Events

Orchestra Tech National Conference

American Composers Orchestra, New York, New York, USA, 10-14 October 2001

Reviewed by Jason Freeman
New York, New York, USA

Over 75 composers, performers, researchers, and arts administrators gathered in New York, 10-14 October 2001, for the Orchestra Tech National Conference, a series of five concerts of chamber and orchestral music and nine panel discussions on a broad set of artistic, technological, and administrative themes. The concerts and panels took place at a number of locations around New York City, including Columbia University, New York University, Carnegie Hall, and the Knitting Factory.

The conference was the inaugural event of the American Composers Orchestra’s (ACO’s) Orchestra Tech project (www.orchestratech.org), which is described as “a multi-year initiative to explore and encourage the integration of technology into the modern orchestra and to stimulate the development of new symphonic music using new media and digital technology.” Tod Machover, composer and MIT Media Lab professor, leads the initiative in his role as the ACO’s Music Technology Advisor.

One of the most enlightening—and sobering—moments of the conference was a presentation by Robert Sutherland, music librarian for the Metropolitan Opera. Mr. Sutherland began with a brief historical discussion of music printing since the founding of the Met, illustrating each “improvement” with sample parts from the Met’s music library. With each advance in printing technology, the clarity and longevity of the music suffered: paper faded more quickly; beams became harder to distinguish and had to be darkened by hand; and note spacing became less logical and natural. Today, members of the Met Orchestra request to use the old handwritten parts whenever they are available, because they are in the best physical condition and are the easiest to read. After a melodramatic pause, Mr. Sutherland stated the obvious conclusion: “So far, technology has not done us well.”

Mr. Sutherland’s observation highlighted two recurring themes of the conference. First, orchestras are reluctant to incorporate technology into an ensemble that functions well without it. As one prominent orchestra administrator saw it: “Composers are trying to fix a problem that doesn’t exist.” Second, the use of technology in an orchestral setting often introduces more problems—artistic, technical, financial, and logistic—than benefits.

These two themes served as a stark warning to anyone interested in uniting the orchestra with technology. Thus, the most interesting performances and panels at the conference were those which heeded this warning and proposed solutions, either through words or through music: compelling reasons for using technology in the orchestra, and practical techniques to address the challenges it use poses.

Many composers gave persuasive artistic reasons for the use of technology in a chamber music setting, both through their presentations and through performances of their music during the conference. Ricardo del Falla’s Homotecia and James Mobberly’s Soggiorno show how chamber and solo musicians, respectively, can bring a fixed tape accompaniment to life through skillfully composed interplay between live instruments and electronics. Robert Rowe, in a panel presentation, surveyed his use of intelligent machine listening in interactive works for soloist and computer: software reacts to performance gestures to create a true collaboration between human and machine. Randall Woolf’s Hee Haw integrates looped samples of square-dance callers (triggered by keyboard players) with a chamber ensemble and two singers to create astonishing musical textures far greater than the sum of their parts. And Joshua Fineberg’s Empreintes uses real-time analysis of each instrument in the ensemble to capture, analyze, modify, and emphasize different aspects of the performance, giving the computer the role of musical interpreter rather than performer: the machine serves as a prism through which the audience experiences the music.

Only a handful of composers, though, directly addressed the challenge of integrating technology into a large orchestral setting. Mr. Machover, whose new work Sparkler was premiered by the ACO at the final Carnegie Hall concert, uses real-time audio analysis of the entire orchestra to respond to the character of several aleatoric sections of his work. In his discussion of the piece, Mr. Machover was vague about what these characteristics were. He suggested that the software, developed by Tristan Jehan, senses general “perceptual parameters,” such as balance and timbre, which can vary significantly in each performance. By giving the human musicians more interpretive freedom, Mr. Machover believes that the electronics can respond in a more varied and meaningful way, adding a new dimension to the excitement of live performance.
Tristan Murail, whose work *Le Partage des Eaux* was given its U.S. premiere at the same Carnegie Hall concert, uses electronics to subtly complete microtonal harmonies that would be impossible to realize on fixed-chromatic instruments (such as the harp). For Mr. Murail, adding electronics is also a way to compensate for some of the inherent limitations of the orchestra. For instance, no instrument in the orchestra can play in a very high register both softly and quickly; compensating for this weakness with electronics opens up new possibilities for orchestration.

Roger Reynolds, whose chamber work *Ariadne’s Thread* was given its New York premiere by the Ethel Quartet, also eloquently addressed the artistic motivations for using technology with orchestra. For Mr. Reynolds, the use of technology in large ensembles provides a chance to explore issues of time, memory, and space in ways that would otherwise be impossible. More than any other composer at the conference, Mr. Reynolds articulated clear motivations for the use of technology, and he has put these ideas into practice in a half dozen works for orchestra and electronics. It was a shame that the ACO was not able to perform any of these large-scale works.

Over the course of the conference, composers, performers, and administrators described an overwhelming list of practical problems inhibiting the success of orchestral music with technology in the American concert hall. These issues range from rehearsal time to union negotiations to equipment reliability to concert hall acoustics. Every participant had a “war story” to share, and there were even a few technological fiascos at the conference performances, ranging from computer crashes to fire alarms. Given the sheer number of works performed, it is actually a minor miracle that the concerts all went as smoothly as they did.

Panelists at the conference offered various strategies for dealing with these practical problems. Rand Steiger, whose work *13 Loops* was performed by flautist Carol Wincenc, proposed that orchestras invest in technology just as they invest in percussion, maintaining an in-house supply of commonly used equipment and a full-time staff—equally fluent in music and in engineering—which is accorded a level of training and prestige similar to that of other orchestral musicians.

A more practical solution, at least in the short term, was proposed by David Wessel, who described an ongoing collaboration between the Berkeley Symphony Orchestra and the Center for New Music and Audio Technologies (CNMAT). Over the last few years, CNMAT has helped the Berkeley Symphony perform a number of works with technology. With an emphasis on seamless integration and reliability, Mr. Wessel mentioned such obvious but rarely used techniques as having multiple, redundant computers (and rehearsing crashes); delivering a full technology setup to a performer’s home to facilitate practice; and setting up a mixing console in the “house” which takes up only a single seat, so as to deprive the orchestra of as few ticket sales as possible. Besides these specific suggestions, Mr. Wessel also proposed a model for collaboration between academic institutions and professional ensembles to together produce performances of music with technology. In fact, the conference itself provided another example of this type of collaboration: a concert by Speculum Musicae was facilitated by personnel and technological support from the Columbia University Computer Music Center.

More than anything else at the conference, Mr. Wessel’s call for collaboration between academia and
professional ensembles is an idea which could [and should] be immediately put into broader practice and could have far-reaching effects. Such collaborations make orchestras less wary of programming works with technology, because the technical details of producing the performance are handled by experts in both technology and symphonic music. Students at academic institutions receive practical training in realizing works with technology, moving toward Mr. Steiger’s idea of training orchestral technology staff. And composers at the institutions are grounded in the practical considerations, pitfalls, and techniques of writing for orchestra and technology.

This type of collaboration between institutions and ensembles already occurs quite frequently when the piece is written by a composer associated with one of these institutions. At this conference, for instance, the MIT Media Lab sent a crew of students and staff to New York to assist in the premiere of Mr. Machover’s work. But this collaboration must expand, as it has at CNMAT, to include the performance of other works as well. Only then will works with technology have any real chance at entering the repertory, or even at receiving repeat performances.

