array

the journal of the ICMA

Array

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ICMC 2004 Keynote Address COMPUTING AND COMPOSING SOUNDS

Jean-Claude Risset

Editor's note: Risset's keynote was originally accompanied by audio and visual aids that cannot be reproduced here. Therefore, the text has been slightly modified; however, the descriptions of the sounds remain.

I am pleased and honored to speak here and now at ICMC, 40 years after David Wessel convened the first computer music conference. Computer music has expanded over the entire world, but it was born and reared in the United States. I come from France; France has become very active in computer music, as witnessed by IRCAM and GRM in Paris, and other centres such as GMEB in Bourges, GRAME in Lyin, ACROE in Grenoble, and GMEM and LMA-CNRS in Marseille. I am grateful to the United States, where I made most of my own research contributions.

For almost half a century now, the computer has been used to generate and transform musical sounds through computation, using processes similar to those used for texts, images and gestures. This has brought new creative potentialities, which have only barely been touched upon.

Max Mathews, here playing his radio baton, first performed digital recording and computer sound synthesis in Bell Laboratories in 1957.

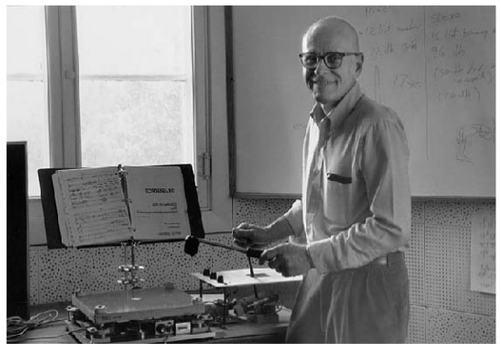

Fig. 1 Max Matthews with his radio drum

Mathews was helped and protected by John Pierce, who directed research at Bell Labs. Pierce pioneered traveling wave tubes, PCM, satellite communication, and coined the word transistor. He is in the center of this photograph, along with Mathews, Jim Tenney (the first composer in residence at Bell Labs), and myself. I succeeded Tenney in 1964 to explore the musical possibilities of computer music synthesis.

Fig. 2 Risset, Mathews, Pierce, Bell Labs 1965

Thanks to the quest for creative innovation led by engineers and avant-garde composers, the computer has been able to develop exciting novel possibilities. Resorting to the computer has brought new ways to extend the sonic vocabulary of music.

The digital domain has remained marginal in music for several decades. Today, digital processes are central in the dissemination of existing music through CDs, and, more recently, mpeg coding, which is used extensively on the web. This is fine, but digital technology should not be restricted to the reproduction of the existing. As Varèse liked to say, new materials permit and call for new architectures. With plastics, one can do better than just fake wood; the quest of novelty is more exciting than the task of mimicking. The creative interest is in *broadening musical horizons*.

I make a plea for computer music to continue to be innovative and not restrict itself to reproduction. Rather than arguing—we shall have several round table discussions—I shall try to make my point by presenting a number of brief examples (in particular of my own work) to illustrate new musical situations that only the computer made possible.

In my discussion of computing and composing sounds, I shall talk about (1) shaping or sculpting sounds, (2) associating sounds and images, (3) controlling music through gestures, and (4) composing sounds for perception.

First, let us consider shaping or sculpting sounds. Clearly, sounds and music can be generated according to various models, as exemplified long ago by the late Iannis Xenakis. Digital processes of various kinds can be used to generate sounds; this is the basis of the process of "sonification," also discussed at this conference. One can set up situations that seem contrary to the rules of physics. For instance, digital filters can be non-causal. In the following sound example, bird's caws will excite resonant filters. The response follows the excitation, but the response can be made to precede the excitation as well.

Computer music permits one to do both concrete music (processing recorded sounds of acoustic origin) and electronic music (synthesising sound material with controlled parameters without an acoustic

source). My own computer music work used mostly synthesis until I realized *Sud* at GRM in 1984. This piece attempts to merge *musique concrète* and electronic music (digital processing and digital synthesis), and I shall give two examples from it. In the first, the energy flux of sea waves shapes the mixing of synthetic tones. In the second, harmonic pitch grids composed like chords are imprinted upon any unpitched material. Synthesis and processing are intertwined to generate hybrid textures.

Now, I shall discuss associating sounds with images. Similar controls can be applied to both musical sounds and images, as exemplified by the late composer Emmanuel Ghent in his work with Jim Seawright and the Mimi Garrard Dance company. The great artist Lillian Schwartz realized several computer films and videos with computer music. I shall present an excerpt of the film she realized in 1970 on my piece *Mutations*. We shall first see laser beams diffracted through plastics, briefly interrupted by crystal growth, and then, at the end, colored dots that move in different places and gather at different times: a process of dispersion concentration. This is a process I had used in my piece *Mutations,* where fast tones have occasional rendezvous in pitch and time. In her film, Lillian Schwartz elected to use the same process at a different time, as a counterpoint rather than a harmony, to avoid sound and image tautologies.

Physical modeling provides natural ways to correlate sound and image, as shown in the pioneering work of Claude Cadoz and Annie Luciani. Solving the equations for a simple mechanical system gives the following sound result. It is quite characteristic. A vibratory system can be modeled in the computer. Solving the equations provides time-animated images and evolving sounds, which bear a straightforward relation because of their common origin in virtual physics.

Now, I will talk about controlling music through gestures. Performers are essential to bring life to music. Performance is all-important in computer music too.

The gestural control of music can been programmed in unprecedented ways. The computer permits one to "map" at will certain gestures to certain aspects of sound. Here one must mention the work of many pioneers, especially Max Mathews, Jon Appleton (who contributed to the design of the digital synthesizer Synclavier and who took it on the road), Joel Chadabe (who pioneered interactive composing), Barry Vercoe, Miller Puckette, and David Zicarelli.

With the hybrid real-time system GROOVE, Mathews and Moore have provided a control of the music that can be programmed so as to implement various models: the organ player model (one gesture, one note), the CD player model (one gesture, all notes), the "Music minus one" model, and the orchestra-conductor model. Combining different models provides flexible ways to specify performance nuances. It also helps to study what performers do. We shall hear a performance of a brief section of Ravel's quartet, realized in several successive sessions by two "performers." Clearly, the system allows varied nuances and musical options to come through.

In Laboratoire de Mécanique et d'Acoustique of CNRS in Marseille, Daniel Arfib and his students study various ways to capture gestures and to map them into musical parameters. I shall present some brief demonstrations of their work.

First, Fabrice Gagneux plays "virtual percussion"—hitting nothing, but not in vain. Virtual percussion can be implemented in various ways. In the example we just saw, accelerometers follow the wrist motions of the percussion player. Second, Loïc Kessous uses a graphic tablet as a "voicer" to control a voice-like sound. Third, using the mathematical concept of sieve (in French *crible*), Jean-Baptiste Millien has set the computer to elaborate on his rhythmic suggestions. Finally, Jean-Michel Couturier has implemented a graphic interface for a personal real-time control of scanned synthesis, a new synthesis process invented recently by Max Mathews and Bill Verplank.

Real-time has enabled the computer to perform live with instrumentalists and to accompany them. Score following was initiated by Barry Vercoe, who worked on his "synthetic performer" around 1981, and by Roger Dannenberg. In order to implement score following more easily, Miller Puckette developed the MAX programming environment and used it in works such as Philippe Manoury's *Jupiter* and *Pluto*. In the following example from my piece *Echappées*, Denise Mégevand plays the celtic harp alone at the very beginning. Then, her playing is amplified thanks to the Max/MSP software.

Working with Scott Van Duyne at the MIT Media Lab in 1989, I pursued the instrument-computer interaction in the acoustic domain, realizing *a Duet for one pianist*, in which the live pianist is accompanied by an invisible partner who plays—on the same acoustic piano—an accompaniment that depends in various ways upon what the pianist plays and how. In the following example, the louder the pianist plays, the faster the accompanying arpeggio—a novel and playful interaction.

Real-time is great, but it can be a mixed blessing. Works that use it rely on advanced technologies that are often both

idiosyncratic and ephemeral. One should be aware that technical obsolescence tends to make these works short-lived. Several works realized on the IRCAM's real-time audio processor 4X can no longer be performed. There are maintenance problems even with well-structured software. I discovered this morning that Wuan Chin-li's paper in ICMC04 is dedicated to the problem of getting the MAX patches of my *Duet for one pianist* to work on his computer. Several pianists performed this Duet, but this required updated documentation, expertise and hard work! In contradistinction, pieces for "tape" survive: the process of recording will always be ported to more recent technologies, such as CDs, DVDs, and hard disks. Also, real-time operation, great for performance, can be hard to resist, even though genuine musical composition implies freeing oneself from the constraints of real-time.

My final chapter—not the least—will return to elaborating, but specifically for the ear's sake, keeping perception as the constraint and the criterion. I shall present some instances drawn from the work of John Chowning and from my own work. These examples were realized using variants of Mathews's modular "Music-N" programs, which enable the user to design complex musical sounds in various ways. Digital synthesis and processing allow us to perform microscopic control on the sound material. Going beyond the assembly of pre-existing sounds, one can apply compositional processes at the sonic level and literally *compose sounds themselves*. The exploration of synthesis has deepened our understanding of the schemes of auditory perception, and thus unfolded new aesthetic possibilities. This leads to a field of inquiry for which John Chowning has coined the expression "Sensory Aesthetics." The examples are not recent, but many of you may not know them, and I contend that they still hold potential for future developments. A lot of research is being pursued on hearing, but it is rarely linked with the creation of novel music.

Computing sounds permits one to escape the constraints of mechanically vibrating sound sources and to take advantages of the idiosyncrasies of hearing to give rise to illusions. Chowning and I have used this possibility, which strongly interests György Ligeti.

Ligeti, Chowning, Sylvia Fomina and Risset at Stanford's CCRMA.

Thus, Chowning strongly suggests an illusory rotation in space in his 1972 work *Sabelith*, and at the same time a continuous timbral metamorphosis: unpitched percussive sounds turn into brassy tones. The loudspeakers are fixed, but for our ears the source of the sound does move. "The illusions are errors of the senses but truths of perception," as Purkinje said, and "music is meant to be heard," as Pierre Schaeffer liked to say.

In the next example, we hear a recording of soprano Irène Jarsky singing in a rather dry studio. Then, the recording is transformed in simple ways—by echoes—to make her voice spread into a larger virtual space.

In his work *Turenas*, Chowning suggests illusory motions with quasi-graphic precision, using auditory cues for localization and speed, and in particular the Doppler effect. This would be much more impressive if instead of stereo we could hear the 4-track for which Chowning composed the piece.

Auditory perception is sometimes unintuitive and surprising. In the next example, which is higher, the first or the second tone? Listeners usually hear the second tone a little lower - about a semitone. However I go from the first tone to the second tone, judged lower, by doubling all frequencies—by going up a physical octave.

David Wessel has shown that hearing has special ways to sort sounds, so that a change of timbres may completely change the melodic structure of an otherwise unchanged sequence. The research of Wessel and others is precious to explore timbral space, a space that is continuous and unbound thanks to synthesis.

Clearly, one must take the idiosyncrasies of hearing into account, so that the musical intention is conveyed to the listener. But these oddities of hearing permit one to construct paradoxical sound sequences similar to Escher's paradoxical images. Here, the stream seems to flow down, yet it reaches a higher point from which it falls as a cascade. The following sound sequence seems to go down in pitch, yet it is higher at the end. It also seems to slow down; however, the beat is much faster at the end. (This example also seems to rotate like the example from *Sabelith*.)

Synthesis provides sonic material of unprecedented ductility, and this opens interesting musical possibilities. In the beginning of my piece *Mutations*, the same motive is used for melody, harmony and timbre. One can then compose timbres just like chords. Synthetic bell-like tones can be turned into fluid textures with the same inner harmonies. This is an intimate transformation.

The four last examples exemplify the ductility of the synthetic material. One can *extrapolate* beyond usual values of sonic parameters, like Chowning synthesizing an extreme *basso profundissimo* voice. One can also *interpolate*, transform, morph; for his piece *Phone*, Chowning's "bells" gradually turn into voices. One can also *stage close encounters* between instruments and synthetic sounds. In the following example, instruments appear like filigree within synthetic tones. Acoustic sounds are audible traces of a visible world, unlike synthetic sounds, which only suggest an illusory world—a separate, internal sonic reality that can also be appealing. When these realities meet, identity can sometimes be an enigma, as in this last example, where the flutist sings into the instrument—flute or voice? Also, the synthetic tones become quasi-vocal—the voice of whom?

"Beauty is in the eye of the beholder." The musical aesthetic experience is our ears and brain. Technology grows according to its own logic, but it can provide us with great resources. Such resources are especially wonderful when they are tailored to help us explore and enjoy unexplored worlds, our inner worlds. That is our task in computer music.

ICMC 2004 Concert Reviews
University of Miami
Concert 5
Rosemary Mountain

The fifth concert of the ICMC was one of the most diverse of the week, both in aesthetics and in presentation. It showed the full array of options, including sound+DVD, sound+dance, live+recorded, computer-generated, and improvised. There was also a certain array of quality, but most of the pieces held my interest for one reason or another.

Id-fusiones by Rodrigo Cadiz was, for me, one of the highlights of the week, due mainly to the innovative treatment of the image-sound correlation. As it becomes increasingly easy to achieve millisecond coordination between audio and visual, the number of failing attempts to combine them convincingly seems to multiply. The perceptual issues involved are still seriously under-researched, but one of the most common factors in producing a sense of poor correlation is the discrepancy between sound and image space. (As this sense is often subliminal, the auditor/spectator may be left with the impression that the piece is simply not very good.) In many cases, multiple-speaker diffusion is in clear contradiction with the portrayal of a virtual 3-D space that is more distant than the sound, and typically viewed through a small, front-centred window. Cadiz neatly circumvented this entire trap by presenting the visuals, at first, like a kind of typewriter notation on a two-dimensional surface coinciding with the screen itself. The manifestation of time was often represented by the single placement of images like letters on the page, usually (but not always, thankfully) in sync with rhythmic aspects of the sound. The typewriter analogy gave way to a more poetic dance, as lines of the pattern were initiated from the right side of the screen and moved left—"backwards" for those of us immersed in the "time as *x*-axis" reading mode. Likewise, colour and size lent character to the sonic layers, which were often, but not always, in keeping with the sonic line. When sound and image diverged, however, one was led to appreciate the counterpoint in full anticipation of their impending resolution into homophony and/or rhythmic consonance. My ears and brain were particularly attracted to a section of the piece that was filled with individual sonic components whose initial fluctuation was balanced with long sustained notes focussed on a single unwavering frequency, reminiscent of certain Indian performance aspects. My aesthetic preference for less continuous sonic glides and nebulous frequency masses in favour of more precisely defined

sonic elements was thoroughly indulged in this piece. The visuals themselves were fascinating for their patterned intricacy.

