SEAMUS NEWS

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We continue to celebrate the 50th Anniversary of the musical computer with a Max Mathews interview; Chryssie Nanou fills us in about MaxFest, an event hosted at CCRMA in honor of Mathew's 80th birthday; John Mallia reports on the opening hours of Northeastern's 2007 Visual Music Marathon; Elizabeth Hinkle-Turner turns in a review of EMS '07; Miguel Chuaqui gives us an update on the upcoming SEAMUS 2008 in Utah; Paul Rudy, SEAMUS VP for Programs, tells us about his international tour; Pauline Oliveros and Mark Applebaum share announcements, and SEAMUS Members share their CD releases and News. (Ed.)

EMS 07 in Leicester, Great Britain
Languages of Electroacoustic Music

By Elizabeth Hinkle-Turner

As an 'electroacoustic music ethno-musicologist' (geez – never thought I would EVER refer to myself as THAT!), I have spent several years searching for a research community. This search has entailed me giving a variety of papers at SEAMUS conferences, ICMC's, and Feminist Theory and Music (FTM) conferences as well as a few other venues. At each I was always a bit of an anomaly – at SEAMUS and ICMC – a member of one of the few paper sessions that didn't deal with MAX MSP for example – and at FTM, a curiosity – the one person there *not* talking about Clara Schumann or Madonna. Provinciality can prevent one from seeing a larger community out there but eventually various things crashed into me: being published by Ashgate; reading and contributing to *Organised Sound*; reading the works of Katharine Norman and Simon Emmerson; having e-mail discussions about 'appropriate communities' with Kevin Austin – and I pretty much stumbled upon with a loud "Duh, Elizabeth, here is where you should be you dope…." the Electronic Music Studies (EMS) Network.

For those of you who don't know about EMS (everyone else can just skip this paragraph), the organization describes its mission on its website (www.ems-network.org) as thus,

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An Interview with Max Mathews

With Kurt Stallmann

We caught up with Max Mathews shortly after MaxFest, a celebration hosted at CCRMA in honor of Mathew's 80th birthday. He fills us in on recent work he has been doing in preparation for that event and also muses on the development of the musical computer since his first experiments 50 years ago.

KS: How did your birthday celebration go?

MM: Well, it went very well and I survived it! There was an awful lot to do. The first event was playing a piece that Henry Cowell wrote around 1931 called Rhythmicana. As far as I know Cowell never heard it because the Rhythmicon, the instrument that he conceived of and Theremin built for him, never really worked satisfactorily.

KS: I see, so this is the first realization of that piece?

MM: Well no, not exactly. Leland Smith, a retired professor at Stanford, made a tape version around 1970 where he

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2007 Northeastern University
Visual Music Marathon

By John Mallia

The biennial Boston Cyberarts Festival, directed by George Fifield, is one of the largest new media events in the United States, bringing together artists from a variety of disciplines working with diverse forms of technology. On any given day during the two-week duration of the festival, digital arts enthusiasts are afforded the opportunity to choose from an appealing menu of film/video, electronic music, performance art, and installation events, all of which are open to the general public, and most of which are free. This year's festival, the fifth installment of Cyberarts, included a welcome addition to the packed schedule of events, the first Visual Music Marathon, hosted and curated by Dennis Miller and held at Northeastern University's Raytheon Amphitheater.

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Max Mathews playing his Radio Baton:
Photo by Roger Linn

synthesized the rhythms on a computer and he also synthesized a click track. The Stanford orchestra then played it against the tape. That was a step along the way.

KS: Did Cowell initially conceive this for orchestra?

MM: Well it is with orchestra, for Orchestra and Rhythmicon. The orchestra plays fairly square music in 4/4, 3/4, and 2/4 time. The rhythmicon plays all these crazy rhythms of which there are 65,000. It makes rhythmic chords with either one beat per cycle, or two beats or three beats on up to sixteen beats per cycle and you can play two against three, three against four, or five against seven against thirteen. Or you can play all sixteen together.

KS: This reminds me of the rhythmic theory discussed in his book, ***New Musical Resources***.

MM: Right. I made a live performance version that could be played on my Radio Baton and Conductor program.

KS: So you performed the rhythmicon part live with the orchestra?

MM: Yes, I performed it live with the orchestra. But that was a lot of work because the rhythms are indeed complex and Cowell does many other things. Cowell is a very good composer in my opinion and I thought it was very musical.

KS: That's fascinating work. Was there a recording made of this performance?

MM: As a matter of fact, we made a recording at the Skywalker Studios after the performance. That was done last Saturday (the live concert was on Thursday, April 26, 2007).