Besides these practical performance considerations, an even more basic hurdle for many composers lies in the technological expertise necessary to create the work itself. Along these lines, many composers, most notably Mr. Steiger and Mr. Reynolds, emphasized the benefits of collaborating with a “technologist,” who should then be credited as an essential collaborator in the creation of the work itself. Many such technologists, including Miller Puckette, Perry Cook, Joe Paradiso, Peter Otto, and Mr. Wessel, presented their own recent research at the conference, and several also assisted in the performances.

At several points during the conference, the conversation drifted away from technology and focused on the more fundamental problem of contemporary music and the orchestra. How can composers expect orchestras to risk programming works using technology when they are so often reluctant to program contemporary music at all?

The optimistic view—and one admirably espoused by the ACO itself—is that by embracing technology, orchestras can reach out to new audiences, renew their relevance to contemporary society, and, in so doing, ensure their own viability into the future. A panel discussion with arts administrators indicated that orchestras are indeed ready to embrace technology, but only in ways which will not threaten their role as a musical museum. Joseph Kluger (of the Philadelphia Orchestra) and Martin Verdrager (of the Juilliard School) described a utopian concert hall experience in which interactive TV displays show audience close-up shots of performers and provide running commentary on the performance.

Few composers would agree with this strategy for integrating technology into the orchestra. Adding a flashy stadium-like scoreboard to the concert experience might reach a few more people of the MTV generation, but it is really only a band-aid solution to a more fundamental problem.

It does indicate, though, that orchestras are ready to incorporate technology into the concert experience. It is now up to composers and researchers to present compelling ideas about how to do so, in ways which are artistically satisfying for composer and audience, financially feasible for strained orchestral budgets, and logistically expedient to reliably and efficiently produce. We can only hope that other orchestras will follow the ACO’s lead in encouraging discussion about these issues and giving composers a chance to experiment with the medium.

For a complete schedule of events for the Orchestra Tech conference, and for more information about the initiative, visit ACO’s Web site (www.orchestratech.org). Most of the panels, symposia, and concerts are available as streaming video at www.newmusicbox.org/ (archived in Issue 30, Vol. 3, No. 6).

The Future of Computer Music Software—A Symposium

Dartmouth College, Hanover, New Hampshire, USA, 19 November 2001

Reviewed by Matthew B. Smith
Hanover, New Hampshire, USA

With the ambitious objective of discussing the future of computer music software, Dartmouth College hosted a monumental symposium featuring some of the most visible innovators in the field. Max Mathews, Gareth Loy, Barry Vercoe, David Zicarelli, Miller Puckette, and James McCartney were all invited to present both their past accomplishments and also the current direction of their work.

Eric Lyon, professor at Dartmouth College, welcomed the audience and gave a brief introduction of the participants. Quoting Mr. Loy’s assertion in 1989 that so many computer music systems rapidly reach a point of extinction, Mr. Lyon countered that today’s symposium would explore the few exceptions that have survived longer and whose concepts are still fundamental.

Mr. Matthews, unquestionably the
first to embark on the creation of computer music software, spoke first. Opening with the disclaimer, “I’m going to be talking about the past,” he described the innovations he implemented between 1957 and 1964 at Bell Labs. Moving quickly from a single voice consisting of a triangular waveform in Music I, waveform oscillators, unit generators, the notion of a score with p-fields, and block diagrams were introduced as Mr. Matthews progressed toward Music V. One critical insight he shared was his intent to shift the burden of timbre design onto the composer. As with many of his innovations, this idea is part of the foundation Mr. Matthews provided for the development of computer music software.

Along with F. Richard Moore, Mr. Loy was one of the primary authors of the software developed at the University of California at San Diego as part of the Computer Audio Research Laboratory (CARL) distribution in the 1980s. The goals of this distribution were to coordinate the community work of developing audio tools for the UNIX operating system. This provided a context for the exchange of free and open source code that was reasonably portable between different UNIX systems. As Mr. Loy described it, the authors of the CARL distribution were “generalists of the most general sort,” so that the user could determine what happened between a “general purpose computer” and a “general purpose loudspeaker.”

While the contributions of the CARL distribution and Mr. Matthews’ work have had an undeniable impact on the current state of computer music, these presentations focused mainly on the past and failed to address the main topic of the symposium: the future of computer music software. It could be implied, though, from these historical presentations that the next generation of music software will be heavily dependent on its predecessors and perhaps may only be an enhancement of the paradigms already established.

Mr. Vercoe continued the pattern of presenting a linear history of his accomplishments beginning with his adaptation of Mr. Matthews’s work into Music 360. This and future permutations were necessary as computer hardware evolved and new capabilities were added. This resulted in Csound. Mr. Vercoe also presented some of his research in how computers interact with performers, with the eventual implementation of this into Real-Time Csound, NetSound, and the industry-supported Extended Csound. Regarding the future of music, Denon karaoke machines will be utilizing many of the Extended Csound features for both sound generation and having the machine “follow” the performer. Also, Mr. Vercoe’s most recent project, MPEG-4, utilizes NetSound techniques for significantly reducing file size by synthesizing only after being transmitted over the Internet.

The creator of Max and pd, Mr. Puckette introduced his software as a blank page that imposes no musical style. Addressing the economics of software, he espoused the positive aspects of both free and commercial software: free software benefiting from its distance from commercial pressures and the constraints of the marketplace, and commercial software being more visible and easily available. Going back into history, Mr. Puckette praised Mr. Matthews’s perennial wave-table oscillator and then demonstrated how simple it was to call up such an oscillator in pd. He also emphasized the importance of being able to archive work so that “musical practice is not hopelessly, irrevocably imbedded in musical software.” Embracing the proliferation of inexpensive hardware and Linux, Mr. Puckette discussed the possibility of empowering the rest of the world to make their own computer music while maintaining diversity.

Mr. Zicarelli’s work in Max and MSP is so dependent on Mr. Puckette’s ideas that at first glance it may seem redundant to have had both of them speak. Nevertheless, he started by mentioning some of the visual design concerns, and attributed the popularity of the software to the ability to externally load objects. Mr. Zicarelli described the ease with which objects can be linked together as “dynamic binding” and attributed such architecture as a bias toward individual idiosyncrasy rather than experimentation. With that in mind, Max/MSP aims to facilitate creative work through system feedback, clear documentation, and a small number of basic concepts that can be applied throughout the entire program. The implementation of JavaScript into Max now allows users to write Max externals without programming in C. It also allows for the patch to be dynamic and build new parts in response to the user interface.

Describing SuperCollider as a “high-level language with a real-time synthesis engine,” Mr. McCartney quickly outlined the various versions of the program. These included the current developments of SuperCollider 3 and SuperCollider Server. The most recent programs split into different machines or, in the latter case, even separate applications. Programmable patch building, spawning events, algorithm trees, and various objects and classes were briefly described. Mr. McCartney observed that in designing an architecture certain decisions cut off other possibilities. SuperCollider Server partially
explores these other areas while sacrificing some of the benefits of the earlier versions. Running as Macintosh OS X command-line programs, the language and synthesis engines communicate via the Open Sound Control network protocol. Overall, Mr. McCartney’s presentation was more technically detailed than the others as he seems to be perpetually modifying and re-creating the SuperCollider environment.

Following these presentations, a panel discussion took place with the six speakers. Beginning the discussion, Mr. Lyon, serving as moderator, brought up the subject of “cannibalism,” or the inclination of different software creators to incorporate ideas from others. Mr. Zicarelli suggested that other software (such as Csound) could be easily incorporated into MSP as an object. He also mentioned the possibility of MSP creating plugins for use in other software. Mr. McCartney indicated that rather than combining things, dividing up components into a modular system might be more effective.

When the question arose of what would happen if the software creators had to start over from scratch, Mr. Puckette answered that his previous experience and memory would make him incapable of coming up with anything new or revolutionary. This insight does bring up the question of whether these panelists really have anything to say about the future of computer software other than the possible revisions of their own software.