The impact of visual on sonic was perhaps nowhere so startling as at the junction between the first and second works on the show. The audience realized, at the conclusion of Miyuki Ito's *Réminiscence d'un ancient esprit*, that the ominous hooded figures who stood immobile against the wall stage right throughout were actually waiting to spring into action for Palindrome's work *Ich, mich und mir,* which followed it. I was not the only one who had difficulty in trying to retroactively subtract that visual image from the sonic piece, in order to re-assess the impact of the work as it must have been originally intended, though I will assume that the composer condoned this "contamination." (The same phenomenon recurred dramatically later in the week, when we mistook fireworks outside for off-stage percussion effects in a work by Brian Bevelander.) Ito's work was very emotive, in a way that seemed quite in keeping with the costumes. It would be a good point of departure for a study in sound-image correlations to present the same work with a different stage-set, such as rosier colours and gentler poses.

The Palindrome work maintained the quality that I have seen and heard in their other works; it was striking because the quality of the artistic elements matches that of the technological. *Ich, mich und mir* presented a fascinating counterpoint of real and virtual bodies, the virtual being produced apparently by projections of the dancers, often delayed and displaced, but by varying and unpredictable amounts. The range of sounds and of visuals were also in nice correspondence, from dramatic gestures to a static-type noise produced by a dancer's costume and echoed by visual noise on the screen.

Of the four works for flute and computer, three were appealing to me because of their classical roots. They were full of interesting sounds and audible structures. Ainger's *Pacific Variations III* presented its classical structure with appropriately contemporary modifications, sequences, and other such techniques applied smoothly and with artistry. Even the extended techniques, which often ruin such pieces by their contrived placement, seemed to be organically derived from the sounds' evolution: long, sustained sounds which faded into the air like butterflies; and timbral effects (multiphonics, breath and singing into the instrument) balanced not only by the comforting web of multiple (and interesting) delays, but also by the formal arrangement of the effects into the multi-movement structure. Rowe's *Flutter* and Pinkston's *Lizamander* were less obviously classical in form, but were still musical in traditional ways: they had nice embroideries, and there was a particular skill in timing in *Flutter*.

Lyon's *Onceathon 2* also boasted recognizable structures of juxtapositions. What made the work less appealing to me was not so much the dissonance between the contrasting segments—"classic" atonal interrupting "classic" MIDI keyboard pop sounds—but that the pop elements were noticeably less interesting melodically, harmonically, texturally, and timbrally. (This view was clearly not shared by many in the audience, who seemed particularly delighted at the hodge-podge and the probably defiant sneering at those of us who prefer beautiful things.) The microscopic nuances of tuning, dynamics, and timing of acoustic instruments are, to me, clearly more appealing than the steady-state, dead sound of electronic pop. The whole piece reminded me of a show of kitsch I saw years ago. At the end, the wit involved in identifying and collecting the components as "kitschy" was submerged by precisely the unappealing aesthetics that had earned them the label.

The work *Terra Incognita* by Frank Ekeberg relied on less imaginative ways of creating dissonance and tension, opening the piece with a very short but ear-splitting noise and then teasing the audience with the anticipation of whether we would be attacked again. The level of dark, brooding apocalyptic mood, created in part by low vocal-type sounds, seemed a bit pretentious in its reliance on extreme and almost visceral reactions, which are far from the aesthetic designs that I find so satisfying in many musical works.

My appreciation of the effect of the dancers in the first two works of the concert, and especially the stunning video of Cadiz, might suggest that I am dependent on visuals for total involvement in the music. The dynamic involvement of performers like flutist Elizabeth McNutt also contributes a significant element to the listening experience. However, the "pure" electroacoustic pieces by Paulina Sundin and Robert MacKay were well crafted and appealing throughout their respectively short durations. Sundin, in particular, played with the virtual physicality by some nice uses of spatialization and an interesting preparation of one section by a sudden cessation of sound after a long swell. It was particularly striking for those of us who tend to track music's motion with our bodies. Nevertheless, the effect of these recorded works seemed to be dependent in part on their high-quality diffusion in a large concert hall. The impact of the concert as a whole, therefore, provided the kind of experience that justified the work of the software and hardware developers featured for much of the conference. That is precisely the reason that is leading me to argue in favour of live concerts over the current state of internet music experiences.

Concert 13

Momilani Ramstrum

As I enter, there is a work already in progress. On three screens are gray metallic bubbling masses surging upward and cascading down. The music is dense, with rising bird and insect sounds over a thick pad of rushing water. A deep rumbling bass sound coincides with the vibrating of the bubbles on the center screen. The bubbles on the right screen seem fleshy, or like flesh flowing over lumpy forms. The music shifts from foreground chirps to background water. All coalesce into thunder, then dissolve into white noise. The surf pounds. The left screen becomes dripping gray metal. A man is inverted and dives into a gray puddle. The water rises in pitch like a chorus. The chirping slows and drops. There is a singing noise. The right screen fades to black. The center bubbles become a smooth gray mass. The chirping spirals around the room as the pitch of the water rises. The right screen returns to flesh. The sounds cycle, rising and falling. The left screen fades out as the pitch rises, fades, then is cut short. The installation was entitled *Friction Sticky Rough* and was by Fred Semanski.

Terma by Craig Walsh, for soprano (Stella Markov) and CD. After the first electronic phrase, the soloist begins a slow melodic line in Greek. The electronics fade to accompaniment. At the end of the first section, the electronics become syncopated, with spatialized and synthesized syllabic duets. The soprano sings *sprechstimme*. In the background are pulsing, synthetic sine tones. The electronics become broader and slower. The vocal line restarts for the third phrase, slowly and melodically, with a slow electronic fabric behind. There is no vibrato on the vocals. The fourth part is like the second, with hocketing and the vocalist mimicking the electronics with syllabic textures. The mixture goes back and forth between smooth and jagged utterances. A series of increasingly higher notes is imitated by a faint electronic echo. A crescendo of texture and sound. The soprano speaks. Low rumbles of electronics. Pure high tones are contrasted with a counterpoint of spatialized, rhythmic electronics and textured chordal noise. Omega. End.

Mirror Story: Graveside by Alicyn Warren, for soprano (Mimmi Fulmer), video and tape. The singer enters, smiling. There is no music stand. A screen is behind her. The stage slowly darkens. Clouds of smoke rise on the screen. Dark low chords punctuated by metallic synthetic tones glissando upwards. The soprano deliberately looks around. Organ chords, chants, fleeting prayers. Second psalm. Images of trees, graves. The synthesizer tones are out of place. A powerful voice is distorted. Image of rain on the graves. There are some distortions in the sounds. Footsteps of pallbearers. The video work is complex and powerful, moving and detailed. Sounds are simplistic. A man's voice is taken apart. "Ashes to ashes, dust to dust." Candles float around the screen. "Born again."

Solo/tutti by Richard Kapen, for viola (Garth Knox) and live electronics. The violist enters and attaches a wire to his belt. There is a large glass music stand. Three loudspeaker monitors face the performer. The composer is seated at his table in the middle of the hall. The viola begins loudly and quickly. The electronics are a high whine behind the dignified viola. The viola sound emanates from the loudspeaker closest to me. The pitch and volume of the electronics descend. The viola plays slower phases, ending with a long bowed crescendo note. A loud pluck. A bowed note. The electronics rise in pitch and volume. Phrases are varied slightly, with long pauses between subsequent phrases. The bowing of the final note of each phrase lengthens. The electronics harmonize delicately. All fades out, then comes a loud pizzicato note on the viola. Another softer pizzicato note begins frenzied sequences in the electronics. A pause, then more soft pizzicato on the viola. An eerie echo in the electronics. The sounds are subtle and shaped. The plucked notes increase in rhythm. The synthesized sounds echo with variations. Short phrases on the viola are captured and spatialized. Both sounds are elaborated, and the sounds of the violist appear around the room. The sounds have clarity, detail, texture, and pace. The texture and gestures thicken and quicken. The electronics merge into a roar. The violist is going so fast that he seems to be ahead of himself. He stops, plucks, and the electronics dissolve backwards. The room expands, then calms as the array of violists tune into silence. Perfect fourths—there is a thin, hesitant new beginning. A hollow echo ringing in the loudspeakers. The hollow ringing moves around the perfect fourths. A romantic trill and many pizzicato plucks. A few quick, whispered phrases. The violist keeps looking left, as if remembering something. *Sul ponticello*—hollow and metallic, a long, light bowing of fourths.

Obsessions Delicates by Arne Eigenfeldt, for tape. Initial sounds zoom around. Obsessively metallic. Textures close around the room. Singing in the background. Sounds are transformed with space and echoes. Metallic hits crash, amplitudes increase. Objects become larger, sound is embodied. Giant toys. Rattles fade away, and giant sizes dwindle to human.

Synthecisms No. 6, by Brian Bevelander, for percussion ensemble (University of Miami Percussion Ensemble) and tape. Six percussionists: one marimba, two vibraphones, tom set, gong, bass drum

and timpani, timpani, marimba, and tom set. The tape begins slowly, with pointillistic timbres. Scales up and down on the xylophone and marimba. It is the beginning of a symphonic work. An expansive start with a slow swell, then an ebb. A beautiful timbral portrait. It hangs almost motionless on the concert stage. There is an expectation of something greater about to appear, furthered by a sporadic low booming sound. Everything fades without having gone too far. The low booming that I thought was a part of the piece is continuing after the applause has stopped. There is a musical event with fireworks outside that we hear in the concert hall, probably the Young Republicans Club. It was an effective part of the work, though I had wondered how the composer had gotten the floor to shake without blowing out the loudspeakers.

Chaotika by James Harley, for percussion (Rod Thomas Squance) and tape. Zipping sounds increase in pitch and density. Metallic hits. The lights are still on, so we aren't sure if this is the piece. The sounds stop and a few in the audience clap. Harley stands and says that Gregory Cornelius collaborated on the piece. The sounds zip and restart, and the percussionist stands. He hits two metal objects that look like lampshades. They make varying pitched hollow metal sounds. The volume increases. The rhythm is steady on twelve beats, then varying and accelerating. The percussionist has regular beats, but the electronics do not. Bongos. Five timbres: two small cymbals, two metal lampshades, one set of bongos, electronics, and tamtams. A rattling rhythm is contrasted with regular beats and no syncopation, all even rhythms, with rests and longer notes at the ends of phrases. Interesting, strongly contrasted timbres. Paul Lansky later said that he liked how this piece set up constraints and stayed within those bounds—that it was a mature piece. When I asked James Harley about the piece, he said that it was missing a layer of processing of the live sounds.

Les Forges de l'Invisible by Elizabeth Anderson, for 8-channel tape. Two squiggling parts, vibrating textures, bells chime, rushing and retreating. Space sounds whir around the room like a science fiction film. Night star sounds, the gravity of stars are placed around the atmosphere. There is a rumbling of outer space or a forest fire circling the building. Crickets or metallic planes blare with heat. Glossy intrigue. Silence for five seconds, then a loud restart. Long, phasing sounds over singing crickets. Expansive swirling attack. Everything fades except for the crickets.

Qin Music by Christopher Ewing, for qin and computer. The delicate tones of the qin are quiet and engaging. The computer's sine tones quickly and seemingly randomly obscure the ethereal sounds of the qin. Ending the piece alone, the flowing qin is weightless.

Mellipse 2 by Mara Helmuth and Allen Otte, for percussion (Allen Otte) and tape. The solo percussionist is caged behind metal objects. Triangles, metal cymbals and gongs are suspended in front of him in a metal frame. He swims in metal. The percussionist is ringing a bell without stopping. There is natural phasing. I think the electronic part has begun. Time shifts as the tapping of metal swerves to a different suspended cymbal. Now I am sure the electronics have started, because there is a high ringing tone not connected to the force of the percussionist. There are ambiguous transitions between the tape and the performer that question reality. For an instant I'm sure, then I'm not. The dominant sound is the metal tamtam and the suspended cymbal. The percussionist skillfully dances with the percussion, bringing a metal cymbal that is not suspended close in order to shift to another instrument. Now, the sound has moved to the side loudspeakers and the electronics are obvious. A gong signals the switch to a buildup of pitch density, texture and amplitude. The electronics hover on the edge of consciousness, extending and elaborating the bell resonances. I'm not sure if I am imagining the sounds on a hot shimmering day, or if they exist outside of myself. A bored scream, a rubber mallet is dragged over the gong. Repeatedly, I am seduced, and I believe that metal can resonate that long. He returns to continuous percussion and the electronics intensify. I think. Not sure how sound is made at all. I am left not knowing what is real, and unable to trust my own mind. The work makes me believe in a new world of extended resonant metal over a lifetime of my own experience. Later, the percussionist said that he created his part as a response to the electronic tape that Mara had composed, purposely blurring the borders between their sounds. This work was the highlight of the evening.

Concert 15
Jeffrey Treviño

The concert began with Adrian Moore's *Dreaming of the Dawn* (listed incorrectly in the afternoon's program as *Dreaming of the Drum*), a large-scale, multi-section piece for eight loudspeakers originally commissioned by the Groupe de Recherches Musicales in 2003. The composer felt it appropriate to remind the audience of the work's inspiration before its diffusion, because the title of the piece is drawn from Emily Dickinson's poem "Dreams—are well—but Waking's better." Mr. Moore first read the eponymous poem aloud to the audience. His reading was met with contemplative silence, and the concert seemed off to a fairly solemn and meditative start—until

Moore said under his breath (to some tittering) as he returned to his seat, "Don't ask me what it means."

Although many found Moore's comment funny, it pointed to a dogged creative struggle, intertwined with the comprehension of the poem, that is an original quality of this work and others by Moore. As François Couture has said of Moore's work (and specifically of his piece *Sieve*), "The large number of sound sources used and the constant analysis the listener must do to relate them to their manipulated counterparts make for a busy, rich, exhausting work. [*Sieve*] leaves an impression of fulfilling creativity." Although the former part of this assessment is true of much good electroacoustic music, the latter part is not, and I too was left with the sense that the creation of *DotD* was a deeply involved and probing artistic endeavor.