KS: Are you planning to release that?

MM: We're planning to release it. It's about 20 minutes long and we need to get another piece or two for the CD. I think we can do that all right. The conductor, Jindong Cai, is the one who is really doing the work here (in correspondence with the editor, Jindong Cai promised to keep the Newsletter informed of the upcoming release).

KS: Can you tell me a little more about how you would use the radio baton to trigger the rhythms? Are those rhythms actually composed out as sequences of rhythms?

MM: Yes. Cowell composed the rhythms and he had a rhythmic score that consisted of a Grand Clef used not to designate pitches, but rather rhythms. The lowest note on the clef represents one beat per cycle and the next higher note is two beats per cycle and eventually on the treble staff, on the highest F is 16 beats per cycle.

KS: Did he designate timbres for those rhythms?

MM: Well, that's interesting. The rhythmicon itself had two spinning disks, one of which made the rhythms. The disks had circles of holes in them of which the inner circle had just one hole and the next circle out had two holes, and so on. There was a second disk which also had the same combination of holes, but it spun at

(MATHEWS CONTINUED)

the pitch rate and there were a bunch of lights behind each circle of holes that could be turned on and off by a 16 key keyboard. So the light, when two holes were lined up, would shine through them onto a photocell. All sixteen rings came to the same photocell. Then it was simply amplified and put through a loudspeaker. Now, as you can imagine, this was a pretty horrible sound! It was described as somewhere between a grunt and a groan in the low pitches and a shriek in the high pitches, so I decided to synthesize the rhythms with a different timbre. The rhythms incidentally are coordinated with the pitches because the structure of these spinning wheels are aligned so that the slowest rhythm, one click per cycle, was always produced at the fundamental. And then the second rhythm, two clicks per cycle, always sounded an octave above, i.e. a ratio of 2:1.

KS: Right, so the sixteen followed a whole harmonic series?

MM: Yes, it sounded a whole harmonic series. We did that precisely, as the rhythmicon did it, but instead of having photocells and spinning wheels I used something else that I've been working on, a set of tunable resonant filters. I call these phasor filters because they're based on rotating complex numbers. A phasor is one way of naming a complex number. When a click was produced, it sent an impulse into a bank of filters that then decayed away. This produced a much more interesting and pleasant timbre as judged by, I think, everyone who heard it. But it did preserve this integer series of both the fundamental and the overtones. That was all done on a second computer.

"The limiting factor now is not what sounds computers are capable of making and have the power to make, but rather it is our knowledge of the human ear and of the higher level brain for music in the human cortex, what the human ear wants to hear. So it now becomes a fascinating search in, let's say, musical psychology for what is the essence of music and how we can extend it."

KS; Was the rhythmicon routed through a stereo system alongside the orchestra or behind the orchestra?

MM: It was routed through a mono system actually. My idea was that the rhythmicon is just another instrument in the orchestra, the solo instrument. I wanted all the sound to come from the vicinity of where I was playing. I was up by the conductor like a pianist would be. But that didn't work very well. The orchestra overpowered the sound of the rhythmicon even though I had plenty of big speakers. I don't understand this. I think the speakers had more decibels than the orchestra although the orchestral brass section was plenty loud. We ended up putting two banks of three speakers each on the left and the right of the orchestra towards the front and a couple of monitor speakers for the conductor and myself in the middle. But I do want to keep working on this because I would really like the computer to be a new instrument that can augment and be combined with the orchestra rather than thinking about it as something that would replace the orchestra.

KS: Are you intending to open this up so that it would be a new instrument that people can compose for?

MM: Sure, yeah!

KS: That's fantastic, so you'll develop a new repertoire for it.

MM: Well, I'm not a composer, I'm an instrument maker. I write computer programs that behave as instruments. I look for composers to try to use the stuff I make in a musically expressive way.

KS: Do you feel strongly that the use of the computer as an instrument should augment and be integrated into an acoustic ensemble?

MM: Yes and this is now quite feasible because in the case of the rhythmicon, everything was done on two laptop computers. In terms of size, laptops physically fit into the orchestra and they offer more power than musicians have been able to usefully do something with.

KS: Over the course of your lifetime, you've seen the development of computers from the very beginning to where we are today. One of the things we put in the April Newsletter is that May 2007 marks the 50th anniversary of your first experiments with the musical computer. I would love to know, at that point in time, did you have any inkling of the power you were unleashing and how it would develop over the next few decades?