With the panel discussion lasting two hours, many issues and questions were raised. While this meeting struggled to provide more than a fleeting glance into the future, these creators are obviously still searching for new methods and solutions to the perplexing problems that arise from music software creation.

Wedelmusic: First International Conference on Web Delivering of Music

Florence, Italy, 23-24 November 2001

Reviewed by Denis Baggi Manno, Switzerland

The Wedelmusic conference, which received its name from the WeDel-Music (Web DELivery of MUSIC) project, is the first of a series which is intended to deal with the distribution of music, including protection and fruition, transaction models, modeling, streaming, new media, conversion, and cultural heritage. The conference took place in Florence on the 23rd and 24th of November 2001, with about 60 participants from all over the world, including Australia, USA, Canada, Singapore, Germany, France, Austria, Denmark, England, Switzerland, and, of course, Italy.

The level of the contributions was generally very high, always at the scientific and technological edge of current research, and the organization was perfect, with well-working audio and video devices. The interaction among participants was likewise very effective and provided many opportunities for exchanges across the several areas represented.

Here follows a brief description of each contribution, with reference to the page numbers in the Proceedings (available from IEEE Computer Society Press, PO Box 3014, Los Alamitos, California 90720-1314, USA; electronic mail cs.books@computer.org).

23 November 2001

After the greeting by Conference Chair Paolo Nesi of the University of Florence, the first lecture was by Keynote Speaker Denis Baggi of the Institute for Applied Computer Science and Industrial Technology (CIMSI) of the Professional University of Southern Switzerland. This talk, “Understanding Jazz: The Structures of Swing” (p. 2), was not an academic lecture but a description, with examples, of the speaker’s multimedia system (book + CD-ROM) explaining the inner working of jazz improvisation. The originality of the approach lies in the fact that every musical example can be heard immediately, and that jazz history is treated in function of improvisational structures that traverse all periods. A few dozen examples were presented, with a demonstration by the speaker on his soprano saxophone.

Mr. Baggi also announced the existence of a new Standards project [IEEE Project Authorization Request 1599, dated 28 September 2001], concerning the “Definition of a Commonly Acceptable Musical Application Using the XML Language.” The interest of Intelligent Manufacturing Systems (www.ims.org) in financing this effort was also noted.

The first session was on Music Protection. Michael Arnold, of the Fraunhofer Institute in Darmstadt, presented “Blind Detection of Multiple Audio Watermarks” (p. 4), a system of algorithms enabling blind detection of watermarks, including multiple ones. This was followed by Martin Schmucker, of the same institute, presenting “High Capacity Information Hiding in Music Scores” (p. 12), describing techniques to add watermarks to a score. He also presented “Using Musical Features for Watermarking Music Scores” (p. 20), on how to exploit musical features such as beams, slurs, and ties to embed watermarks. “Watermarking Music Scores While Printing” (p. 28) was introduced by Marius Bogdan
Spino of the University of Florence; this is a new technique for watermarking music while printing music sheets. Franco Bartolini, of the same university, presented “Watermarking-Based Copyright Protection of Internet-Delivered Multimedia” (p. 36), a proposal for an Electronic Copyright Management System to enable protection in open networks. Finally, “Content Protection and Usage Control For Digital Music” (p. 46), was delivered by Yongwei Zhu of the Kent Ridge Digital Lab in Singapore. This work concerns a watermarking scheme for both compressed music and MIDI format.

The next session, Music Editing and Recognition, started with “Automatic Formatting of Music Sheets” (p. 170), by Riccardo della Santa of the University of Florence, presenting a set of conditions and rules for music formatting formalized for execution by the Music Intelligence Formatting Language system. George Giannopoulos, of the University of Athens, discussed “Music Editors for Visually Impaired People: User Interface Specifications and System Design” (p. 178), user-interface specifications and software systems for the electronic editing of music by blind people. Lastly, Ivan Bruno, again of the University of Florence, presented “Optical Music Sheet Segmentation” (p. 183), a system that recognizes and extracts basic symbols from a musical score.

The last session of the day was on Applications. “The European Music Navigator: To Build Bridges Between Local, National and Global Cultures, Using the Ontology-Based Search Technology Melvil™” (p. 192) was presented by Peter Rantasla of the International Association of Music Information Centers in Austria. Kai Renz, of the University of Darmstadt, presented “Web Delivery of Music Using the GUIDO Note-Server” (p. 193), an online service to deliver graphical images of a music score. The session ended with an exhaustive demonstration of the WeDelMusic music editor by Mr. Nesi, a system which deals with all sorts of music encodings: score, images, texts, and the like (see also the article on p. 79 described below).

24 November 2001

The next day began with the session Music Modeling and Distribution. Andreas Kornstädt, of the Center for Computer Assisted Research in the Humanities, Stanford, discussed “Data Models for Virtual Distribution of Musical Scores” (p. 62), the MuseData model for score archiving and distribution. “Music Information Description by Mark-Up Languages within DB-Web Applications” (p. 71), presented by Maurizio Longari of the Laboratory for Musical Informatics of the University of Milan, was a review of past standards, and focused on the use of XML.

“WeDelMUSIC Format: an XML Music Notation Format for Emerging Applications” (p. 79) by Pierfrancesco Bellini of the University of Florence, described the WeDelMusic project with examples of XML encoding.

The session on Audio Fruition and Manipulation began with “The Neural Network Model of Music Cognition ARTIST and Applications for the WWW” (p. 155), by Frédéric Piat from Paris. It described a Neural Network capable of simulating high-level perceptual and human cognitive abilities with regard to human musical preferences. In his paper, “Expressive Morphing for Interactive Performance of Musical Scores” (p. 116), Antonio Rodà, of the University of Padova, described a system to process in real time the expressive character of the rendition of a score.

Max Mühlhäuser, of the University of Linz, Austria, presented “GlobeMusic: The Internet Scale of eMusic Making” (p. 131), an Internet system for computer-human interaction, individual eMusic-making, cooperative eMusic-making, and the like. Florian Pestoni, of the IBM Almaden Research Center near San Jose, described “KARC: Radio Research” (p. 139), a system to select a radio station in function of a user’s musical tastes. “Real Time Musical Events Streaming over Internet” (p. 147), introduced by Dominique Fober, of Grame Computer Music Research Laboratory, Lyon, is a protocol for streaming real-time events over the Internet. Finally, “The Recording Studio that Spanned a Continent” (p. 161) was the contribution of Jeremy Cooperstock, of McGill University, Montreal, describing a real-time concert played in Montreal and heard in Los Angeles via broadband Internet. His presentation also touched on related issues such as real-time “jamming” over the World Wide Web.

The next session, Cultural Heritage, consisted of one contribution, “Saving the Multimedia Musical Heritage of Teatro Alla Scala for Querying in a Web-Oriented Environment” (p. 52), by Goffredo Haus of the Laboratory for Musical Informatics at the University of Milan. He described the rescuing, processing, archiving, and structuring of the documents—audio, video, and other—of La Scala, accessible through a multimedia database.

The session Music Analysis and Classification completed the conference. “Classification of Melodies by Composer with Hidden Markov Models” (p. 88), by Emanuele Pollassi, of the Laboratory for Musical Informatics at the University of Milan, focused on a Hidden Markov model to abstract the style of a composer. “Content-based Identification of Au-
dio Titles on the Internet’’ (p. 96) was presented by Helmut Neuschmied of the Institute of Information Systems Joanneum Research in Graz, Austria, and concerns a system based on Audio DNA, from which the title of a piece can be extracted. François Pachet, from Sony, Paris, discussed his ‘‘Musical Data Mining for Electronic Music Distribution’’ (p. 101), a method of classification for music. In conclusion, Jérôme Barthélémy, of the Institut de Recherche et Coordination Acoustique/Musique, Paris, presented ‘‘Similarity on Computational Music: A Musicologist’s Approach’’ (p. 107), regarding methods for musical analysis.

