always was kind of into recording, but didn't have the ability to do a lot of it. Also I've never been good about doing it. I improvise a lot, and I'm very bad about either writing down music or punching in a recording. I'm always, "Well, this isn't really good enough to bother with." Some of the things like the *Unseen Worlds* CD wouldn't exist if I hadn't had a friend over at the time that was like, "You should be recording this—I'm gonna just turn on this deck," and captured some of those things. I've never been very product-oriented, as it were. God, I'm digressing again.

But synthesizers I really didn't know about and hadn't worked with really until the very end of the '60s. I had this one teacher [at Juilliard], Mike Czaikowski, and I kept showing him pieces I was writing, and he said, "You know, there's something I think you might really find interesting. I'm gonna have to show you this." And he took me down to Mort Subotnick's studio over the Bleecker Street cinema, and it was like the world went from black-and-white to color. I was blown away. I fell madly in love with the synthesizer. It totally transformed the way I thought about music, and the way I heard street sounds—everything. It was just an awesome thing, with the freedom that it gave, and instead of writing down all these little pencil scratches on paper, I could make things out of real sounds and I could take them over to places like The Kitchen, which at that point was just starting out—incomparable downtown venues that were still pretty informal at that point—and just play them for people.

Rhys Chatham was one of the other people that worked in that studio. He and I and Eliane Radigue, all three of us learned how to use that Buchla system together—the three of us puzzling it out together. And then Rhys had this idea that The Kitchen, where Woody and Steina Vasulka had been having video screenings, why don't we just add some things where composers can go over and play their pieces for each other, so we all can hear what each other is working on—you know, now that we have a medium here where you can actually record something on tape and play it for other people instead of having these stupid little notes. And also Rhys was way ahead of me in terms of avant garde stuff. I mean, he'd been playing with LaMonte Young, and he clued me in to what was happening in new music downtown. I learned about aesthetic variety I hadn't been familiar with before—not just through him, of course, but through being downtown instead of just around Juilliard and Lincoln Center and the places where I was officially studying, or in midtown where I was working in film studios and trying to learn how to place music behind dialogue and those kinds of things.

So I had a lot going on in several different niches of music in the city. But the synthesizer was a complete revolution for me. It was late for the synthesizer—I think it was 1969. I had only just moved to New York in August of 1968, right after the infamous political convention in Chicago, and I had spent a good deal of that first year just really not knowing anybody in the city and being very much by myself, just trying to make a living and figure out how to live here. And I began to meet musicians through the super of our building, who played drums, and some of the musicians that he was jamming with in the basement from time to time. They talked me into giving music a try. So I've been really lucky that there have been supportive people at particular moments of my life—just randomly supportive people—have been ther at points that have been helpful. And I hope I've been able to do that for some other people too. You just never

can tell. There are points when just a single conversation with the right person changes the course of your life. It's amazing.

I definitely agree with that. I was curious—for later synthesizers, what were some of things you may have used?

Well, I had shared studio access to the Buchla modular that Mort left behind when he went out to Cal Arts, and that Mike Czaikowski turned into the NYU Composers Workshop there. And it was frustrating to work in a shared studio because these things didn't have memory or any way to put a patch back up once you took it down. So you'd have your two-hour session or whatever, and if you didn't get something recorded to your satisfaction by then, you had to pull out all the cables, and when you got back you'd never get the patch back the same.

So I wanted something of my own. Electrocomp [EML] in Connecticut had come out with a relatively inexpensive machine which I managed to pick up used—the Electrocomp 200 modular. I ended up with two of those things. It was very simple. There was almost no voltage control compared to the Buchla, which was very rich in control structures and abilities to mix them—but it was mine. I made "Crying Tone" and "Sediment" with that, laboriously making one sound at a time and A/B rolling them from two decks into one. "Sediment" just came out on Sub Rosa in Belgium, on their latest anthology of early electronic music.

So I worked with that for a while, and then I really reached a point where I was totally starved for more complex control, and to have memory. Instead of drifting gradually further and further from where you had a patch set up, you would be able to really continue refining and working on it. Also in my apartment, which had something like 15 amps for five rooms, every time the refrigerator went on, I had to retune all the oscillators. It was just a total pain in the neck.