MM: Well, I had a strong opinion about the power of it as expressed in a mathematical theorem called the sampling theorem. And as far as music is concerned, it says that any sound the human ear can hear can be made from the right combination of digital samples so in that sense it's a universal instrument. Other instruments like the violin are very beautiful but they always sound like violins and I suppose that's their strength and their limitation. I felt this was opening many, many doors to different timbres and it is. But what I didn't realize at the time was that in this class of all possible sounds, all possible timbres, almost all the timbres you make are either uninteresting or disagreeable or painful and not what the human ear and the human brain wants to hear! It's a very select group of timbres that are musically expressive and exciting and beautiful. We had much to learn about how to make useful timbres. Of course people like Jean-Claude Risset made great progress in learning about that and Chowning made great progress in learning efficient ways to make the timbres and we found out a lot more, but we also have much that we don't know. The limiting factor now is not what sound computers are capable of making and have the power to make, but rather it is our knowledge of the human ear and of the higher level brain for music in the human cortex, what the human ear wants to hear. So it now becomes a fascinating search in let's say, musical psychology for what is the essence of music and how we can extend it.

(MATHEWS CONTINUED)

Max Mathews , radio baton with the Stanford Symphony Orchestra, Jindong Cai, conductor, Dinkelspiel Auditorium, Stanford.

KS: In your earliest experiments then, was timbre a priority on your list of things that you were aiming to explore?

MM: Well, when I made the Music III program which was the block diagram compiler like MAX/MSP is today, it allowed composers to design their own instruments. That was the big breakthrough that I felt I made for music. I think that is true and that many people have followed on along those lines. My initial work was to demonstrate what you could do with these building blocks: putting in modulations like vibrato, putting in attack and decay, and putting in arbitrary waveshapes. To demonstrate, I actually composed a couple of pieces in the early 1960s. One piece called ***Numerology*** showed the kinds of things one could do with attacks, decays, vibratos, and other things. The other called ***The Second Law*** showed what one could do with controllable noises when there was control of both the bandwidth and the center frequency of the noise. It also showed that one could make noise that had such a narrow band that it could carry a tune or noise that had such a broad band that it sounded like the wind, or noises with rapid attacks that hit the ear like gunshots. But this didn't get very far towards really nice timbres.

KS: At the same time you were working with these programs, you had a love for live performance. You are known for your love of the violin. Over the course of your research, eventually the GROOVE system was developed as a way of integrating live performance and digital control over analog synthesis. I was wondering if that was in your mind from the very beginning, that you wanted these computers to interact with live input?

MM: Actually, at the very beginning, I wanted a program where composers could realize and hear their music rapidly rather than having to wait for however long it took an orchestra or some other ensemble to play their music. I also wanted a way of playing music that was easier, in a technical sense, to learn than it was to learn to play the violin. Although I continue to love to play the violin, it's always been very difficult for my fingers to do the kinds of things they have to do to make good violin music. I wanted an expressive instrument that was easier to play. But initially it was a program for composers rather than for performers. Soon after I made the program and after I made a few little pieces of music with it, I realized that I also wanted to be able to perform live so that I could affect the sound with my own expression as I was hearing the sound. That desire led me onto GROOVE.

KS: You also did work with graphic interfaces using a light pen, is that right?

MM: Yeah, that was one of the first graphic tools that could directly communicate with the computer. I made a way of expressing musical scores by drawing graphs. I played with that for a while and got some, what seemed to me to be interesting results, but I haven't had time to follow through on that yet. But I do want to sometime.

KS: It seems that one of the primary concerns guiding your research over the years is really the use of this new instrument, the computer, as an expressive device.

MM: Yes, you said it, exactly!

KS: Do you have any thoughts about where you see this all going over the next few years?

MM: Well, one thing I see is the integration of the computer as a musical instrument with existing instruments as part of orchestras. My opinion is that the Western orchestra is the world's most expressive and powerful instrument that exists today. It has only one limitation and that is that it always sounds like an orchestra. That is both its power and its limit. Now it isn't quite that limited, there are a few composers that can make a symphony orchestra sound like something different than the traditional orchestra by putting together different combinations of instruments and blending them so closely that it sounds not like a group of instruments playing together but rather a single new instrument with a new timbre. But it is quite rare that a composer achieves this. I think that if I could supply electronic instruments that had timbres that are expressive and different from traditional instruments, that these would broaden the palette of orchestras.

KS: So that's key for you, that the timbres would be new. You wouldn't be using instrument imitations to augment an ensemble. For instance, I've seen programs that allow performers to make a fuller sounding ensemble by augmenting live performers with sampled instruments. The programs also have some kind of metronome/click arrangement so that the conductor can control the tempo and playback. That's a different kind of augmenting of the orchestra than what you're talking about.