The WeDelMusic Conference concluded on Saturday, 24 November. Other related activities, such as a session on Electronic Music Publishing, continued at the Villa Strozzi in Florence, home to Tempo Reale, active in computer music.

Publications

Thomas D. Rossing: Science of Percussion Instruments

Hardcover, 2000, ISBN 981-02-4158-5, 208 pages, illustrated, references, name index, subject index, World Scientific, Series in Popular Science, Volume 3, World Scientific Publishing, Farrer Road, P. O. Box 128, Singapore 912805; telephone (+65) 466-5775; fax (+65) 467-7667; electronic mail wspe@wspc.com.sg; World Wide Web www.worldscientific.com

Reviewed by Anthony De Ritis
Boston, Massachusetts, USA

You think Led Zeppelin rocked? You may want to hold your judgment until you experience the Till Family Rock Band, a family from Northwestern England playing on lithophone instruments that use vibrating stones to create sound. According to Thomas Rossing, lithophones are descendents of ancient Chinese stone chimes, just one example of the breadth of percussion that is covered in his book, Science of Percussion Instruments.

This text presents facts and perspectives from a multiplicity of music and science-based disciplines. At once it reads like an encyclopedia, a book of orchestration and instrumentation, an ethnomusicalogical treatise, an introduction to acoustics and psychoacoustics, and a historical reference. Mr. Rossing’s book is thoroughly informative, never wavering from its intent to be written specifically for musicians. For the most part, the author avoids complex mathematical formulae.

Although percussion instruments may be among the oldest musical instruments, Mr. Rossing notes that relatively little has been written about the science of their sound. Science of Percussion Instruments responds to the lack of scholarly work in this area, in what may become the standard reference for all future research on the acoustics and psychoacoustics of percussion instruments.

At 208 pages, the text is not meant to be a thorough introduction to the physics of sound, Mr. Rossing chooses topics in acoustics that directly support his discussion of percussion instruments (he describes these chapters as ‘‘Interludes’’). However, one merely needs to refer to his previous publications, The Physics of Musical Instruments and the Science of Sound, for a more complete discussion. Together, these three texts are a formidable trilogy, solidifying the author’s position as one of the foremost thinkers on the science of musical sound.

In an orchestration seminar I attended in graduate school, we would often discuss how church bells might have influenced contemporary French composers. These discussions typically occurred after listening to the music of Gérard Grisey or Tristan Murail. In what ways could the spectra of bells be used as the basis for harmonic structure in a musical composition? How we could have used Mr. Rossing’s text back then! The book handles the complexities of all kinds of bells: church bells, carillon bells, hand bells, cow bells, temple bells, Korean bells, Japanese bells, and covers their construction, tuning, sound radiation, spectra, decay, and more.

If you are ever asked to compose a work for carillon, your compositional resource has arrived. Jeff Davis, the carillonneur at the University of California, Berkeley, once asked me to compose a piece for him, and suggested that I should avoid major thirds because they don’t sound so
good. What is it about the construction of carillon bells that makes this the case? Why is there ambiguity in the pitch of bells? With the discussions provided in Mr. Rossing’s text, I now feel empowered to write such a piece.

You can tell that the author has an affinity for individuals who have experimented, built, and performed on original percussion instruments. Citations of Harry Partch’s “cloud chamber” bowls, his “boos” [bamboo marimbas], as well as the “zoomophone” built by instrument-maker Dean Drummond [consisting of 129 aluminum tubes tuned to a 31-note per octave scale], are found throughout the book. If you’ve ever wondered which instrument was used for the scene changes in the TV show Charlie’s Angels you need look no further. The answer to this trivial pursuit is the “mark tree,” named after creator Mark Stevens. In addition, there are no less than four works cited that make use of the typewriter as a percussion instrument. At times, Mr. Rossing’s text reads like a history of orchestration.

I would suggest that the reader jump ahead and learn immediately about “holographic interferometry” [in chapter 10, “Music from Oil Drums: Caribbean Steelpans”]. Many of the informative graphics provided throughout the book are based on this technology, and this discussion provides a clear understanding of vibrational modes, a topic more complex for those of us challenged by the physics of a vibrating string, or of air moving in a column. Some musicians may feel the need to reread the discussion on nodes and modes, but this patience will be rewarded, as it unlocks much of the difficulty associated with the vibrational patterns of membranes.

Science of Percussion Instruments is an inspiration for my own research and composition. In his preface, Mr. Rossing describes his philosophy regarding how the scientific study of musical topics generally confirms what we already know about music intuitively, but can be used to effectively shorten the learning curve. Soon orchestration texts will include acoustics and psychoacoustics in addition to learning the range, idiomatic usage, and standard combinations of musical instruments. Of course, these topics are not mutually [or musically] exclusive, and that’s the point. Texts like Mr. Rossing’s suggest alternative learning styles, which can only contribute to one’s ability to master the tools available to composers.

Mr. Rossing’s use of science in learning about percussion instruments [or for that matter, all musical instruments] is an effective balance between universal scientific truths about sound [not culturally dependent] and the instruments and methods of making sound [which are culturally dependent]. The emphasis on the musics and instruments of other cultures suggests that Mr. Rossing would be equally content in life as an ethnomusicologist. His book documents a most effective way to learn about music through the utilization of interdisciplinary methods. Richard Fleming, a professor of philosophy at Bucknell University [and an excellent scholar of music] often speaks about the nature of placing the texts of two disciplines side by side, to see what one could teach the other. This is the spirit of Science of Percussion Instruments.

Here, the author’s placement of a variety of texts from the fields of music and science, side by side, has resulted in an in-depth understanding of percussion instruments, and should be a stimulus for future research.

Mr. Rossing’s book is an invitation to understand percussion instruments holistically, a trend in music education that, in my opinion, will continue. Science of Percussion Instruments successfully tackles a topic that many have avoided due to its inherent complexity. It is an invaluable reference.

Bob Snyder: Music and Memory: An Introduction

Softcover, 2000, ISBN 0-262-69237-6, 291 pages, illustrated, glossary, bibliography/references, index, appendix: listening examples; The MIT Press, 5 Cambridge Center, Cambridge, Massachusetts 02142-1493, USA; telephone (+1) 800-356-0343; electronic mail mitpress-order@mit.edu; World Wide Web mitpress.mit.edu/

Reviewed by Steven M. Miller
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In an attempt to treat compositional concepts for students without formal training in traditional Western music theory and notation, Music and Memory: An Introduction by Bob Snyder is aimed at the sonically interested artist whose conceptual and aesthetic sophistication demands a serious treatment of the subject in an accessible form. In doing so, it successfully applies a whole range of concepts from the fields of cognition and perception, including cognitive psychology and cognitive linguistics. Applying these concepts in terms of how human perception, cognition, and memory systems operate and interpenetrate each other to perceptible music features and structures, the book covers very intensive and sophisticated musical issues without a single example of Western musical notation. The ability to discuss both high- and low-level musical and auditory features and phenomena without relying on notation both makes
it more accessible and avoids a lot of notation-specific pitfalls. Along the way, it is clear that the concepts and explanations provided are also intended to treat non-notatable (at least in traditional staff notation) musics, including the whole history of electroacoustic musics, and—to a perhaps more limited degree—some non-Western musics as well.