So how exactly does one create a piece of music that leaves the impression of a fulfilling creative process? The answer, in this case, lies most apparently in the relationship between the large-scale formal structure and the more local development within a given section of the piece. Save a few disruptive suffocations due to sudden bouts of digital silence between sections, the entire multi-movement work seemed to be, like Dickinson's hyper-articulating punctuation in the original poem, an engaging, iterative process of expression. The composer has compared the local detail at any given moment in this piece to driving a stick-shift car. However, although the piece might be careening recklessly through an amazing variety of altered orchestral timbres—beautiful sounds in their own right—it pauses occasionally to reconsider its path and begin anew. This music is beautiful because it expresses an impossibility of precise expression through a series of masterfully calculated, ardently executed, and subsequently abandoned outpourings. The composer reproduces Dickinson's poem and discusses the work as a search for a meaningful structure here: http://www.shef.ac.uk/~mu1ajm/docs/dreaming.html.

The next work on the program, *one thousand and seven hundred and fourteen questions* by Michael Gurevich and Lindsay Manning, was a testament to the effectiveness of simple algorithmic composition in the face of the human psychological apparatus. The idea is straightforward enough: over a thousand contestant responses from the popular American game show *Jeopardy!* (in the form of questions, according to game rules) were diffused into eight channels, with a sum decrease in the density of responses as time went on. The piece's effective moments—and some of them were very effective, though they were few and far between—came from the mind's propensity to associate events by proximity in time and space. The piece left me with a variety of memorable experiences, ranging from poignant (a brief cloud of responses ending with "What is memory?" followed by a particularly sparse moment) to delightfully absurd ("Who is Wagner?" followed immediately by "Who is The Flying Nun?" heard across the room).

As an American from Bakersfield, CA—the country music capitol of the American West and the cradle of Buck Owens's "Bakersfield Sound"—I appreciated the next piece, Chapman Welch's *TELE*, which was a monumental salute to one of the genre's most auspicious axes. A tribute to jazz, rock, country, and rockabilly guitar virtuoso Danny Gatton (known to fans as "The Master of the Telecaster"), the piece features several of Gatton's signature guitar techniques—chicken pickin' (playing each note with both pick and fingers), open-string rolls, and slide guitar techniques—as well as several more common vernacular electric guitar extended techniques, such as volume swells and tremolo picking. Also remarkable was an effective deployment of that oft played out but frequently effective dichotomy between "human" sounds and "machine" sounds: Welch juxtaposes his warm, analog, human virtuosity with digital sounds like noise and sine tones to create what seemed, at times, to be a dueling relationship between soloist and accompaniment.

Certain electroacoustic traditions try to create a virtual acoustic space by masking the existence of eight discreet sound sources and the room in which they diffuse. A venue like a church can leave the art and its presentation space at cross purposes (and, according to several composers' opinions following the concert, did so). Fortunately, the program's fourth piece, Christopher Cook's *The Castle of Otranto* for live trombone and tape, deviated significantly from such traditions. The trombonist entered the stage after the piece began with tape alone, pausing to look up at a gigantic illuminated cross hanging at the front of the church's central knave. From this point on, the soloist engaged in a series of theatrical gestures reminiscent of Luciano Berio's trombone Sequenza, only with a more explicitly programmatic point of departure. The trombonist seemed to represent the hero of the Gothic novel treading carefully through a haunted castle, and the piece reveled in the instability of the taped response to the soloist's stimuli. Cook took advantage of the highly directional nature of the trombone's sound by placing three microphones left, right, and center of the soloist's bell, to allow and make visually apparent the soloist's transgression into the virtual space of the loudspeakers. The result was an observable joy of ventriloquism, brought on by the soloist's ability to map his sound easily onto various

combinations of the eight loudspeakers. Although the theatricality seemed a bit stilted at first, the final gesture—in which the soloist loses hope, stops playing, and hangs his head in despair while sitting on the steps to the altar—was marvelously executed by trombonist William Bootz. If the content of the tape part aspired to capture the supernatural element inherent in the genre of the piece's program, the loudspeakers' sounds bore too close a resemblance to others heard at this festival (in less intentionally eerie contexts) to be effective. This, however, is more a criticism of much of electroacoustic music's propensity to represent unstable, negative, and ambivalent states than it is of the sonic choices in this particular piece.

The next piece, Ivica Bukvic's *Legisonitus #1: Gone in 8 Minutes*, came with a concise and heady program note attached, which I reproduce here in full:

> Posing as one of the most polarized artifacts through superimposition of the extreme right-wing Musique Concrete and sporadic touches of the Cologne dogma, this piece is an experiment in relegating the creator's responsibility to the world of chance and circumstance, where author's [sic] final touches but enhance the flavor of the moment preserved in time.
>
> That is all.

I don't know what this means, but I'm fairly sure it's political; the piece of music, on the other hand, was a recording of someone driving somewhere. At the outset, a collage of brushed garments, propositional speech, and intimate breaths created an atmosphere of anxious waiting in advance of an engaging narrative trajectory. That this trajectory turned out to sound like an uneventful recording of an uneventful car trip from point A to point B was wholly disappointing. Although I admire the composer's sense of experimentation in the context of certain politicized traditions, with experimentation comes the possibility of failure, and this one failed in more ways than it succeeded.

The concert finished with Yu-Chung Tseng's *Burning Up*, an homage to Iannis Xenakis's use of hot coals in *Concrete PH* that engineers natural sounds from sampled instrument sounds. The direction of the eleven-minute piece seemed to mirror the process of creating the synthesized natural fire timbre: the disparate sounds combined over time to form an ultra-clear digital representation of the sound of a crackling fire. Although the form of this piece, as well as its author's description of it, drew attention to the timbral processes at work, most interesting to this audience member were the music's rhythmic profiles. This piece contained some of the masterstrokes of spatialized rhythm at the conference, and it is unfortunate that they were heard in an environment as soupy as a church.

Considered as a concert event in its own right, this was a show marked by an amazing diversity of compositional goals, materials, and media. Considered as a single event in a weeklong festival of our organization's activities, I take great pleasure in reporting that this diversity is representative of most of the concerts heard throughout the conference. It was a joy to hear such an assortment of projects, and I can hardly wait to hear what these composers come up with next.

Interview with Chris Chafe, July 22, 2005

Jeffrey Treviño

Composer/performer Chris Chafe began experimenting with networked musical performance in 1998. In 1999, he received a grant from the National Science Foundation to initiate the SoundWIRE (Sound Waves on the Internet from Real-time Echoes) research group at Stanford's Center for Computer Research in Music and Acoustics (CCRMA). The group develops sonified evaluations of network Quality of Service and experiments in real-time musical performance via networks with high Quality of Service.

The SoundWIRE project has led to several notable collaborative real-time musical performances via high QoS networks. In 2000, the team's real-time networked reverb won the "Most Captivating and Best Tuned" research demo award at the SC2000 supercomputing conference in Dallas, Texas. Chafe played his celletto (an electric cello that he designed and built) in Dallas, sent the audio back to CCRMA's stairwell in Palo Alto, California, and then sent it back again to Dallas for a lush reverb created by a real space miles away. The team expanded their demonstration for SC01 (Denver, Colorado) to include over 320 channels of audio streamed in real-time between Denver and Palo Alto. (All the channels contained plucked string sounds in delay lines caused by the network latency.) 2002 saw the group's first successful multimedia collaboration, with low-latency video by McGill University's Jeremy Cooperstock. For his senior thesis, Stanford undergraduate and SoundWIRE contributor Daniel Walling distributed his dramatic improvisation ensemble between Los Angeles and Palo Alto; the resulting CyberSImps show can be seen online at http://ccrma.stanford.edu/groups/soundwire/cybersimps/. In the spring of 2004, musicians in Palo Alto, California; Missoula, Montana; and Victoria, British Columbia collaborated in real-time for a week to determine the form of an improvisational composition, which was performed at a meeting of CCRMA's industrial affiliates. Acclaimed documentary filmmaker Kris Samuelson joined Chafe and company for a summer 2004 collaboration that paired the improvisations of two duos of musicians, one in Palo Alto and the other in Stockholm, with flowing video of jellyfish and lunar landings. At the Audio Engineering Society's October 2004 convention in San Francisco, Chafe and his colleagues triangulated Mariachi Cardenal de Estanford into three recording studios around the Bay Area. The three studios' sound outputs were mixed back into a mariachi band in a San Francisco concert hall for the conference attendees.

Composer Jeffrey Treviño, Chafe's student while at Stanford, caught up with his former professor in Palo Alto on July 22, 2005. The two discussed Chafe's artistic interests, their relationship to the SoundWIRE project, and future directions for his work in the realm of networked performance.

JT: The last time we talked, your most recent networked performance project involved piping a mariachi band from three different locations around the Bay Area into a performance at the Audio Engineering Society's convention in San Francisco. Was that the most recent major event for SoundWIRE?

CC: Almost the last thing. Roberto Morales and I had a demo when I was in Europe about two months ago. I went to the art institute in Zurich, which is teamed up with the music conservatory, and we wanted to find out if you could play together as a duo between Zurich and here [Palo Alto, California]. Every time you set up for a networked performance somewhere, there's a whole bunch of new problems that you never knew about, you know. This is still kind of the very bleeding edge—this is the hemorrhaging edge, sometimes. The duo was an improvisation with Roberto Morales on flute and electronics and me on celletto. We've been doing a lot of weekly playing together, recording everything we do, so we have this down to where a lot of our reactions and musical thoughts just happen and we're having a good ole time; we're going to keep doing that every week. So it made sense in this case to have Roberto on the California end (since I was traveling in Europe), and we just made a date to try this thing out. There was enough wonderful support on the technical side to get the machines in place and connected up, but then we discovered that, beyond the basics, there was a crummy problem in one direction where packets were being dropped, and—it's interesting, maybe this is a word to the future, you know, for me, note this on a post-it—the thing to really avoid is promising the world to anybody in a show like this before you've actually tried it for real. And I had that misgiving, so I told them, "Don't do any publicity for this demo." You want to say, "Interested and forgiving people are allowed to attend," and it was a good thing I did it, because in this case, we really couldn't spend any time ferreting out the cause of the technical bottleneck. Unfortunately, the audience was in Zurich, and it was the to-Zurich direction that was dropping, whereas back to Roberto was great. At that point, we just yanked it down to one channel of 48

kHz and said, "Okay, we'll drop a certain number of those packets, but at least it'll play." And we played like crazy; it was really fun. The thing that I really cared about musically was going great. We could really get into our thing. Roberto does this fabulous Max-based processing of his flute and my cello and everything goes into the Osterizer, and so on—so sometimes you couldn't tell whether there were dropped packets or not…no, seriously, you could tell, and we weren't playing tight rhythmic-based music, either. We were flying around all over the place, and we played a good half-hour set that people enjoyed—at least they said they did—and we didn't pay them to say that.

JT: So what do you care about musically?

CC: In improvisation, it feels like it's working if you have this causal development of a piece going on, where one thing leads to another thing, you're building up this kind of forward history in the piece, and you're listening like crazy to each other, right? Roberto and I have that. There's a lot of development, there's a lot of common vocabulary, and when you're finally in it, you're playing with all those elements, and you know you are. So we had that going on. It wasn't just sound effects; it was this really strong kind of direction, which I think came through to the fifteen people or so who were there. They really picked up on it.

JT: But you play with him in person a lot.

CC: A lot, yeah.

JT: So, do you think you could get that kind of rapport with somebody whom you've never played with in person, somebody with whom you've only played over a network?

CC: Right, good question. So you only meet them for the first time in a tunnel or something, and then you start to play. It happens all the time when I'm improvising that I find other people who do it, too, out of some sort of weird bodily need or something, and it works, the first time. Well, I saw you and Max Mathews play together once—was that the first time you guys had played together?

JT: At the Cantor Arts Center?

CC: Yeah.

JT: Yeah, that was the first time we'd ever played together—

CC: And it smoked—I mean, it was great. You know, and everybody picked up on it. So it really has a lot to do with just a kind of willingness, and some chops.

JT: But Max and I were physically there.

CC: Yeah. Now the question is, could the same thing happen over a network? The answer is: the technology is successful when it doesn't matter whether you're physically in the same place or you're remote. So that's when we've gotten there. Now, the past history of our demos, and maybe the hype of all this, is that we have a successful technology, probably, because of the kind of high-definition audio that we're doing. And my definition of high-definition in this case is multi-channel, uncompressed, uncorrupted, low-latency audio. And all these things kind of add up. Adding compression adds latency, etc., so you just keep it down to the bare bones: it's here on the computer side, then it comes off the converters, it goes into packets, and it goes on the wire, and there's just nothing else going on. Just do that with lots of channels, and do it in a distance radius in which the delay doesn't impact the type of music you're playing. In Zurich, you're not going to play salsa (at least I'm not going to try), but in Seattle, maybe. So scaling the type of music according to the network's distance radius seems, right now, to be part of that definition of high-definition.

So if two improvisers meet in this tunnel, no video channel or anything like that, would it work? And this seems to be the question everybody's asking right now: how crucial is the visual connection in this world, too? And I can't say one thing or the other. Right now, I think it's desirable, but the musicians, once they're playing the music—it's like the cockpit window on the shuttle: you just want to know if the planet's really out there, you know? Take that window away, and there's a little less of that assurance. Where we've had ensembles that are less used to purely acoustical cueing (like inhaling breath to get a phrase started), where they really need to have a nod, then you have to cover for that. You put in an acoustical nod, otherwise known as an upbeat. These are all questions that we're feeling our way through in this new venue.