MM: That's a very practical thing to do for theatre orchestras, especially traveling theater orchestras when, on the road in the middle of nowhere, they probably can't find a group of performers necessary to play the score correctly. I think the performer of the electronic control part of this kind of music is called a tapper. And there are some rather good programs where the tapper conducts by pressing a middle C key on a keyboard and when he gets tired of tapping the key he can press C# and it will continue to play in the same tempo putting the system into a kind of auto-mode. Then if he hits C again, he will get control of the tempo back. These programs even have a way of vamping. If the performers forget their lines and they have to regroup, they can hit another key and

(MATHEWS CONTINUED)

the orchestra will go around in a pleasant circle until the performers get straightened out and take off again. I don't know if that would really work very well or not, but it could. There are some very advanced programs. And usually, as you say, the thing that works well is having a group of lead musicians playing live and having them reinforced by the sounds being produced by the electronics and controlled by the tapper. It could also be the conductor who's providing the control, although he's got a lot of other things on his mind.

KS: It seems that the development of computer produced timbres flows in two streams. One aims at efficient algorithms for synthesis and you mentioned Chowning's pioneering work in that regard. Another seems to be focused on replicating and manipulating instruments through recorded samples. That technology, too, is reaching a new level of sophistication in recent years with the increased power of personal computers.

MM: I've heard two performances by John Adams that use this technology to very good effect. One was his opera, ***Dr. Atomic***. He had blends of electronic and orchestral sounds that were absolutely seamless and he did it with sampling. He would probably sample the orchestra or whatever instruments he wanted to use, and process these with various reverberations and chorusing and other things. I don't know the specific processing he used, but anyways he ended up with a sound file for a short segment of electronic sound. These files were played 'live' by a laptop player. I don't know whether he sat back with the mixers in the auditorium or whether he sat in the orchestra. Anyway, the laptop player would follow the conductor and when the time came to start the soundfile, he would hit a key on the laptop and it would start while synchronized with the orchestra. Thereafter, though, it was the function of the conductor and the composer to make it possible to stay in synch for however long the soundfile lasted which wasn't too long.

KS: So Adams triggered several of these pre composed soundfiles on a laptop?

MM: Yes. Adams came out with another very nice concert opera called ***The Flowering Tree*** based on an Indian classic legend, a beautiful piece. These were both done in San Francisco, one at the Opera and the other in Davies Symphony Hall.

KS: The rhythmicon represents a type of new instrument where timbres are synthesized in real-time using the phasor filters you developed rather than pre-recorded, manipulated samples. Can you tell us a little more about the phasor filters?

MM: The phasor filters are resonances. They're two pole filters. When you excite them, they die away. Resonances are very, very important in music. I think I could say all successful acoustic instruments have very strong effects of one kind of resonance or another. Think of the resonance of a violin string or a violin body, or the resonance of an air column, or the resonance of a piece of metal or a drumhead. Digital resonances made by computers running difference equations have been around for a long time. I had resonances in Music III, but they were unruly resonances, so that if you tried to retune them dynamically they would produce glitches and changes in the volume of the output and other such things. These phasor filters are much more tunable. That's what I hope to get out of those. I've just been working with these for a little while. The other thing that Bill Verplank and I worked out was something called 'Scanned Synthesis'. Again we had resonances of objects but they were not acoustic resonances, rather they were control frequency resonances like changing shapes of objects. We would scan those at an audio rate to convert the shape of this slowly changing object into an audio signal which is slowly changing. I think that one essence of what the ear and brain wants to hear is a change in the spectrum of the sound at a sort of vibrato rate, a rate commensurate with the length of a note. If it changes faster than that then things get sort of harsh and if it changes slower than that, the ear gets tired of the sound very quickly. So there's a limited frequency range of changes that seem to be important. Now this is entirely speculation on my part.

KS: That sounds like a good topic to follow up on with more study. Max, it has been great being able to talk with you. It's really very inspiring that you are continually thinking and making and inventing!

MM: You're welcome. I must put in a plug for SEAMUS at this point. I love that society. It's the only conference that I go to with any regularity. And the reason, it's very simple, is that you go there and you hear a lot of music. The music has gotten both better and I think "more live" over the last decade.

KS: When you say "more live" do you mean more performance oriented?

MM: Yes, more performance oriented. Not just playing tapes, but playing things where the performers are affecting the music as they play it. And it's getting also more interactive where we get chamber groups now involving both electronic and traditional instrument performances.

KS: Yes, at SEAMUS 2007, several pieces like that were presented. We look forward to seeing you at the next conference!