Most current texts on musical-theoretical concepts are, at best, largely inappropriate or misguided in terms of addressing these other musical traditions. Indeed, the intentional avoidance of “standard notation” has some, perhaps unintended, benefits. Among these is the ability to broach both lower- and higher-level musical issues with performers and composers whose facility with notation may not match their levels of musicality and musicianship. It also forces the musically literate reader into encountering the concepts in new ways. In doing so, Music and Memory introduces auditory and cognitive concepts in basic, fundamental terms and then applies them to music-specific contexts, providing a broad foundation for understanding and applying the concepts in a variety of related disciplines.

The book is divided into two large sections of approximately equal size: section 1: Some Cognitive Concepts, and section 2: Some Musical Concepts. Section 1 is further broken down into nine chapters, while section 2 comprises four. In general, each section progresses from fundamental concepts to more specific contexts and applications. Also, section 1 provides the theoretical underpinnings of cognitive and memory systems that are in turn used to illustrate and explain music-specific features and concepts in section 2.

Chapter 1 provides a broad overview of the “levels” of memory and how they interact. The three levels identified—echoic memory, short-term memory, and long-term memory—are explicitly linked to the auditory functions of event fusion, melodic and rhythmic formations, and formal identification, respectively. A diagram of these memory levels shows the overall conceptual structure and inter-dependency of the levels. This diagram is referred to a number of times throughout section 1.

Chapter 2 explores the level of echoic memory and early processing in some depth. The concepts of feature extraction and perceptual binding, the most basic stages of cognitive processes, are shown to relate specifically to the level of echoic memory: “the persistence of a large amount of auditory information for a very short time, usually on the order of 250 msec, and probably no longer than several seconds.” This continuous, undifferentiated data stream is not yet categorized, and the function of the early processing stage is to detect specific features and categories of features and organize them into perceptual units. Representation and recognition follow.

Chapters 3-5 deal with short-term memory, “a type of temporary memory that persists for a short time (3-5 seconds on average, 10-12 seconds maximum) and whose capacity is limited to around 5-9 elements, or one chunk.” In turn, this level of memory is shown to be intimately related to the perceptual functions of grouping, phrases, and sets. The idea of boundaries is established. Metaphorical ideas of musical gravity, motion, causality, and repetition are explored. Short-term memory is also related to conscious awareness, rehearsal, and the “chunking” of experience into related units and groups of units.

Chapter 6 covers long-term memory, breaking it down into “implicit memory,” which is not available to consciousness, including skills, habits, conditioning, priming, etc., and “explicit memory” which is available to consciousness, comprising events and facts. The progression from explicit to implicit with repeated experience and intentional practice is established.

The final three chapters of this section establish and explore in turn, categories, schemas, and metaphors as integral to cognitive and perceptual processes. These organizational features allow us to relate newly acquired information to previously encountered information and to organize both accordingly.

Section 2 begins with chapter 10, which focuses on the “event fusion” level, where successive sound waves are fused into single events. It is on this level that basic concepts of pitch arise and in turn give rise to melodic and harmonic intervals. In particular, the octave interval is singled out for special treatment, given its prevalence across styles, historical periods, and to a large extent geographical/cultural boundaries.

Melody, in the sense of successive pitch intervals, is the subject of
Chapter 11. Melodic features such as scales are related to the short-term memory processing system, and then further related to metaphorical concepts such as schemas, nuance, grouping, streaming, motion, contour, and tonality as particular cases of melodic organization. Image schemas such as axial, arch, and gap are further explored.

Chapter 12 takes a similarly in-depth look into rhythm, the time-domain organization of events. Basic concepts such as beat, pulse, tempo, accent, and meter are established as functions of short-term memory. These are then grouped into higher-level features and metaphorical constructs such as rhythmic contour and tension, extended meters, and “free rhythm.”

The final chapter deals with form. In this discussion, form is not restricted to standard or traditional musical forms so much as on exploring how short- and long-term memory processing lead to recognition and recall of formal features such as syntax, closure, coherence, sectional structures, redundancy, duration, succession, linearity, etc. Compositional strategies such as memory sabotage, high-information content, low-information content, and those related to memory length are covered.

The overall organization, clarity of presentation, and non-reliance on standard notation are all clearly strengths of this book. Numerous graphical examples illustrate concepts, and are generally clear and easy to understand in the context of the text. An appendix giving suggested examples for listening is very thorough and broad-based. It would have been very useful to have these examples collected onto a CD packaged with the text, although that might have been a logistical or licensing nightmare. At any rate, it is clear that the examples suggested would tend to lead any given instructor using the text to compile their own examples to supplement or replace the author’s suggestions. There are a few small typographical errors, although in general the copyediting is uniformly good. The most annoying for this reviewer was the consistent misspelling of James Tenney’s name as “Tenny.” This is particularly unfortunate given the obvious centrality of Mr. Tenney’s work as a basis for the current volume.

Perhaps the strongest contribution this book could make would be to a large-scale redefinition of what the term “music theory” means in the context of contemporary, creative, global music. At this point in time, the standard idea of music theory is so bound up with the history of Western classical music as to really constitute a sub-discipline thereof. Supported by Mr. Snyder’s text, along with such books as Tuning, Timbre, Spectrum, Scale by William Sethares, The Musician’s Guide to Perception and Cognition by David Butler, META HODOS and META Hodos by James Tenney, and Music, Cognition, and Computerized Sound, edited by Perry Cook, as just a few notable examples, it should seem clear to any discerning reader or practitioner of music that a non-stylistically based “theory” of music is not only needed but already well established. Basing musical concepts and auditory features on scientific, cognitive, and psychoacoustic explanations will go a long way towards establishing a more precise, flexible, and broadly applicable body of knowledge from which to explore the theoretical side of music. Music and Memory: An Introduction is thus poised to make a valuable contribution to our further understanding of music.


Reviewed by Sean Ferguson
Montreal, Quebec, Canada

As its title suggests, this book is an overview of the large number of subjects contained within the field of music psychology. Charles T. Eagle, Jr., in his introductory chapter, defines music psychology very broadly as an investigation of music as a “form of human behavior.” Since this includes such a wide variety of topics, the focus of the book is on breadth of information rather than on depth. Its goal is to serve as a general reference and as a pedagogical tool, not to make an original contribution to the field. The book is a collection of chapters, each by a different author, that together form an introduction to the field of music psychology. With only one exception, all of the contributors—including the editor, Donald A. Hodges—are professors at American universities.

In general, the individual chapters present an overview of a particular aspect of music psychology—such as psychoacoustics, music cognition, or neuromusico-somatic research—followed by an extensive list of references. The latter is one of the most valuable features of the book, providing pointers to more detailed treatments of the chapters’ topics. These reference lists can be quite extensive, some more than twenty pages long. The chapters are presented very
clearly and are generally well-organized and thorough. Even topics with which one may not be familiar (such as, in my case, neuromusical research) may be grasped with relative ease. The authors normally define technical terms at their first appearance and for the most part avoid excessive use of jargon.

Although the orientation of the book is mainly pedagogical, it is not organized as a textbook. The chapters do not proceed in a logical succession, with one expanding on concepts introduced in previous chapters. Instead, each is a self-contained unit and they may be read in any order. That being said, for those who are less familiar with the field, it is probably best to begin with Mr. Eagle’s “An Introductory Perspective on Music Psychology.” As previously mentioned, the author defines music psychology in its most general sense as being concerned with human musical behavior in all its facets. He gives a very brief overview of the history of the field, including lists of standard works of reference, textbooks, and periodicals, and also suggests possible directions for future research. After this chapter, the reader might then wish to progress to those dealing specifically with the fundamentals of hearing, a topic which is crucial for a fuller understanding of the other chapters of the book; it is an unavoidable fact that music is first and foremost a heard phenomenon. These chapters include “Basic Physical and Psychoacoustical Processes,” by Wanda B. Lathom-Radocy and Rudolf E. Radocy, and “Hearing and Music Perception” by Scott D. Lipscomb and the editor of the collection, Mr. Hodges.