And it is a venue; I think it is, anyway. I define it that way, because it's really not like playing in a tunnel. A tunnel has very describable acoustics. I've been hiking through the underpass of a freeway this summer. I think it's a hundred feet long, and it's just a tube. Normally a river goes through it, but during the summer, hikers go through it, and it's really narrow. And if you're in that tunnel, there's a very peculiar acoustic to a conduit like that, and that's part of the sound of what you're doing. If you're in a room together, you can't avoid the sound of the room: it's a physically consistent ambience that has the players and their reflections all in the right place. How would you simulate that electronically? You'd have to build

a tunnel out of a computer music reverb that includes the regional distance of the delay as part of the acoustic. So we've been playing some of those games, and that leads to what's been going on since the mariachi demonstration for the AES convention last fall. We've been looking at distributed reverb, which allows you to form a tunnel surrogate in a computer music reverb algorithm. The transit time from one end to the other is actually incorporated in the algorithm, so it's a distributed signal-processing algorithm. It's a reverberator that has components on both ends and uses the network as part of the delay structure of the reverb. And, if you do it with multiple channels of audio, you can do it in a way that keeps the reverberation reflection angles, player positions, all of that stuff, consistent with the physics. So it would be like going into a tunnel. We aren't really there yet, and I think that may be another step towards making this venue become even more of a natural performance space. Finally, though, if I walk into a tunnel with a new player, and we just start playing, I think our performance is enhanced by the fact that our interactions in the same space are physically meaningful, even if the space is synthetic. I should probably do the experiment with a willing stranger under that freeway sometime, just to see, but I probably won't. It's more likely that we'll do it between here and, who knows, Los Angeles or some place. So we have to develop that. I think contributions from various quarters will be necessary to get the physically consistent ambience part of the technology going right.

JT: You said that you could have a shorter delay time to Seattle than you did to Zurich. In your physical model, then, would you basically change the distance of your tunnel based on your latency?

CC: Yes. If we wanted the hundred-foot tunnel in all cases, we could artificially lengthen the delay to Seattle so that it matches the bare-bones delay that you get to Zurich. That'd be one way to do the same performance to both directions. Unfortunately, we can't go the other way (get the Zurich dimension to be as tight rhythmically as the Seattle one) until we figure out how to beat the speed of light. It's quite a differential: just over ten milliseconds to Seattle, and just under a hundred to Zurich. That's what we're dealing with on these round planets, darn it.

JT: And you don't think that that's going to get any faster?

CC: It will, slightly. The basic speed law is at work here, but what's been nice is that—for reasons other than music, obviously—people have been gnawing away at the transit times on the Internet, so that these router delays are shrinking substantially. I think we had something on the order of twenty routers in the Zurich experiment. Each router's delay time is under a millisecond now, and that's really cool. You'll probably still have twenty routers in a lot of these cases, but as the router delay time decreases, those twenty milliseconds of latency will go away. That part gets good, and we have optical-based router switching and all these things coming around the corner—again, not because of us, but we can use it musically. And those twenty milliseconds are going to be significant for the extremes, for both the low latencies in Seattle and the larger times in Zurich. If Zurich comes down from a hundred milliseconds to eighty milliseconds, it may not ever get you into this range where you're really cooking on the rhythmic thing, but when some of the more local delay times change from fifteen milliseconds down to zero milliseconds, that puts it into the extremely close range. That's less than the five feet between us talking; that's five milliseconds. And that was what happened with Mariachi Cardenal de Stanford at the AES convention. That was the first time we had actually heard a distributed ensemble for which the radius, in terms of the acoustical delay between the ends of the ensemble, was much smaller than the room that we were listening in. It was like a little egg inside this bigger natural room, the concert hall that the audience was in. That was kind of inside out for me, because most of the time the delays are bigger than those of the listening space of the audience. So we're getting there.

JT: Going back to Max, I was talking with composer Justin Yang earlier about how we admired the musicality of people like George Lewis and Max Matthews, who build a system or an instrument and then stop development to take time and learn how to play it. If you as an artist were to stop at certain points throughout the entire development from 1998 on, as things have changed, how did "what you would do" change with the technology as it developed?

CC: I'm hoping to reach that stage where, for my less improvisational music, I start to actually structure stuff that lives only in this disconnected, remote world. That's part of the musical form, and it becomes one of the things that I'm designing with musically. So the technology needs to sit still enough for me to reach a point at which I can play with those designs. It's exactly put the way you said it. But I haven't had that opportunity yet. I haven't written specifically for this medium, let's say, whereas I guess I've got projects going on for other media that are sitting still, and I'm having that kind of enjoyment. I haven't reached the point at which you cease the technical introspections, the "make it work" part, and really get into the musical materials.

JT: When you say that you eventually want to make the remote and disconnected tangible in these projects, it sounds like a potential outgrowth of your *Ping* project and other collaborations with UC Berkeley's Greg Niemeyer. Can you talk about the connections between your networked improvisations, projects like *Ping*, and the idea of making tangible something that's normally not?

CC: There are four projects with Greg Niemeyer in which we're making tangible some sort of flux that's inherent in really commonplace stuff, but not apparent. In *Ping*, it was the behavior of network traffic. Everybody's got these wires running around them, and there are packets flowing all the time, but we're not really aware of all the funny rhythms and intricacies of traffic jams on the Internet. That was a way of making that tangible. Also like that was the *Oxygen Flute*, which monitored carbon dioxide levels in a plant growth chamber. You walked in, and you became sensible of your gas coming in and out of your mouth and exchanging with the leaves and bamboo inside the chamber. It makes tangible a very necessary exchange going on in our world: we breathe because plants breathe, and we wanted to make that kind of tangible as well, to bring it to the surface.

If you look at those projects, they're in the sonification world. They take data sets and dress them up musically so that, using your musical listening, you can pull out patterns from these data sets. This is interesting in and of itself, because you can use it to better appreciate the dynamics of some sort of system. But for me, in those pieces, it's much more about the music that comes out of them, because they're not all that different from the equations that I play with and jam with, which, in their first principles, really resemble the chaotic systems that are going on in an Internet traffic simulation. So the artistic perspective I have on sonification music is, again, really different from this kind of perspective that I've got on the telecommunications stuff right now. These are worlds that will probably couple together at some point—who knows, at the moment? I'd love to see that. It would be really fun to know what that means.

JT: So right now, it is really more of a telecommunications project.

CC: Pretty much. You can sort of look over the hill in your imagination and say what this might be, in terms of new musical avenues and forms and fun music to make. At the first go-round, benchmarking it against reality is an important thing to do, too. Say I'm going to split an ensemble into two rooms, have these folks either in different parts of the country or different parts of a building, and find out what happens to ensemble playing. What we're learning about are some underpinnings of the psychophysics of this weird beast, the ensemble. We often study players in isolation, but ensembles are really different beasts. They have these coupled behaviors that I don't know much about myself, and I don't think these have been teased out terribly well elsewhere. So as soon as we stick a wire in the middle and cause that separation, we've exposed some of the dynamics of those ensembles. But better to understand it a little bit before I go too far in tweaking this behavior to my own nefarious needs. That's going to happen, too, but it's a little bit like violin acoustics: a lot of time is spent trying to make a software violin from algorithms that sounds exactly like the real thing. Well, that's going to be hard to do, and we're not going to get there any time soon. But the research itself is very informative. The closer you get, you pull out answers, which then become modules for manipulation. You can create weird violins with tuba sprouts on them. We do that, obviously. It's that dual nature of research and creation. I go into the research to learn more about the goods that we're going to play some games with later, and I think this distance stuff is really still in that first stage, you know; we don't know enough to start playing. The technology is not done, by any stretch of the imagination. Dropping packets one way on the Zurich thing: that's broken, that's just absolutely not ready, and we have to find out how to cover for that. On the other hand, Daniel Walling's CyberSImps show, done a couple years ago, is a perfect example of a form that came out of separating the ensemble and crafting improv sketches that took advantage of the fact that they'd been split apart between Los Angeles and here. That was a major tour de force on the technical side, for him to get that going, but he closed the technology and then started working on the show. And that was great. That's really what you want to see happen more in the future, too. We will.

JT: So what's going to happen next with all this?

CC: I don't know exactly what's up, although it seems to involve a couple points in Europe. The folks in Zurich would like to do something else, if we get it figured out. There's a really neat possibility that the group in Belfast, Ireland at Queens University, will start to do some stuff with a new group starting there. This group is fun to describe, on two fronts, because it has a little bit of its technical motivation, but it is really more than that. On one front, there have been collaborating haptic instruments coming out of that group. They control synthesis with extremely simple stuff, like stirring your finger in a pan of little pebbles, and the music that you get from the system fits that motion. It's absolutely simple: a microphone pickup on the stones—not tracking every stone, or

anything like that. And the sound is really good. Now, the question is: what happens if you have one tray of stones on one side, one on the other, and you cross their synthesis and send it across the network? You have networked moving pebble music. That has haptics, sound synthesis, and some ensemble questions to it. I think those experiments are just ripe, ready to go. We don't need fancy stuff; we can use kind of a bare-bones signal transport to get that going. On the second front, both of our groups are starting to work with large-array multi-channel surround-sound-type things. At Belfast, they have a concert hall with a grid floor, a couple hundred seats, and they can surround them with an array of loudspeakers, including under the floor, and you can joystick sounds around a full-sphere projection. With the pebbles folks, and some of their new ideas, they're going to be joysticking in haptic ways. You're going to have a very tactile sense of this ambience as well as an instrument that you can feel; it touches back to you, it responds. So it's a full-picture thing. We just installed a room that has a hole in the floor like that, too, so the idea is to connect these kind of full-picture things over the network, doing music that can tolerate the hundred-millisecond delay one way, and getting the haptics involved. These are all pretty happening, I think.

JT: Since it was a telecommunications problem and not a musical one, why did you start this whole interest?

CC: It was a lot of fun for me right at the outset, actually, probably because I was a Ham Radio operator when I was kid.

JT: It all makes sense.

CC: Who's out there, CQ, CQ—is anybody listening? I think I told you this, but it was literally instigated by a woman, Elizabeth Cohen, who was working with the Audio Engineering Society as president during that time. Betsy had been part of a group who had been just commissioned to look at how Internet2 might serve the audio community. Lo and behold, after looking into that for a bit, they happened to note that the AES and Internet2 fall meetings were both in San Francisco at the same time and, coincidentally, something like a block apart. So Betsy said, "You can't miss this opportunity. We want to cross-connect engineers from both sides and talk about the problems." She called me up and said, "By the way, CCRMA should be there and do a demo." I said, "Oh great," you know, and <ponder> and, "What do I have for this?" There's this basic tenet that I was taught years ago: don't do a demo that makes music sound worse. So I bagged it. I said, "No, there's nothing here. I don't have anything to show." But it got the wheels turning, and this was at the right point in other work that I was doing; I was trying to figure out, "Okay, you have this odd idea of sending MIDI data from one place to another." Of course, lots of people had been working on this, but I hadn't really spent much time in the shower thinking about it before. I was doing a lot of music with feedback algorithms, particularly in MIDI, and I realized, "Okay, you could just get a couple Disklaviers, and you could have a feedback loop, and then they'd both blow a fuse; it'd be really fun." I immediately translated that into an audio picture, which is more of what Betsy was talking about. What if you had a feedback loop, but it was audio feedback? It would incur this network delay, and, with regular deliver and high signal quality, you'd have a delay line. That immediately grabbed me as a weird way to make a plucked string. You can use this delay line in a simple physical model, and if you can use it in a simple physical model, you can use it in anything. It's a delay line. I was also kind of going around and proselytizing at that point in time that delay is everything, and not just because of my administrator side of life. The idea is: all wave motion that we're used to, except for direct sound (which is almost completely missing in a lot of the things that we do), everything that makes a pitch, everything that has an echo, anything that has rhythmic systems—anything—is all based on time delay. I was trying to hammer this into some of my teaching. I also began thinking of the Internet as kind of a weird acoustical medium that has the possibility of reflections. All of a sudden, it became a full-fledged medium, just like air, water, or earth: you bang on it, and it reverberates. I took that interest to a networking group at NSF that I'd just learned about and said, "Hey, we can use these funny reverberating impulses to listen to Quality of Service on the Internet. A slightly changing delay time is going to create a pitch change, or a dropped packet is going to create some kind of crusty string sound." And the proposal floated, which surprised the heck out of me, and it actually turned out to be really out on a limb for that networking group. But it turned out really good, because we had a lot of students join this project. They did all this fabulous work to set up the streaming, which was really hard to do in 2000. It took a lot of special code and inventiveness to get low latency streaming, and we got it going. It was great. Next, we started using our system to split ensembles. We've always had this dual nature in the project. One side of it is experimenting in this odd acoustical medium called the Internet, and the other is fun with ensembles. It hasn't really changed. That's the telecom answer. The telecom approach to me is, "Eyes open, what are the qualities of this weird, acoustical medium?" It's certainly different from air; there's no doubt about it. As far as I can tell, it's the only medium that has a varying speed of sound, although air may be changing a little bit over certain time scales. The Internet

is jittery. You don't want it to be jittery. When we're trying to do these shows, we try to factor that out, but its nature is that it's jittery. The other weird thing about it is that it's asymmetrical. And that's more like a violin top plate, actually, because the speed of sound along the grain and across the grain is different; but end-to-end, bi-directionally, I don't know if there are any media that are asymmetrical like that besides the Internet. So it's this kind of funny beast that we're just playing games with right now. That's the short answer, told long.

Letter from the Editor

Over the past twenty years, Array has been a reflection of the interests and issues surrounding the International Computer Music Association. Periodically, the editors of Array have focused on the status of women in computer music. It has been seven years since the publication of Bonnie Miksch's letter and the responses to it from women working in the field of computer music. Continuing in this tradition, I have asked Gregory Taylor to write an open letter to the community, and I invite responses to his letter. Some people were concerned by my choice—they thought I should have invited a woman to write a statement about the female gender. I strongly believe that the lack of equality is not just a women's issue; it affects all members of the community. Gregory Taylor is an advocate for women in the field, programming many works by women on RTQE, a radio program of electronic, classical, ethnic, improvised and experimental music that has aired on Sunday evenings in Madison, Wisconsin since 1987. He has studied feminist theory and has a unique perspective on the computer music community because of the diversity of his background.

Recently, Harvard University President Lawrence Summers issued an apology for comments he made at an academic conference on women and science suggesting that "innate differences" between the sexes may account for fewer numbers of women in elite math and science academic positions. This created a firestorm in the media, and many articles were written containing possible explanations as to why the percentage of women earning doctorates in science and engineering is considerably higher than the percentage of women professors.

Computer music straddles two worlds: science and art. The number of women in academic positions in art and music is much higher than in science and engineering, but there is still a bias toward men in the arts. Of the 861 works that Christie's, Sotheby's and Phillips de Pury & Company offered over three days starting May 10 2004, a mere 13 percent were by female artists. Sixty-one pieces were assigned an estimated price of $1 million or more; of those, only 6 were by women. Of course, the fields of art and music are vastly different, and it is difficult to put a value on art. I mention this case merely to show a concrete example of difference in gender and the arts.