An accompanying CD-ROM elaborates upon these last two chapters with interactive multimedia examples of many of the concepts discussed in the text, including, for instance, demonstrations of critical bandwidth, masking, and diagrams of the physiology of the ear. It also contains a stand-alone program that allows the user to experiment with sliders that control the amplitude of the partials of a harmonic spectrum, and to see and hear the resulting waveform. If a picture is worth a thousand words, then multimedia must be worth a thousand pictures. I have used these examples to great effect in my own teaching of acoustics to students in a course on digital studio composition at McGill University. Although the interface is occasionally awkward and the graphics are somewhat unsophisticated, the disc is brimming with information that is presented quite clearly. The book itself is valuable, and, in combination with the disc, it becomes an even more useful reference and teaching resource.

Following these two chapters, I suggest the reader turn to another chapter by Mr. Hodges entitled “Human Musicality,” that deals with the relationship between people and music in less technical terms. He discusses the different types of human musical behavior in their various contexts, and poses a number of interesting questions, not all of which can be answered by reading the book. This chapter seems to form a natural pair with “The Cognitive Organization of Musical Sound” by Mr. Lipscomb. The author discusses various topics relating to higher-level aspects of hearing, including pattern recognition, auditory scene analysis, and information theory.

At this point, the reader should have enough of a general background to be able to decide on the order of further readings. Those interested in a deeper understanding of the mechanics of hearing may wish to read Mr. Hodges’s “Neuromusical Research: A Review of the Literature,” which deals with the elusive links between the physical structure of the brain and our perception of sound. The search to quantify the aesthetic impact of music on the listener is explored in the chapters “Responses to Music” by Harold F. Abeles and Jin Won Chung, “Physiological Responses to Music and Sound Stimuli” by Dale L. Bartlett, and “The Musical Experience and Affective/Aesthetic Responses: A Theoretical Framework for Empirical Research” by Patrick T. McMullen. The role of music in educational and therapeutic contexts is explored in “Learning Theory and Related Developments: Overview and Applications in Music Education and Music Therapy” by Joe B. Buttram and “The Influence of Music on Human Behavior” by Mr. Hodges and Paul A. Haack. Related to these chapters and also to Mr. Lipscomb’s discussion of music cognition is “Tonal and Musical Memory” by Mr. Bartlett.
Recordings

David Rosenboom:
Invisible Gold

Compact disc, 2000, Pogus 21022-2, available from Pogus Productions, 50 Ayr Road, Chester, New York 10918-2409, USA; fax (509) 357-4319, electronic mail pogal@pogus.com; World Wide Web www.pogus.com

Reviewed by Andrew May
Boulder, Colorado, USA

Hearing older works of electroacoustic music can raise a disturbing question: Are all the toys we have nowadays spoiling us? The latest gadgets sound so smooth and sleek as they perform millions of DSP calculations each second; but that doesn’t always buy us better music! David Rosenboom’s recording Invisible Gold is a fascinating example of what a resourceful musician and engineer could accomplish back in the days of slow, hard-to-program computers and analog synthesis modules that didn’t deliver rich, juicy patches right out of the box. The sounds with which Mr. Rosenboom created the works on this CD aren’t polished to the high gloss of today’s standards; on the other hand, these performances are exciting, challenging, and alive in a way one seldom hears even in the shiniest new works of digital music.

The first piece on the CD, Portable Gold and Philosophers’ Stones, creates an unusual timbral and harmonic space based on pulse waves tuned according to the undertones of a fixed pitch; these are then fed through resonant filters that sweep through the overtones of these bright, raspy timbres. The piece grows from a single drone through increasingly complex harmonies, each based on a continuing drone that gradually descends an octave and a fifth, finally closing on an unstable E-minor sonority. Through this slow harmonic evolution, the energy of the music ebbs and flows effectively. The resonant filters create a palette of gestures that includes fleeting wisps of high-frequency energy, slow timbral shifts that let one or two partials ring out, broad filter-sweep glissandi, florid trills between adjacent partials, sudden harmonic expansions amid the gradual descent, and a recurrent tabla-like swoop in the low bass.

The second piece, On Being Invisible I, uses Buchla instruments (modules, 200 Series, and Music Easel) to create an even wider range of sounds: filtered and reverberated impulses sounding sometimes like plucked strings, sometimes like water dripping, metallic shrieks that punctuate and divide phrases; chattering rhythms of low- and mid-range pulses; distant, hollow bass melodies; sharply metallic, nonharmonically modulated attacks; and grinding, scraping, and buzzing interjections that gradually coalesce into rhythmic patterns.

Similar instruments are used in On Being Invisible II, where the range of instrumental timbres is expanded with finger cymbals and other acoustic sounds, whose characteristics drive the synthesis into new sonic territory (at the beginning of the piece, for example, the amplitude of a finger cymbal, fluctuating as the instrument swings in front of the microphone, seems to drive the pitch of an oscillator to produce a deliciously jagged downward glissando).

These pieces stand pretty well on their sonic merits alone. Their hardware-based timbres have an instrumental quality and character that’s often missing in more recent music, where so many different sound sources and processing techniques can be combined without much effort. The more complex and modulated sounds are delightfully gritty, and the pre-MIDI flexibility of tuning gives richness and variety to both melody and timbre. There’s also a lively and constantly shifting contrapuntal balance between the different timbral archetypes that make up the two On Being Invisible pieces.

The recordings, made between 1972 and 1977, are clear and well remastered.

Sound in itself, however, is really not the point here. Long before computing environments for interactive music (such as Max and pd) were available, Mr. Rosenboom was designing and programming “self-organizing, dynamical systems” (as described in the liner notes) that mediated between live performers and automated systems driving synthesis. Each of these pieces proposes a quite different model of interaction, but all of them rely on an unusual mode of live performance: rather than instruments or voices, the primary sources of data for interaction are brainwaves. Several frequencies of brainwave activity from the performers (in the first piece, Pat and Alan Strange and Marilyn and Frank
McCarty; in the second and third, the composer himself are monitored for coherence and correlation; these silent live “performances” condition and influence the automated systems. It’s hard to imagine what these pieces would be like in concert. Mr. Rosenboom comments: “Zen-like meditative disciplines emphasizing calm alertness are particularly effective” in producing the kinds of coherent brainwave patterns that make the pieces work best, conjuring an image of the performer(s) wired up and sitting still with eyes half-closed on stage. Such an image doesn’t fit with my own recollection of more recent performances in which Mr. Rosenboom improvised at the piano with live interactive computer systems; his on-stage persona was active, intense, at times frenetic. The music on this recording (particularly On Being Invisible) is more consistent with this identity: each piece works its way toward a state of high energy and density which is maintained through most of its duration.

The way energy shifts between different states through these pieces is striking. Each unfolds fluidly, naturally, and musically. The computers Mr. Rosenboom used in these three performances couldn’t have been particularly agile, yet the results are persuasive and only occasionally predictable. The first two pieces are particularly effective in striking a balance between chaos and repetition, transformation and contrast, variety and obsessive focus, and between their various available musical gestures and timbres. From very limited materials, convincing musical shapes are created. Perhaps the feedback systems involved in decision-making processes were so carefully programmed and finely tuned that almost any input data would have produced effective results; perhaps brainwaves are a remarkably fertile source of musically relevant [or at least, interestingly varied] data; then again, perhaps Mr. Rosenboom was more active in guiding these systems in performance than his notes appear to suggest. He does point out that “touch sensors are also used to direct the software and initiate a few sounds” in On Being Invisible, but this hardly seems like sufficient intervention to invest these systems with the musical sense and strategy they seem to display. However they arose, the “virtual persona” generated in all three pieces are credible and challenging.