Computer music exists at the intersection of the two male-dominated fields of science and art, resulting in a subgroup that inherits

stereotypes from both parents. Gregory Taylor postulates that Open Source, iPods, Intermedia and Millennials will be the key to equality among the sexes. Much progress has been made over the past twenty years, but I am still hearing stories of sexism from young women who are just entering the field. From conversations stopping when young women enter the room, to overheard gossip about women's husbands programming their computers for them, to noticing a distinct lack of representation at the higher-level conferences, women are still being discriminated against in the computer music community. It may not be the blatant sexism of the past, but worrisome conditions still exist. I believe we, as men and women straddling the dual disciplines of art and technology, need to carefully mentor the next generation of women composers and researchers to ensure equality in the future. I encourage all readers to respond with their own replies to Gregory's statement. These statements will be published in a future edition of Array.

Thank you,
Margaret Schedel, Array Editor

Thoughts on Gender and Computer Music

Gregory Taylor

I am honored (if a little surprised) to be invited to say a few things about gender and computer music. For one thing, it provides me with the instructive dilemma that gathering one's thoughts and commenting on the history through which one has moved always provides (I am old enough to recall the original ICMA meetings that began this public discussion). I am sure that there are many of you who are flush with harrowing or amusing tales of what has not changed, and who can also bear witness with greater skill than I to the string of victories—modest or otherwise—won by patient, sustained work and attention. I'd like to briefly mention some things I see as emergent features in the landscape since the 1990s, and to wonder aloud about how, if at all, they might represent vectors of change and opportunity for computer music as an en-gendered enterprise. These changes can be summed up with four recent neologisms: Open Source, iPods, Intermedia and Millennials.

It is neither surprising nor novel to note that technological advances and improvements have changed the face of computer music practice, and that a similar shift has occurred with respect to the software tools used to create music on these machines. The creation of computer music no longer involves negotiating limited access to a small number of centers of physical, intellectual and social capital. Although the Open Source movement is of recent vintage, computer musicians were among the first groups to make use of freely available source code for the purpose of creating music (cf. Cmix), and that list of programs has now expanded to include software tools such as Pd and SuperCollider, among others. While some feminists view the Open Source movement as crucial to the task of empowering women and their communities in the developing world (based upon its low cost and the ability to modify source in ways that "localize" or tailor the software to specific communities), I'd like to suggest that it may be interesting to consider questions of gender and the Open Sourcing of software in a more general context—that of intentional communities formed around the use of common tools. This slight shift in emphasis allows us to consider how the emerging Open Source movement might change the gender dynamics of computer music in ways that are qualitatively different from user communities organized around the use of proprietary or commercial software, where common use does not necessarily imply the access or the ability to engage in the transformation of these shared tools at a low level. To what extent do Open Source communities share features with more traditional software communities in terms of gender analysis? Similarly, what effects might the arrival of new approaches toward intellectual property associated with Open Sourcing, such as Creative Commons, have on the landscape of computer music practice for the community and the for the individual composer herself?

Composition itself is and largely remains a private and personal undertaking, whose results are mediated through a set of complex social interactions whereby music is distributed, received, experienced, discussed and appreciated. While various parties have worked to create wider opportunities in these interactions as currently constituted, we are seeing shifts away from historical mechanisms for "vetting," producing and distributing music, as well as the rise of "iPod culture" as a default mode of listening—a shift away from the traditional modes and sites for listening, which involve the gathering of communities who agree to listen together, toward experiences that are simultaneously public (wherever we sit with our headphones on) and private (what we're listening to). I believe that the challenge lies not only in working to encourage diversity in the current modalities of the computer music community, but in thinking about what these shifts in enabling technologies and new forms of production, distribution and attention suggest. Are we looking at the beginnings of a discourse that allows us to surround

ourselves with voices and objects we agree with, to engage more easily in the guilt-free demonization of an "other" that the rise of Talk Radio demonstrates (remembering that we ourselves may be tempted to create our own more salutary aesthetic or political "bubble" that varies from that of others in content but not in form), and to withdraw from the communities we could be creating and nurturing with more direct engagements (whose new forms we must also imagine)? What happens to forms of mentoring (formal and informal) and the exchange of information and enthusiasms when communities become increasingly non-geolocal, and creative output comes to us as objects we interact with privately with no audiences nearby? How do we replace or account for the million little bits of back- or sub-channel information that are mediated along with the direct experience of art and persons in physical/social/communal settings as our works travel (and travel a wider and more unpredictable path) without us or our friends by their side? The so-called "second wave" feminists saw, quite rightly, that their task involved not only working to create a place for their works, but to create new contexts and discourses in which works were situated. That work continues, but new contexts are also emerging.

I also believe that recent history suggests that the nature of those contextual shifts also concerns boundaries of genre and shifts in goals and norms that might best be described as generational. An acquaintance of mine once suggested that anyone wondering what "happened" to gender in computer music should entertain the notion that some feminists have simply decamped to newer forms that are more hospitable to them—to some new "frontier" more amenable to homesteading and settlement. As I understand it, this view argues that feminists have migrated from what we would define as the traditional boundaries of "computer music" to Intermedia in the same way that the dinosaurs evolved to become birds. I find such a Darwinian characterization exceptionally problematic, and would generally argue that feminist enterprises have been more involved in maximizing the number of places in which people are free to work (and, thus, computer music is and should remain a choice for anyone who wants to compose or create audio art) and nurturing those choices wherever they occur. But there is a sense in which the past decade has seen the emergence of Intermedia as both a new genre and a collection of attitudes about work that arguably represents a change in the landscape. If so, is this new landscape more amenable to the goals, values, and practices that thematize gender? What effect, if any, does this new landscape of practice have on the ways that computer musicians define themselves? To the extent that the current landscape of Intermedia work and practices could be said to reflect the cultural practices of more "traditional" genres from which it is partially constituted, how might feminist analyses of those constituent practices elucidate the dynamics of new and emergent collaborative Intermedia enterprises?

In addition to new tools and new forms of activity, the intervening years since the '92 ICMA meeting have also seen the arrival of a new group of computer musicians who came of age and entered the practice with their own energies and strategies for transforming the discourse. While I find it ironic that scholarship and study about "generations in the workplace" that is intended to oil the machineries of production and consumption remains one of the primary sources of potential insight into the forms these differences of perspective may take, feminist study has consistently and properly argued that our knowledge is situated in a set of overlays of gender, class, race, and historical circumstance. While there remains a strong and widespread set of shared goals and values where issues of gender and computer music are considered, I would also argue that we have and will continue to see emergent differences within the discourse that are best characterized as generational. The older generation of women and men in our midst who worked for inclusion and greater opportunity may now find themselves serving as "gatekeepers" to a younger group of "gen Z" or "Millennial" composers, who have come of age in a different set of historical conditions and who may view their apparently "shared" circumstances and surroundings quite differently. I would like to suggest that acknowledging, translating and reconciling differences borne of age and cultural/historical circumstance is an important part of creating a consensus that empowers communities, as well as provides opportunities for empathy, enlightenment, and personal growth.

Composing to Subvert Content Retrieval Engines

Nick Collins

[Author's Note: I have angled this mostly from the viewpoint of audio research, but the same would apply to general multimedia content analysis. Also, note my tongue in my cheek as I exaggerate the dangers and undervalue some of the great research in these areas.]

It's not enough that everybody on the planet has become a potentially prolific composer, and that everyone expects the wide dissemination of their talent for using entry-level computer music software. What really hurts is the knowledge that engineers are devising machines that will automatically categorise all this excessive output and establish a world of content-based searching and meta-data databases, where everyone is made equal in association (for examples, see the Semantic HiFi, SIMAC and SeMMA projects, or look at the proceedings of the ISMIR conference). And to continue the fearful tirade, I don't know if you've yet heard an automatic summary generated from Stravinsky's information-heavy Rite of Spring, but I can assure you that it doesn't quite sum up that work's full scope (Peeters et al 2002). Even more regrettably, I imagine the digital rights management info is longer than the summary.

Some researchers in the field have at least admitted that categorisation is inherently problematic and that genres are ill defined (Aucouturier and Pachet 2003, Lakoff 1987), and there is hope that search platforms will be customisable to an individual user's definitions and personal preferences. Even so, we face a set of rather dangerous parameterisations, using such assumptive properties as tempo (as if fixed 4/4 120bpm for a given piece is the only possible metrical reality), key (as if non-standard tunings, that is, anything other than 12TET, are an unnecessary inconvenience) and forms that contain riffs, verses and choruses. Despite music psychologists prompting a wider cross-cultural viewpoint on what constitutes music (Carterette and Kendall 1999, Cross 2003), and composers' and sound artists' wider explorations (too many to list—I guess I need a good classifier to sum them up), our future is most likely to be angled towards a limited, commercially dogmatic and self-prophesizing Western popular music perspective of music theory. Of course, there are good practical reasons for this. For instance, automatic tempo tracking is much more accomplishable for obvious four to the floor metronomic dance tracks. We are perhaps rushing into the technology of content analysis, however, without any full solutions to the problem of music, let alone auditory scenes (or maybe that should be the other way around). Despite many brave efforts, we are unlikely to gain much deeper analysis in the short term. This does raise some peril of blandification. If entered into too hastily under some imagined lucrative commercial payoff, content summarisation is employed independent of any great solution of the cognitive properties of music and exploits rather facile and pragmatic attributes.

Now, there are even more implicit measures of timbral similarity within and between pieces based on generalised information content, time and frequency domain features and other data grist to the machine learning mill. The problem is that these data features tend to fail in analysing the fine musicological details of works, having little regard for the particulars of the cognition of music and the human auditory system. Meanwhile, our auditory models are hardly perfect, and where the cochleograms and basic linear simulated sensorimotor loops are running, they are too often in slow non-realtime that will hardly classify fast enough for all the new content being generated every day. I guess it's not our fault that our biological computers still outwit their mostly non-parallel silicon rivals. However, the optimistic surge of papers on machine classifiers continues, unabated by any worries about the psychological plausibility of many measures.

There are useful compositional applications hidden amongst all this, particularly on the level of event classifications and sound databases on the note/phone time scale (Schwarz 2003, Sturm 2004). In fact, this is about to become the boom audio effect. As a researcher, I've already heard enough of it, and the chart hits are still to come a few years down the line… But it is the wholesale study of pieces of music as data points in an immense and head-spinning space greater than all the audio you could ever listen to in your life that scares me.

One further danger is that fixed products are praised and promoted above any generative or algorithmic works, which are much more difficult to classify. However, given assumptions that a work cannot generate more than some limited extent of timbrally dissimilar material, generative music may be subsumed by the expedient of running the categorisations on a concatenation of four of five sample slices. So let's hope that no one goes through the effort of making any large-scale algorithmic works that would be annoying to summarise.

That is probably enough background for my rant. Now, it's time for a positive proposal.

As serious composers commenting on this rising phenomenon, we need to create

pieces that will cause misclassifications, annoy the assumed parametrisations and wreak general havoc with information retrieval assumptions. I list below a few practical things that artists may like to dabble with, in the manner of anti-pieces for content description, underminers of database music and playful compositional ripostes to the information engineers.

To disrupt imposed genres: Play with polystylistics and polygenristics. Your pieces should fit into as many styles as possible in as short a time frame as appreciable. Disrupt established forms, jumping between verse and chorus at improbable speed. Run conventional forms in retrograde or rotation, or place two popular songs almost exactly end to end. You must evade automated analyses constructed by the association of like textures, metres and other supra-note level information. I foresee timbral variations if you wish to retain some thematic core, but certainly dispense with simple relations and embolden your medium to long time scale constructions.

You may also embrace established forms in a very literal sense, leveraging them to sneak up on places in the categorical space. For instance, steal a model entirely from another piece, perhaps using substitution synthesis operations to change the timbre, but leave associative form intact (Sturm 2004).

A standard tactic to harry any established hierarchical order is to take any two or more hitherto dissimilar styles from diverse branches of the tree and meld them. Punk + Ravel = Never Mind the Bolero. Salsa + glitch + skiffle = Satchel. Mexican electroacoustic + Japanese court music = Alvergaku. This genre game may be automated, using technology against technology. Write a set of genre rules within an interface that treats interpolations (you'll need to define this interface first to avoid writing many transition functions to cover all combinatorial cases). Or, you might use statistical analysis techniques a la David Cope's algorithmic composition or similar.

Note, in particular, that flooding a market with algorithmically composed variants is a way to change the genre weightings. A lazier creator, without profound dreams of variability, might create many subtly varied copies, perhaps dissimulating their meta-data descriptions. If the signal analyses that set up classification parameters remain so expensive that home users are authorised to run them on their own data, I imagine crack coding software being readily available to masquerade your variants as truly tested media.

To mess up likely parameterisations: Tempo and metrical variations should be explored throughout a work. Impose a constant accelerando or a varied tempo curve, a mixture of tempi and other complex metrical structures, a metric modulation or two and a mixture of the beatless and the pulsing. You may enjoy adding a complex tempo pattern that is subliminal (slowly varying with less than 5% overall rate change, so as to provoke only preconscious phase change rather than period adaptation) (Repp 2001).

Research melodies you cannot easily hum. Even the contour should be ambiguous. I suggest working with Shepard tones in 72TET.

Write inconsistent Creative Common Licenses to originally protect your rights.

As a point of policy: Play live only to select audiences, paying great attention to the threat of bootlegs. Submit no fixed audio to categorisation, or send in unrepresentative samples to distort your predicted field of endeavour.

Failing all this, I suggest artistic collaborations with the engineers themselves, where a good insider knowledge of the machines may empower you. But for those who maximise hits and their own marketing exposure by such dealings, I reserve the horrible reward of an empty soul.

Unfortunately, I imagine that some safeguards to unequal weightings will continue—that the cunning engineer-creators in the content companies will uprate their own works, that corrupt composers will pay top dollar for preference and that various critical authorities, retaining prominence by their established audiences, will remain arbiters of much public taste.

Perhaps it is a dream, but I also have a plea to the listeners, if there are to be any who aren't too busy composing and authoring. I only hope these consumers will use classifications to generate dissimilarity and make playlists that subvert their own favoured styles in the celebration of diversity and the reward of novelty. Finally, the common claim to have a "really varied record collection" can be quantified by genuine statistical measures.

I should set up an international organisation such as ISNTMIR (Irate Syndicate Not Trusting Music Information Retrieval) or CACAPafMuP (Composers Against Content Analysis, Particularly for Musicological Purposes). But I assume that this small essay will eventually automatically be placed with like calls to war, and that content analysis will prepare its own nemesis for me.

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Why Haven't I Written About the Pieces Played at ICMC?

Leigh Landy

It had to happen sooner or later. It happened at ICMC 2004 in Miami. Margaret Schedel, editor of *Array*, approached me during a meal sliced thinly among the numerous events that make up an ICMC and made a request that I review one of the following day's concerts for this publication. I like Meg terribly, so my negative response was rather out of character. She persevered and deserved to succeed, having worked with me so closely on recent collaboration issues for the journal I edit, *Organised Sound*. However, there are moments when integrity takes over and kindness has to take second place.

So what is this rant all about? It all starts with the years and years of ICMC reviews read in ICMA publications, and even in *Computer Music Journal*. I shall comment about these presently, but before doing so, there's something else that needs to be discussed, and that is the question of whether after-the-fact reviews of one-off events serve much of any purpose at all. I personally don't think so, and have therefore not earned a reasonable amount of money, having chosen not to review dozens of events for a significant number of newspapers, journals and newsletters throughout the years. Why have I not done this? The answer is simple. Unless the reader is able to be encouraged to hear the piece(s) of music in question after reading the review, what's the point?

The French music critic Maurice Fleuret is known to have called the late twentieth century the Kleenex Era, i.e., use (perform) a piece once and throw it away. I've written on occasion that the unfortunate result of this notion is that many a work's *première* is also its *dernière*. This sad if not ridiculous fact is even more ridiculous when one takes into account that a great deal of new music deserves to be heard a number of times for a listener to gain a reasonable amount of understanding of what the piece involves, what it communicates and so on. You, the reader, may now complain: what's the point in performing a one-off piece in the first place? I (virtually) blanche and have little to reply. Any Friedman-influenced economist can tell you that the effort that goes into the creation of a new work is hardly "economically" sound if it is only performed once or a few times. I would suggest that in such cases, what goes into a work's creation and what comes out do not add up to the artistic equivalent of black ink.

You may now suggest that with our current ability to offer our music in the form of downloads, CDs and so on, why worry about the one-off concert? This, again, is a valid argument. Still, the constitution of the ICMA does not yet include a paragraph suggesting that a work that has been accepted for performance should, by definition, be placed on that year's ICMC website or the ICMA's own site. Therefore, the further distribution of the work in question is up to the artists themselves. There are exceptions, and the ICMC 2004 DVD included more works than I remembered ever being distributed. These, indeed, could have been reviewed.

But before moving on, although there isn't too far to go anymore, there's the story I interrupted a few paragraphs ago. This story concerned reviews I've read describing ICMC concerts. With very few exceptions, these reviews could be placed in a bundle entitled "Essays in Mutual Back Patting" or some such. The ICMC is not as evil as some festivals I have had the pleasure to attend, where most face-to-face discourse is warm and encouraging, but a good deal of behind-the-back talk is rather different. There is some of that at ICMCs, too, of course. What typifies an ICMC review are the following:

- An attempt to find at least something worth praising in a work, as the author is also a "computer musician" (whatever that may be)—in any event, someone working in a similar context and therefore someone who understands the lonely, detached cultural role of the person or people involved in the work being reviewed. This type of understanding is totally praiseworthy; nevertheless, these reviews do tend to leave a great deal of space for reading between the lines concerning issues that one has decided not to discuss.

- A tendency exists in these reviews to describe things from a fairly technical point of view, as this is what brought the ICMC people together in the first place. Again, this makes total sense, but has little to do with the success or failure of aesthetics, one of the key roles of a music review throughout the ages.

- In consequence, and given the fact that the review writer will probably not be provided with adequate time to have a long chat with all artists involved in the review, there is hardly any attention provided in terms of what I call the "dramaturgy of music," including a composer's vision, the "why" of a work, what is intended to be communicated (if the composer is able to articulate this) and so on. Please note that there is a maximum word count for the concert programme in the ICMC concert booklet that more or less disallows this aspect of a work to be adequately introduced beforehand.

So where does this leave us? My response to all of those newspapers, journals and newsletters has been: if you want me to write something about the event, why not allow me to do it beforehand and publish it before the event as well? This implies that I might be able to find out (much) more about the works in question. It also means that I might get to know the music better through its recorded version (if relevant) or through rehearsals. Last but not least, it allows the listeners a chance to be provided with a good deal of information before the fact to either accept or reject, facilitating intelligent discussion of the pros and cons of the work afterwards. Indeed, such announcements do run the risk of alienating a potential public (although not at the ICMC), or at least placing expectation into their ears. So perhaps here, too, there's something wrong. I see a role of facilitation in such articles, as they can enable potential listeners to make an educated choice about attending an event. With this in mind, I would opt to write up works or events that I personally support. This in no way means that I am against controversy or against negative reviews. Still, at the end of this Kleenex Era, we should find means of support for cultural events.

Where, then, is there a place for negative comment? The answer to this in terms of the ICMC is obvious. First of all, it will inevitably take place in the corridors and the bars of that conference. The average IQ of those present goes hand in hand with an ability to dislike works that don't agree with anyone in attendance and articulate why this is so. The same holds true for many events beyond the ICMC. Furthermore, where there are repeated performances, where there is a relevant accessible document (sound or audio-visual recording), there is every reason to start a debate, as there is every opportunity for that debate to develop.

The ICMC seeks premières, or at least works of very recent vintage. It includes a handful of "works of historic interest" from time to time, e.g. in Berlin. It is unlikely that most *Array* readers will have heard any of the new works unless they were present at the concert in question or have received the work through alternative means (a small minority, methinks). So what's the point of reading a review about a piece that most people are unlikely to be able to hear?

As an ICMA board member, I have spent many an hour at board meetings encouraging a greater ICMA/ICMC music focus. This has many manifestations, most of which fall outside this short discussion article. As long as most composers don't introduce their works properly in an appropriate form (art for art's sake's death is long overdue); as long as many of these composers aren't even present at the event; as long as time isn't set aside for the discussion of musical issues, writing reviews of Kleenex(-like) events serves little purpose.

Although I firmly believe that many of these works deserve praise, what I am more interested in is their being understood and, in consequence, appreciated. The panel I chaired at ICMC 2004 focused on appreciation—something most ICMC artists encounter much too little of. Until we have found a better balance to that "economics" problem introduced above, the place of the post-mortem review is not clear to me. I would prefer to see active musical debate (and distribution) replace the review until the status of appreciation has been improved.

Festival Reviews

Spark Festival of Electronic Music and Art
February 16-20, 2005
University of Minnesota

Brian Kane

Spark 2005, hosted by the University of Minnesota and organized by Douglas Geers, presented a broad array of compositional, conceptual, intellectual and improvisational work in electronic music. Transcending the stylistic and artistic preconceptions that often pigeonhole the vast terrain of electronic music into distinct categories, Spark 2005 presented an exciting, arresting and balanced sampling of recent pieces and research. Spanning four days, the festival included panel discussions; papers on recent research in computer music, technology and aesthetics; concerts of live electroacoustic music, eight-channel tape pieces, multimedia works and improvised sets; installations; lectures and seminars; and demonstrations of new technology.

The keynote artist was composer Philippe Manoury, who lectured on two recent works: *Sound and Fury*, commissioned by the Chicago Symphony, and *K*, his most recent opera based on Kafka's *The Trial*. The majority of the lecture was devoted to explaining the analogies between Faulkner's great novel and Manoury's work. Disregarding any programmatic representation of the novel, Manoury discussed the musical way in which the novel unfolds in time. Through the negation of chronological narrativity, both Faulkner and Manoury unfold events that become fully clarified only as the piece develops. In addition to his lecture, Manoury's *Jupiter,* a seminal piece in the development and application of computer-based score-following techniques, was brilliantly performed by Elizabeth McNutt. Manoury also held a master class seminar where he looked at the work of graduate composers at the University of Minnesota.

As for live performance, some of the festival highlights included a concert of chamber pieces with electronics performed by NeXT Ens, which included works by Burton Beerman, Douglas Geers, Gabriel Ottoson-Deal, Zack Browning and Margaret Schedel. This group is dedicated to performing works of live electronic and computer music, and its musical, intelligent and intense performance reveals a tremendous commitment to their mission. In particular, Shiau-uen Ding, the director and pianist, is a powerful force on the new music scene. Her solo recital, where she

performed a wide variety of pieces by composers James Mobberly, Christopher Bailey, Katherine Norman, Eric Chasalow, Corte Lippe and Jonathan Harvey, was staggering in its sheer breadth. Her handling of Lippe's classic *Music for Piano and Computer* and Harvey's eerie *Tombeau de Messiaen* was truly remarkable: clear, smart, aggressive, precise and lovely. Another excellent concert featured an assortment of electroacoustic works by such composers as Noel Zahler, Alicyn Warren, Butch Rovan, and Anthony Cornicello. In particular, Rovan's work for cello, electronics and video was a true multimedia masterpiece. Based on the poetry of Anne Carson, *Hopper Confessions* simultaneously presents a series of short musical pieces (which beautifully integrated the cello and the electronics) with words and video. Rovan managed to capture the pacing and the feel that one gets while reading poetry silently to oneself by slowly superimposing the text over a video filled with dark and moody images.

In addition to the concerts and performances, many of the papers presented at Spark 2005 were of unusually high quality. Robert Rowe's "Personal Effects: Weaning Interactive Systems from MIDI" addressed the impact of technological obsolescence on the survival of electronic and interactive pieces that are facing imminent extinction from the repertoire. By reconstructing obsolete hardware in environments like MAX/MSP or in open source code, older pieces can be saved from technological destruction. Scott Miller's paper "Audio Mobiles" explored some exciting new directions in eco-systemic programming based on Agostino Di Scipio's ideas. By using the computer as an autonomous system within the sonic ecology of some given space, Miller creates fascinating sound sculptures that cause and effect changes in the sonic landscape. In addition, his work raises interesting and complex questions about the nature and grounding of aesthetic experience.

Several papers on Friday morning's session addressed aspects of Pierre Schaeffer's work. Marcus Bittencourt used Schaeffer's criteria for musical instruments as a framework within which to create an unusual virtual instrument—a "Tusk Harp" that he uses in his radio-opera entitled *KA*. George Brunner's lecture on the evolution and development of Text Sound traced the origins of this fascinating movement back to Schaeffer and some of his original premises and goals concerning *musique concréte*. These premises were challenged in this reviewer's own presentation on Schaeffer and the philosophical origins of *musique concréte*.

With a new generation of composers, and with the general increase in access to recording technology, the line between popular music and academic electronic music is beginning to vanish. One of the great virtues of Spark 2005 was the way it wove these two strands seamlessly together. The festival began with an opening lecture by DJ Spooky, who has managed to straddle both the academic and popular worlds through sheer musical and intellectual force. But it is clear that DJ Spooky is not alone. In fact, many of the events and performances at Spark were engaged, directly or indirectly, with popular music. J. Anthony Allen, Margaret Schedel, Per Bloland and Robert Hamilton held a round-table discussion on the problems facing the young composer today. Not surprisingly, much of the discussion was centered around the role and influences of popular music on young composers versus the academic pressures to produce autonomous art music. But what was surprising was the way in which the festival, through its vast array of performances of widely divergent styles and its appropriation of non-academic performance spaces, made the question moot. In particular, each night of the festival was capped off by a set of experimental performances held in a casual setting. Some memorable performances were J. Anthony Allen's set of music for drum, bass, electronics and video, an improvised set by Seji Takahasi and Michi Yokota, and an evening featuring Keith O'Brien and some local DJs.

Even within the usual electroacoustic and chamber music setting, a few pieces stood out because of the manner in which they tied the academic and the popular together. Josh Clausen, a young composer studying in Minneapolis, created dense, aggressive and funky rhythms based on pre-recorded phonemes in his eight-channel piece *Phoneme Play*. Zack Browning's *Secret Pulse* for flute, violin, cello and computer generated sound applied magic squares onto musical structures such as density, timbre, rhythm, style and orchestration. The result is a collage of rapid crosscuts, evoking the flashy production of pop music and the jagged complexity of Frank Zappa.

In surveying the variety of artistic and intellectual activity presented at Spark 2005, one clear theme emerged: the issue of mapping in music. For example, how can some set of originally non-musical data be mapped onto musical parameters? This question was explored by three works in particular: Michael Berkowski's *Species*, Craig A. Coburn's lecture on musical landscapes and satellite data, and Henrik Frisk's *etherSound.* In *Species*, Berkowski takes John Conway's classic "Game of Life" algorithm and maps its generations of cells onto harmonic partials, creating giant spectral structures that evolve over time into more or less stable states. Coburn's work, based on satellite images taken over Canadian cities, takes another approach to parametric mapping. Each pixel of the image, which possesses five different parameters (three for color, two for location), is mapped onto musical

parameters, transforming these images into a riotous and dynamic player piano. Frisk's *etherSound* installation allows the audience to send a text message to a computer that maps their message into a stretch of sound. The transformations are based on factors such as the number of words in the message, syllables per word, vowel sounds, and other phonological data. Some technical problems arose due to the differences between European and American cell phone protocols, but in an ideal setting, the work would allow the audience members a unique opportunity to investigate the nature of the mapping through trial and error.

In all of these works, the mapping of parameters from one domain to another was much like an act of translation. Other works handled the question of mapping differently, moving towards an artistic investigation that seemed more akin to poetic metaphor than translation. Dennis Miller's *faktura*, a work for sound and video, presented a continuously evolving series of virtual textured landscapes paired with musical soundscapes. Both the audio and the video were on equal footing here, one mutually supporting the other, highlighting similarities between the aural and the tactile senses. In Margaret Schedel's *Cassini Division*, written for cello, violin, flute, percussion, bowed piano, electronics and video, a different balance was struck between the aural and the visual. Here, a single video image is superimposed upon itself and transformed over time based on information gathered from the performers. The visual impression of a single, slowly transforming object was the perfect complement to the music, which explored an extremely reduced palate of sound objects in an astonishing variety of ways. Finally, the *60x60 Project* premiered a video accompaniment to the collection of sixty short tape pieces, each one minute in length. Video artist Shimpei Takeda worked with a series of visual motives, mostly taken from rural and urban landscapes, transforming the piece from a compilation into a "meta-composition." The imagery, which focused intensely on specific aspects of the landscape, acted like a well-chosen metaphor for the music, which was also constrained to a small amount of material due to the formal limits of composing a one-minute piece. In many respects, Takeda's visuals, as sophisticated and modern as they were, also reminded this reviewer of the classic short film by Ray and Charles Eames where an asphalt playground is being washed down; both reveal the unexpected beauty and complexity of the common visual landscape.