One wouldn’t be likely to put Invisible Gold on as background music. Many of the sounds don’t exactly caress the ear, and on the local scale of time, the musical gestures tend to be a bit generalized and schematic. However, if one commits to a more engaged mode of listening and attentively follows the shifts of form and energy through these performances, a convincing and wonderfully inhuman rhetoric emerges. As with any effective improvisation, an active listener is drawn into a web of convincing, often surprising musical shapes and decisions. Virtual personas become apparent whose behaviors are plausible but not obvious; the electronic systems provide a fascinating non-human window into our human experience of music. This CD provides a valuable opportunity to revisit the use of brainwave data to control electronic music, a technology that surprisingly few musicians have continued to explore. Perhaps more importantly, it shows that well-conceived systems mediating between live performers and automated processes can be impressively musical and flexible—even without all those fast, fancy, fat-sounding toys we’ve grown accustomed to having around.

The Arditti String Quartet: Roger Reynolds


Reviewed by Thomas DeLio
College Park, Maryland, USA

For over 40 years Roger Reynolds has produced an extraordinary body of original, thought-provoking, and inspiring compositions. From such stunning early works as Quick Are the Mouths of Earth (1964-1965) through such recent music–theater projects as Odyssey (1989-1993) and Justice (1999), Mr. Reynolds has steadily emerged as one of the central figures of that rich and diverse mosaic which constitutes our contemporary music world. Throughout his career, he has exhibited unbounded enthusiasm for sonic exploration. As such, he has embraced a great many of the most important musical developments of the 20th century and integrated these into a wholly new conception of artistic expression. For example, he has for many years used the resources of digital technology for the purposes of sound synthesis, sound processing, and algorithmic composition, and has used these resources in a variety of contexts [instrumental, multimedia, music theater]. Moreover, he has been profoundly influenced by the music of various world cultures [especially those of Asia] and has integrated these into his own work at the deepest theoretical and philosophical levels. (Certainly, he has never produced the kind of simplistic postmodern style collages so preva-
lent today among composers who claim to embrace the world's diverse musics. He has clearly absorbed various aspects of serialism (the second Viennese school and beyond), as well as the profound implications of stochastic composition, and is one of the very few composers to bring these contrasting visions of order into play successfully within his work. Mr. Reynolds's drive to integrate such apparently contradictory impulses has enabled him to forge radically new conceptions of musical language and form.

Though Mr. Reynolds's work defies easy categorization we must never make the mistake of imagining that his music lacks focus or is merely eclectic. His music reflects a mind that has rejected any false sense of unity that may result from simplistic reductive thinking or the embrace of any single, narrow approach to composition. Instead, this composer always seems to favor the kind of unity that comes from an unequivocal acceptance of the world's inherent and, indeed, essential contradictions. Rather than embrace just one medium, one compositional method, or one cultural tradition—one creative stance—Mr. Reynolds seems to be motivated by an extraordinary passion to embrace human experience in all its richness and diversity. Through his music we are awakened to the fact that our experience, and hence all understanding which emerges from that experience, is literally built upon this inherent diversity.

In the program book accompanying the CD set under review, Eastman School of Music scholar and composer Ciro Scotto has noted that the various transformations of sonic materials encountered in Mr. Reynolds's work "constantly stretch and test our conception of what it means for a work to be musically coherent." I think this is absolutely true and central to any evaluation of this composer's importance. However, the real significance of his work emerges only when we consider just how this testing and stretching is articulated as a musical process, and, ultimately, toward what end it is undertaken. It seems to me that through his music Mr. Reynolds tries to vivify for us the process of coming to coherence; how a specific sense of the coherence of the world emerges for each of us in our own unique way as we experience and absorb its data. I believe that, in one way or another, the underlying design of each of his compositions reflects this process. In his book A Poetics, poet and literary critic Charles Bernstein once noted that form is "how any one of us interprets what's swirling so often incomprehensively about us..." The complex sonic evolutions that constitute each of Mr. Reynolds's compositions beautifully and eloquently articulate this conception of form.

Mr. Reynolds's music also helps us to understand that we each impose a unique sense of coherence on the world as we perceive it, and, moreover, that the framework of our perceptions determines the extent and limits of our ability to fashion any sense of order out of all that we perceive. John Cage achieved a somewhat similar goal by repeatedly bringing us face to face with the world as unformed matter. Mr. Reynolds, in contrast, does so by constructing musical forms which render sonic matter in a constant state of regeneration. The triumph of his music, as I see it, lies in the way it shows us that the very framework of our perceptions is itself in a state of perpetual flux. Every one of his compositions reveals this in a new and startling way. No other composer active today has done so quite as brilliantly.

Mr. Reynolds's work has always been generously represented both on LP and on CD. In recent years, two double CDs have been released containing larger samplings of his compositions. The most recent of these is a compilation of a number of his recent pieces for string quartet and solo strings. This album, entitled simply Roger Reynolds, was released on the Auvdis Montaigne label in 2000. It contains three quartets: Coconino...a shattered landscape (1985, revised 1993), Visions (1991), and Ariadne's Thread (1994), all performed by the renowned Arditti String Quartet. These are coupled with two works for solo strings performed by various members of the quartet: Kokoro for solo violin (1992), performed by Irvine Arditti, and Focus a beam, emptied of thinking, outward...for solo cello (1989), played by Rohan de Saram. It should be stated at the outset that throughout this CD set the quartet's performances are quite beautiful. Comparison of the scores of these works with these recorded performances reveals exceptional accuracy both with respect to rhythm and intonation. All of the composer's devilish technical demands are met with absolute aplomb. The performers exhibit a level of virtuosity rarely encountered today, even among specialists of contemporary music. Moreover, the formal design of each composition is always clearly delineated. The Arditti Quartet brings this music to life with extraordinary clarity, subtlety, and intensity.

Coconino...a shattered landscape was written for the Arditti Quartet. Coconino is a part of the northeastern region of Arizona (USA). It is characterized by a topography filled with vivid geological contrasts: lava cones, red rock spires, pine forests, even a meteor crater all coexist within a relatively small...
area. This part of Arizona is also characterized by dramatic variations in climate, and clashes of cultures (Native American ruins, ghost towns, etc.). These contrasts, especially those of a geological nature, seem to have inspired Mr. Reynolds as he composed this piece. In the liner notes, Mr. Scotto points out that a particularly interesting aspect of one's experience of the Coconino region's topography is the way it achieves a sense of visual unity in spite of its inherent diversity: “Although fragmented, the terrain as a whole is still unified, since bits and pieces of differing patterns form larger mosaics. Another interesting feature of these geological forces is the improbable terrain resulting from one geological process interrupting another.” As the music unfolds, the composer projects a shifting sense of coherence and continuity. Consequently, the listener feels that the very terms and conditions of coherence (what it actually means to experience coherence at any given moment) change as the piece unfolds. In Coconino, we are constantly thrust into a perceptual present. Events do not seem to lead to one another, nor do they really emerge from one another. Rather, they perpetually renew themselves. This “shattered landscape” represents a world in constant perceptual flux, in which the world is never experienced the same way twice. Our perceptual framework is refashioned over and over again, so often, in fact, that what we are left with is a vivid sense of the instability of that very framework.