In conclusion, Spark 2005 was a tremendous success, and the credit goes to Douglas Geers (with the help of his students) and the University of Minnesota. If, in future years, the Spark festival continues to present a large variety of high-quality works and papers, there is no doubt that it will become one of the nation's premiere festivals for new work in electronic music and art.

Electronic Music Midwest
September 16-18, 2004
Lewis University

Doug Geers

The sixth Electronic Music Midwest festival happened September 16-18, 2004 in Romeoville, Illinois (USA), south of Chicago. Organized by Mike McFerron (Lewis University), Paul Rudy (University of Missouri-Kansas City), Connie Mayfield (Kansas City Community College), Ian Corbett (Kansas City Community College), and Jay C. Batzner (University of Missouri-Kansas City), this festival alternates its location annually, and was hosted this time by Mike McFerron at Lewis University.

Presented with a particular interest in the theme of globalization, EMM 2004 consisted of eight concerts, several paper sessions, a roundtable discussion, and a special opening event meant to reach out to non-aficionados of electroacoustic music. Guest artists included a large number of composers and performers from across the world, and featured composer Kevin Austin (Concordia University) and a concert by the Cincinnati-based NeXT Ens. The theme of globalization was integrated into the festival as part of an ongoing series of events at Lewis University called "The Many Faces of Globalization." With this theme in mind, the first event of the festival on the evening of September 16 was the "EMM/Globalization Welcoming Concert," a two-hour presentation by Kevin Austin that could loosely be called a lecture. However, Austin's presentation style, as well as his use of both sound and video, gave the evening an atmosphere more like a variety show, albeit a thoughtful and intellectual one (if such things exist). Austin strode, stalked, and even danced in the Philip Lynch Theater as he spoke about the changes that globalization and electroacoustic sound reproduction have brought to music since their inception, making extensive use of diverse audio and video examples. The audience included many Lewis University faculty and students of various majors. Music played during this concert included recordings of traditional Chinese music played on MIDI instruments, a video of the Twelve Girls Band playing a medley of classical themes, Hugh LeCaine's *Dripsody*, Max Mathews's 1958 realization of *Bicycle Built for Two*, readings by Jack Kerouac, James Joyce, and Dylan Thomas, and more.

After this opening presentation, the remaining concerts featured a wide variety of works, including music for live performers with electronics, pieces

for two- and eight-channel playback, and electroacoustic music with video. Moreover, although many of the works on these concerts were likable, for the sake of brevity I have selected a small number of them to discuss here.

One interesting work from the first concert on September 17 was James Caldwell's *Texturologie II: Density 10.6*, played by alto flutist Andrea Redcay Graves. In this piece, a gently lyrical work, particular flute pitches and attack/amplitude values triggered arpeggios of computer-generated sounds and controlled aspects of them such as brightness, tempo, pitch range and contour. Although seemingly simple, the work was effective in that the performer used her own performance gestures to control the computer's gestures, and because the relationship between these felt completely organic. The work's only shortcoming was that the limited harmonic language, combined with the call and response relationship between the flute and computer that pervaded nearly the entire piece, made it feel, despite its attractive surface, a bit long.

J. Anthony Allen's *Saturations III-B* for two-channel tape was another appealing, focused work. All the sounds of the piece were derived from filtered noise, but Allen successfully built this basic material into a convincing repertoire of gestures, and used pulse and crescendos to generate sustained tension.

Benjamin Broening's *Arioso/Doubles* for clarinet and Max/MSP used the French Baroque variation technique of doubles as a conceptual inspiration for a work in which both melody and timbre develop and vary thematically. The melodic shapes and flowering of motivic material were both excellently realized, giving the piece a strong sense of coherence, sustained energy, and forward motion. The MSP processing consisted mostly of soft waves of harmonic material, delays, and reverberation. This was subtly realized, creating a halo-like trail behind the clarinet. The development of the computer material was possibly a bit too subtle, though, in that its general character did not seem to change dramatically during the piece.

The entire concert by the NeXT Ens was a pleasure. This recently formed group, whose members are graduate students in music at the University of Cincinnati College-Conservatory of Music, is dedicated to performing electroacoustic repertoire. Chamber groups devoted entirely to electroacoustic music are unfortunately rather rare in the USA, and although NeXT only began performing in 2004, this concert demonstrated that they have already developed into an expressive, cohesive ensemble.
The instrumentation of the NeXT Ens is flute/piccolo, alto, guitar, percussion, piano, violin, and cello. The group performed seven works of varying instrumental combinations and aesthetic approaches on their program, and all of the performances sounded precise and committed. Highlights of their program included Mara Helmuth's *The Edge of Noise*, a quirky but convincing ensemble-plus-MSP work that explored non-traditional instrumental noises, seemingly non sequitur vocalizations, parody, and spicy harmonies. This piece succeeded in unifying the disparate materials, and its humor seemed more like existential commentary than silliness. Sean Verah's *Slipping Image* for ensemble and tape developed from angular interjections to an elegiac ending, sustaining interest with thematic development and excellent instrumental writing. Christopher Bailey's *The Quiet Play of Pipes* brought forth pungently expressive microtonal harmonies from the group, aided once again by computer sounds generated in Max/MSP. The spectral colors of this work evolved as if in slow motion, lingering and breathing gently, with sounds reminiscent of industrial noise occasionally drifting into the texture. In addition, NeXT also played works by Dorothy Hindman, Jen Wang, and Ivica Ico Bucvic; each contained intriguing moments.

Jeff Harriot's *Design* for bass clarinet and fixed media playback served as a gentle opening to the festival's second day. The piece was minimalist in conception, with slowly repeating patterns of pitches that outlined consonant intervals. Bass clarinetist Jeffrey Ouper played mostly long notes that wafted in and out of the texture, moving from *niente* to *piano* and to *niente* once more. As this work began, I was prepared to become bored, but Herriot's subtle manipulation of the simple material held my attention through most of the piece.

The second concert on Saturday featured works with video. Of these, three especially successful pieces were *Interludes* by Keith Kothman (music) and John Fillwalk (video), *Slowly Sinking Slower* by Douglass Bielmeier, and *Underground* by Tom Lopez (music) and Nate Pagel (video). *Interludes* consisted of three movements, and the video for each of these focused on a single subject: a field of grass, a merry-go-round, and birds in air. The images moved slowly and were subtly processed, and the music matched this well, with long and often spare sonic lines. *Slowly Sinking Slower* mixed raw footage of intriguing but not always identifiable outdoor objects and scenes with dreamlike music in which long drones created a darkly meditative feel. *Underground*, in contrast, sought to express the energy of a London subway station. Its video included clearly recognizable parts of the station: subway cars, turnstiles, passengers, etc., but also subjected the raw footage to significant processing, so that much of the work was a collage of visual design. Meanwhile, the music to the piece worked in a similar manner:

Mr. Lopez used a palette of sounds dominated by struck and plucked sounds, including several piano-like and bell-like timbres. He manipulated them quite interestingly and deployed them at times in a manner of acousmatic music, at others as interlocking pulsed modal patterns in a manner somewhat reminiscent of Paul Lansky's works, and at several other places as energetic techno music. The result was dense, interesting, and fun. Moreover, Lopez's clever transitions between these genres pointed out the similarities among them, most noticeably in their use of rhythmic gesture. However, although *Underground* succeeded as a piece, it did have some flaws. First, and most importantly, I felt that the video and music sometimes seemed out of step with each other. An example of this is the end of the piece, where slow, fuzzy, contemplative shots of turnstiles were accompanied by very upbeat pop-like music. Another problem I had with the piece was that I enjoyed the music's swerving stylistic presentation but felt that some moments sounded a bit too "MIDI" for my taste.

Another piece that succeeded was Jeremy Spindler's *Glassworks and Silverscapes*, a work which I would describe as a "kinder and gentler" type of acousmatic music, in that it featured the granularization of sounds into a myriad of gestures without overusing explosive gesture shapes. I must admit, by the way, that I am dismayed by the number of composers who think that if one "punch in the face" gesture is a good thing, then a piece consisting of fifty of them must be wonderful. I have left concerts in the past feeling literally abused. However, Mr. Spindler's work avoided that Jerry Bruckheimer approach to composition, and created clever gestures from samples of a toy piano, with a particularly good use of space to rhetorically animate them.

Paul Rudy's *Love Song*, which appeared later on the same program, combined field recordings from outdoor locations with recorded vocalizations into a convincing sonic journey through several distinct musical scenes. This piece also featured a moving apotheosis near its end, created in part by building a thick harmonic block of timbre.

The final concert of EMM 2004 featured another performance by Kevin Austin, this time as composer and diffuser. Austin's *Three Zheng Etudes (Version II)* were a set of exquisite playback works that imagined physically impossible performances of the zheng, a traditional Chinese instrument. Each of the movements used a seemingly simple bit of recorded zheng as its basic material, but then spun out a wonderfully shaped and endearing tapestry of sound. Another successful work on this concert was Per Bloland's *The Wondrous Delight of Profound Ineptitude*. Reading the program note, I was a bit concerned about this piece, because it mentioned the use of recordings from an anti-war rally, and I find that it is very hard to write political music that transcends politics. However, this work effectively captured the visceral feelings of urgency from the rally without merely becoming a document of it. The recordings were highly edited, and thematic materials were drawn from them and repeated with variations, so that the listener's experience was primarily sonic/musical and not literary. In other words, Mr. Bloland developed his materials in a convincing way, and the result was a compelling composition.

EMM ended with Larry Austin's *Tableaux: Convolutions on a Theme* for alto saxophone, reverberation, and eight-channel tape. This fifteen-minute work was written for saxophonist Stephen Duke, who performed it here. The computer part of this work comprised a harmonic tapestry, and the saxophone part was a semi-improvisatory fantasia over the tape. As the work progressed, the tape harmonies became increasingly bright in timbre, and the saxophone became more energized. Finally, in the last minutes of the piece, a famous nineteenth-century theme was revealed as the source for the entire composition. In performance, this piece worked quite well as a showpiece for Mr. Duke, whose intense and virtuosic playing held the audience's attention throughout.

CD Reviews

P. Kuljuntausta: *Momentum*

Robert Denham

Can a work of sound art (music) survive on color alone? Petri Kuljuntausta makes a good case for it in his most recent CD, *Momentum*. All of the works represented on his program rely heavily on the concept of color as subject matter, some exclusively so. Kuljuntausta's fascination with color takes form in a keen interest in the building blocks of sound and how these various elements (harmonics, beating patterns, etc.) can be isolated and magnified so that they begin to function as their own entities apart from the sonorities within which they originated. As a result, his music is more concerned with the steady revelation of these hidden components than with any sort of linear form or presentation of themes, which would be indicative of the classical tradition. With this in mind, one should not listen to Kuljuntausta's music with the expectation that it should methodically progress from one point to another, but should instead revel in the experience of being enlightened as to the latent powers of expression that are contained within "simple" particles of sound.

Canvas (1999) relies almost exclusively on the preoccupation with color described above. The piece begins with a sample of male voices singing an F major chord. Kuljuntausta stretches this sample to the point that it carries a certain timeless quality, and eventually creates other chords that are closely related to the original F major (D minor, for instance). Within this slow-moving texture, he alternately magnifies specific pitches or overtones that occur naturally within these chords. The overall sense of this music is that it is derived from Medieval practice, emulating in some distant way the straight tones, smooth swells, and cathedral quality decays of Gregorian Chant. This piece does reveal a subtle sense of progression (the male voices, which begin with "Ah" tones, gradually evolve to express some Latin texts), though it is primarily concerned with exposing the variety of different color possibilities within the original sample.

Violin Tone Orchestra (1996) betrays the influence of Steve Reich, as Kuljuntausta momentarily sets aside the concept of "color as king" in favor of exposing the rhythmic possibilities within a given sample. Just as Reich explored the possibilities of phase shifting in his early tape-loop pieces (*Come Out, It's Gonna Rain*), Kuljuntausta takes a short sample from one of his own string quartets and phase shifts it against itself. Sometimes the phasing takes place at such a slow rate that it is barely perceivable; at other times, it is abrupt and the changes are immediately apparent. The process is still typical of Kuljuntausta's interest in finding the profound within the mundane, since he is exploring the rich possibilities contained within a seemingly insignificant fragment of sound.

The title of the third piece on the disc, *Four Notes* (2001), is not surprising considering the composer's tendency to use limited resources to produce maximum results. This piece is also derived from samples of the string quartets mentioned above, and is similar to *Canvas* in that it sets up a relatively static texture out of which pinpoints of color are explored under a musical microscope. This piece, by virtue of its lack of direction, makes it obvious that Kuljuntausta does not consider horizontal form as being an essential element in the message he is trying to convey.

Just as the focus on color in *Canvas* is reflected by similar practices in *Four Notes*, so the concept of phase shifting within *Violin Tone Orchestra* is reflected in the fourth piece, *When I am Laid in Earth* (2002). In the latter, Kuljuntausta works with a limited sound palette (again he is using samples of his string quartets, along with a synthetically produced harpsichord sound), and creates rhythmic friction between a pair of two-note figures. These figures are set in opposition to one another so that the first pattern is slightly slower than the second. As a result, periods where the figures seem to correspond alternate with moments where the patterns are obviously disjunct from one another. In addition, the individual figures themselves eventually split to produce a total of two string and two harpsichord samples.

Freedom (1998) is yet another work that gives color the central role, but it is unique among the other pieces on this CD in that it focuses less on isolated overtones and more on the beating produced by the harmonic relationships between various pitches. A low pedal A is established near the beginning as a sort of ominous drone from which the texture is not allowed to escape until the end, when it finally steps up to B. As other pitches are set against this pedal, beatings result in the pedal itself so that it "grumbles." This is yet another work where Kuljuntausta creates a sense of timelessness due to a lack of harmonic progression; one gets the impression that the composer intends these pieces to be seen as "meditative escapes," where a given concept is evident from the start and has only to be experienced (less thinking, more feeling). In this sense, it is not so important that the listener be present for every moment of the piece, though doing so would allow the full meditative experience that Kuljuntausta envisions.

Counterpoint plays a major role within *Momentum*, which suggests a trend on the

part of Kuljuntausta towards referencing music of the past (remembering his reference to the medieval period in *Canvas*). In the course of this piece, string samples are contrasted with an electric guitar patch, and these timbres are subtly altered to produce vague shades of color, or ghostlike effects. As one might suspect from the work's title and its contrapuntal texture, a subtle sense of direction does present itself in the form of a gradual shift from simple two-voice counterpoint to a more complex web of contrapuntal lines. In this way, *Momentum* stands apart from its peers by virtue of taking more care in the process of "getting from here to there."

In the Beginning (2001) is a provocative reference to the first chapter of Genesis. Again, the composer uses string quartet samples, but this time they are presented as a slow-moving backdrop against which other sampled sounds are set. These samples include city noises such as traffic and trains, coupled with natural sounds such as birds and wind. The composer is still interested in the integral components of the string quartet sample, magnifying particular harmonics or other pitches, but these are not so invasive as in the other pieces. The quartet samples are subservient to the other sampled sounds, much like the string ensemble in Ives's *Unanswered Question* is a backdrop against which the proverbial question is asked. As may be expected, *In the Beginning* moves at an incredibly slow rate of speed (if it can be said to be moving at all); listening to this piece is like sitting in Golden Gate Park on a sunny afternoon, experiencing the curious conflict between the urban and natural worlds.

Kuljuntausta does not present the listener with an endless variety of stimuli, but chooses instead to focus on the variety that is contained (though often overlooked) within limited sources. His music offers the listener an opportunity to explore the many possibilities inherent to these sources, and to briefly step back and appreciate the beauty of "common" sound. In this light, his CD is a great success, and deserves the consideration of every serious appreciator of computer music.

Rodrigo Sigal, *Space Within*

Jennifer Bernard Merkowitz

Rodrigo Sigal's new solo CD, *Space Within*, is a tour de force of complex yet clearly defined aural interaction. The music, all written between 1999 and 2002 while the composer was working on his PhD at City University in London, focuses on the relationships between sound worlds, whether they are synergistic or fraught with tension. Sigal's goal was to "generate emotions by exploring the relationships between human beings and computer generated sound material," and the pieces were part of a thesis entitled "Compositional Strategies in Electroacoustic Music." As such, each piece demonstrates a different strategy and dynamic between acoustic instrument and electronics (or, in the case of the two fixed format pieces, between different recorded materials), and Sigal is a master of managing those subtle variations. Coupled with remarkable performances by three different instrumentalists, the execution of his ideas is coherent, musical, and memorable.

Sigal, who was born in Mexico in 1971, demands much of his listener: he states that his music "cannot be understood while the listener is engaged in other activities," and recommends the use of headphones or a high-quality sound system. Indeed, his music requires fixed concentration in order to appreciate all the subtle changes in timbre, clever spatial effects, and carefully planned structures. The experience of listening to this CD with headphones is phenomenal; I highly recommend it.

The first piece on the CD, and my favorite, is *Friction of Things in Other Places* (2002). It focuses on the musical ideas that can stem from disparate sounds happening simultaneously. The piece starts out with the peaceful sound of wind chimes, and traverses parallel soundscapes where we hear voices, electronic hum, water, coins, and the heavy drums of pop music before returning to the sounds of the beginning. It is almost as if the listener is taken on a journey through space at one moment in time, and then suddenly gets yanked backwards to the point of departure. Each transition is beautifully handled, and the connections between the diverse sounds seem both jarring and completely logical at the same time. Sigal takes care to manage his themes so that the listener can follow the trajectory of the piece while still exploring variations and relationships with other sounds.

Rimbarimba (Lejos Del Silencio) (2002) for marimba and Max/MSP-triggered electroacoustic sounds is the next piece on the disc, opening with a memorable octave riff accented by an electroacoustic whoosh-thud (pardon the onomatopoeia). In this piece, Sigal visualizes the human performer as a "bridge" between the artificial sound worlds and the recorded sounds related to the marimba. The marimba and the electroacoustic sounds draw from each other, and their relationship is made evident in the connections between their rhythmic materials and their spectral characters. The electronic sounds turn the marimba into a kind of "meta-instrument" by adding to the timbre of the live performer's line. At times, this enhancement is very subtle, like the slight detuning of the marimba's pitches, and at other times the electronics add another element to the sound, making for a duet

that is so tightly integrated it still somehow sounds like one instrument. Robert Esler performs this piece with great nuance and skill, and seems very conscious of his role as the bridge, blending in seamlessly with the electronics. The only thing that bothered me about this piece was the ending; a female voice enters very close to the end, breaking through the sound world of the past fourteen minutes and triggering a flourishing close in the marimba. While the ending was convincing, I found myself wondering how the voice was connected to the rest of the piece.

Track 3 is *Twilight* (2000), a piece for bassoon and electroacoustic sounds. It consists of four continuous movements based on the four types of twilight: civil, nautical, astronomical and true night. For those unfamiliar with this concept (as I was before looking it up), here is a brief explanation: before the sun rises and after it sets, civil twilight occurs when the sun is up to 6 degrees below the horizon, nautical twilight occurs when the sun is from 6 to 12 degrees below the horizon, astronomical twilight is when the sun is 12 to 18 degrees below, and beyond that is true night. The four stages delineate how much can be seen and distinguished at various points of the sun's rising and setting. This concept is an integral part of *Twilight*, which tries "to evoke the daily and almost imperceptible process of light fading away and night covering the sky" by drawing a parallel between sunlight and sound. The blurring of sight as the world becomes dark is made manifest in aural illusions; there are many moments when the listener is unsure which line is being performed live and which sounds are electronic trickery. As the piece progresses, the brightness and clarity of the electronic sounds fade, and they evolve from eerie meta-bassoon glissandi and extremely high-pitched nasal riffs to percussive thumps, glitches, and sounds of wind, to simple resonating timbres growing out of the live bassoon's long notes. The bassoonist, Wendy Holdaway, does a fabulous job of manipulating the sound of her instrument to reflect these changes in her "environment." Just as the sun's light over the horizon slowly fades away, the piece ends with a very "dark-sounding" fadeout—a fitting conclusion to Sigal's creative version of musical twilight.

The next piece on the CD is *Cycles* (1999), which is in two movements that are composed similarly: "Stop" and "potS." Sigal describes the concept as "Feelings and sounds coming back to our memory. 'Cycles' of ideas, transformations, processes, and sounds." Both movements use similar source material—a voice saying "stop," and a dichotomy between high- and low-pitched sounds. However, they come off very differently because of the way the material is treated. "Stop," the longer of the two, has a more relaxed and logical trajectory. A lone high tone begins the piece, and gradually becomes more complex in timbre. It is joined by lower swells and thuds, and the two lines become intertwined to introduce the spoken voice. The rest of the piece builds from this type of interaction. "Memories" of sounds past weave in and out of the texture. Eventually, the voice transforms and becomes part of the previously separate registers. "Stop" is an excellent example of Sigal's mastery of creating strategic relationships between sound worlds.

The second movement, "potS," has a faster pace and more tension. It is clear that this movement has the same concept and source sounds as the previous one; however, the vocal sounds appear more in distress, and the sounds have a more synthetic quality than those of the first movement. Clearly, the feelings and sounds coming back to our memory in this movement are not as pleasant. This movement also seems less focused. As a whole, though, the two movements together create a very interesting demonstration of composing out the same idea in two different ways. I'm not sure that one without the other would work as well. By composing two movements, Sigal introduces another layer of relationships: that of a sound to its counterparts in the *other* movement.

Tolerance (2000), for cello and electroacoustic sounds, closes the disc on Track 6. As the title suggests, the relationship between the live instrument and the electronics in this piece is one of peaceful coexistence. Both take turns in the spotlight, and it is as if they are having a conversation, "translating" gestures from cello to electroacoustic sounds and vice versa. The cello has some very lovely lines, and Thomas Gardner makes the instrument sing while flawlessly executing difficult double-stops and harmonics. About halfway through the piece, strangely reverbed voices enter into the electroacoustic vocabulary. This makes the piece a little creepy for a couple minutes, and I was relieved when the voices went away. The rhythmic activity gradually loses speed until the piece ends in a slow counterpoint of cello harmonics and high-pitched electroacoustic responses. It was a very beautiful finish for the CD.

On the whole, I would highly recommend the music on Rodrigo Sigal's *Space Within*. Sigal composes with a fresh awareness of the possibilities and relationships inherent in electroacoustic music, and he is not afraid to make bold juxtapositions and craft them into convincing musical ideas. He has a lyric sensibility and a keen sense of structure that combine to make his pieces clear, enjoyable, and memorable. We can only wait for more great music to come from this promising young composer.

Book Review

Arun Chandra, ed. *When Music Resists Meaning: The Major Writings of Herbert Brün*. Middletown, Conn.: Wesleyan University Press, 2004 (ISBN 0-8195-6670-5).

Joseph W. Hupchick

Throughout much of the history of music in the Western world, composers seem to have had little to say about their own music, or even about the music of others—at least as far as the surviving evidence is concerned. For composers who have written a substantial amount on the subject of music—Schumann, Wagner, Schoenberg, Babbitt, and Oliveros immediately come to mind—such writings are an invaluable resource, not only for understanding the composer's own work, but for gaining insight into his or her philosophy of music and its relationship to history, society, and culture. *When Music Resists Meaning: The Major Writings of Herbert Brün*, edited by Arun Chandra, provides such insight into the musical and cultural world of one of the late-twentieth century's most inventive composers.

The essays in this volume span more than forty years—1952 to 1993—and represent a diversity of views on music and the arts. The collection is divided into five main sections. The first four comprise Brün's essays and lectures, and the last comprises Brün's poetry and plays. The first section, "Listening," concentrates on music from the listener's perspective and on the relationships between listener and composer. For Brün, the centrality of the listener cannot be understated; concerning listening, he writes: "It is absurd that throughout the history of music and its social functions, the word *genius* frequently applied to composers never yet has been applied to a listener" (52). Although Brün's work ponders the very nature of music ("Under what circumstances will an acoustical event turn into a musical event" (50)), he is primarily concerned with the listener whose *intent* is to listen, rather than the casual listener who happens to hear music, as on the radio. It is therefore no surprise that Brün makes no attempt to hide his distaste for—even hostility towards—background music of any kind.

Central to Brün's view of the relationship between composer and listener is the concept of anticommunication, a term so difficult to define that Brün himself often writes *around* it rather than define it. While communication is defined as "a human relation between persons and things which emerges and is maintained through messages required and permitted by already available systems or mechanisms," anticommunication is a similar relationship "which emerges and is maintained through messages requiring and permitting not-yet-available encoding and decoding systems or mechanisms" (288). Similarly, while "communication is achievable by *learning from* language how to say something," anticommunication "is an attempt at respectfully *teaching* language to say it" (63). For Brün, anticommunication and communication have a deeper social significance: "Insistence on *communication* ultimately leads to social and physical violence. *Anticommunication* ultimately leads to the insistence on *composition* and peace" (289).

The better part of the second section, "Composing," consists of two previously published interviews with Brün concerning his compositional philosophy and practices. In particular, "Toward Composition," an interview with Stuart Smith originally published in *Perspectives of New Music* in 1979, provides a glimpse into Brün's beliefs about the composer and his place in society. For Brün, the composer should maintain a level of political responsibility. In their relationships with society, people can be either *products* of society or *inputs* into society, and Brün believes the latter to be more socially responsible.

The third and fourth sections, "Composing with Computers" and "Cybernetics," are naturally the most technical and, consequently, the most difficult to follow for those who might not be familiar with the technology of computer music. In these sections, Brün's lucid and insightful prose occasionally gives way to writing that straddles the fine line between the seemingly profound and the virtually nonsensical. Consider Brün's definition of music:

> Music is the result of a continuous attempt to reduce to order the assumed chaos in the system of acoustical elements and events, with the purpose of mobilizing the means for the communication of thoughts which transcend the definition of the system. (A creative project.)
>
> These thoughts, consequently called "musical thoughts," are the result of a continuous attempt to organize a system, called the "composer's mind," with the aim of knowing all about the system, and to render the extracted information communicable. (A scientific project.) (186)

The body of the volume closes with the fifth section, a brief selection of Brün's poetry and plays. Considering the appeal of Brün's poetry in particular, it is

regrettable that this section is so short: the poetry and plays amount to a scant thirteen pages, comprising five poems and two short plays. Appendices include a brief biography, a list of Brün's compositions and program notes, and chronological lists of compositions and publications.

In general, Chandra has done an admirable job in editing the collection; the book is well organized and free from the types of errors that so frequently plague similar publications. But notwithstanding the virtues, the collection does suffer from a few problems. Perhaps its chief weakness is the lack of editorial material. Considering the value of this collection of essays, not only to composers and computer musicians but to a more general readership of artists and musicians, a foreword by the editor concerning Brün's contributions and his importance to twentieth-century music is certainly warranted. This is all the more necessary considering how little attention Brün has received in general musical discourse during the last several decades. For example, only a scant 225 words have been devoted to Brün in the second edition of the *New Grove Dictionary of Music and Musicians* (a generous treatment, considering that he is just as often not mentioned at all). In addition, a number of the essays contained in the collection are previously unpublished lectures. Additional information about the context of such lectures would be helpful to readers.

One final remark concerning the title: the identification as "The Major Writings of Herbert Brün" is somewhat misleading. Given Brün's substantial list of publications, those that comprise this volume represent a mere fraction. This fact should not diminish the value of this important work, nor should it be interpreted as a criticism of this collection. However, it does underscore the need for further recognition and availability of Brün's additional writings. In particular, his earlier writings, which were printed in German, have never been available to the English-speaking world; even the original German versions are frequently conspicuously absent from American library shelves. It is hopeful that this volume will be only the first pioneering step towards an increased awareness of the life and works of one the most innovative composers of the twentieth century.

The Editors of Array are looking for interested persons to write articles and reviews for upcoming issues. (The next issue will be coming out in the summer of 2007.) If you would be willing to write something for Array, or have feedback about this issue or ideas for future issues, please email us: array.journal@gmail.com. In your email, please give us your name, mailing address, and any particular areas of interest, so that we can send you any appropriate materials. If you write a CD or book review, you will be able to keep your review copy free of charge. The success of Array depends on input from its readers, and we look forward to hearing from you.

Thank you,
Margaret Schedel
Jennifer Bernard Merkowitz

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