Coconino is also a rich and remarkable study in oppositions: oppositions of linearity and non-linearity, contrasting register formations, pitch structures, timbres, and gestures. Often these oppositions interpenetrate, projecting a sense of multiple, simultaneously evolving strata of dramatically differing types of sonic matter fused together as if by a welder’s torch. Technically, one of the ways that Mr. Reynolds achieves this goal is through the use of the aforementioned compositional algorithms as implemented on the computer. These algorithms are designed to produce a novel elaboration of any given set of musical materials, elaborations that are often unpredictable and, hence, unexpected and disconcerting. In the forthcoming book, About Form and Method (Taylor and Francis 2002), Mr. Reynolds points out that “these algorithms do not add information, or indeed, transform the materials upon which they act except in terms of continuity. That is to say [they] operate by subdividing, replicating, and reordering the content of a subject phrase.” Often, in Coconino, we hear a musical event that reminds of something else we have just heard, in ways that we cannot quite identify. As listeners, we develop a heightened awareness of not just the results of these changes, but also, in some concrete sense, of the processes that engender them. Significantly, the oppositional principles alluded to earlier appear to have also affected the design of these algorithms. The two Mr. Reynolds typically uses, SPIRLZ and SPLITZ, have been described by the composer as, respectively, continuous and discontinuous. (These procedures are discussed in detail in About Form and Method.) The composer’s use of computer-implemented compositional algorithms is one of the most successful that I know because they are put to the service of a higher goal, the shift of focus away from the object of our perceptions toward the process of perception.

Visions, a commission from the Lincoln Center for the Performing Arts in New York, was also written for the Arditti Quartet. It too was inspired by visual images (though quite different from those of the Arizona landscape): two paintings by the 16th-century Flemish master, Pieter Breugel the Elder. The two paintings in question present extreme contrasts. In notes accompanying the score the composer states: “Visions sprang from the notion that one could begin with a tightly unified world of form, material and method, but travel to quite distinct destinations nevertheless.” The work contains two movements which consist of “an introduction and an expansive movement followed by a repetition of the introduction [now radically altered in spirit so as to differently prepare the listener] and then a second movement, compressed and agitated, but indebted to the same proportional structure and materials as the first.” As with Coconino, the goal of Visions seems to be to highlight both the malleability of sonic matter as well as the variability of our perceptions of that matter. Each of the two movements begins with the same basic materials but presents them as though seen through a different lens. As a result we encounter two very different perspectives on the same materials. From each perspective, in turn, the music naturally tends to evolve in a different way. Here again, Mr. Reynolds uses computer algorithms (most notably SPLITZ) to alter his basic materials. One could not imagine a more vivid image of the mutability of perception.

Ariadne’s Thread, the third quartet on the recording, was a joint commission by Radio France, The Florence Gould Foundation, and Les Ateliers UPIC, once again composed for the Arditti Quartet. The piece was loosely inspired by the familiar Greek myth to which the title refers. It differs from the two previous quartets in that the string ensemble is
Ariadne’s Thread is a stunning work, one of the greatest American string quartets of the past 50 years. In his monograph, The Searcher’s Path [Institute for Studies in America Music, Monograph 25, 1987], Mr. Reynolds has elaborated upon his interest in computer enhancements of acoustic sounds. Referring to his interest in combining instruments with tape, he notes that computer-processed instrumental sounds can evoke “a degree and type of elaboration that would be quite unthinkable [probably even unimaginable] from a solely instrumental perspective. Each decision to attempt a formal process of this sort is intimately linked with the fact that the computer offers possibilities far beyond the traditional limits of instrumentally achieved musical variations.” However, referring to such computer enhancements, he warns: “This new methodological strength needs to be put at the service of forms that are linked to it in significant conceptual and perceptual ways. To do otherwise would be unimaginative, inappropriate, even irresponsible.”

The most startling aspect of Ariadne’s Thread is the way the quartet is often treated as a single, albeit rather complex, sound source. The actual fusion of the individual instruments into a single unified sonority is enacted in very different ways over the course of the work. Although, occasionally, solo passages seem to pull us in a different direction, this fused ensemble sound constitutes the main “thread” running through the composition. As I see it, the form of the work marks the transformation of the string quartet itself into something quite new. As the composition unfolds we are drawn deep inside the sound of the string instruments [see the second section of the piece, Track 14 on the second CD of the set, where the computer part seems to enhance certain aspects of the string sound and, quite literally, draw us inside the quartet’s tones and timbres]. When we enter this sound world its components are transformed and we literally feel that the quartet [both as a sound source and a performing ensemble] has been remade from the inside out. This transformation is achieved several times over the course of the work, both gradually and suddenly. The penultimate section of Ariadne’s Thread (Track 19) constitutes the culmination of this process. Here it seems that every nook and cranny of the four string instruments is dissected, enlarged, extended, and embellished. We are truly inside the instruments now; not just inside their spectra but inside the totality of their component sounds: pitch fluctuations, attack noises, etc. Not surprisingly, after each excursion into the world of computer-altered string sound, when we return to unprocessed string sound we hear it in a new way. It is never the same twice. Indeed, by the end of the piece we no longer have any sense of “normal” or “typical” or “traditional” string sound. Such notions have been obliterated. We recognize the extent to which our experiences change our perceptions [another constant in Mr. Reynolds’s work].

Coupled with these three quartets are two solo works. Kokoro for violin was commissioned and premiered by Irvine Arditti. From the liner notes we learn that “kokoro” is a Japanese word of multiple, rich implications: heart [in both its physical and emotional connotations], mind, soul, and spirit. In essence, kokoro references the totality of being. The source material for the piece consists of a violin solo heard near the end of the first movement of Visions [the final section prior to the coda of that movement]. Kokoro consists of twelve well-defined sections, each with a distinct emotional and sonic character, as well as its own, unique, evolutionary trajectory. Together these “vignettes” reflect the many complementary and often contradictory traits that constitute each individual personality. This is a stunning work in every respect. It is music that is beautifully imagined and realized. The string writing takes advantage of every nuance of sound production available from the violin. Every aspect of the instrument is exposed, examined, and developed according to its own potential.

Focus a beam, emptied of thinking, outward . . . [for solo cello] was premiered by another member of the Arditti Quartet, Rohan de Saram. The title of the work is borrowed from the poetry of James Merrill. As this title might suggest, the composition opens with a sense of intense introspection, homing in immediately, at a rather deliberate pace, on a narrow range of gestures and materials . . . “focused.” In this respect, at least at the outset, this piece seems quite different from the other works of the set, all of which, in one way or another, tend to open in a more expansive mode. Gradually, Focus a beam does, indeed, become more expansive with respect to the range of its exploration. Indeed, the form of the piece could be seen as another journey of transformation, this time from a state of introspection to one of extroversion. It too is beautifully conceived and expertly realized.
In every respect this is an exceptional CD set. It offers an extraordinary collection of works by one of America’s greatest composers, all performed with technical finesse, insight, and sensitivity to both form and detail. For anyone not yet familiar with Roger Reynolds’s music it affords an excellent place to begin one’s exploration. For those who are already familiar with his work, it will reward with ever new and varied insights.

Katherine Norman: London

Compact disc, 1996, NMC D034; available from NMC Recordings, 18-20 Southwark Street, London SE1 1TJ, UK; telephone +44 (0)20 7403 9445; fax +44 (0)20 7403 9446; electronic mail nmc@nmcrec.co.uk; World Wide Web www.nmcrec.co.uk

Reviewed by Ian Stevenson
Chatswood, New South Wales, Australia

This compact disc by Katherine Norman is a collection of three musical soundscapes and a piece for clarinet and “tape” performed by Jonathan Cooper. The first three sections together form a sonic presentation of the composer’s relationship with her home town, and are collectively titled London.

In Her Own Time (18'24'')

This is a work of multiple layers. The listener is presented with an evocative documentary montage in which the composer represents her own remembering of her mother retelling her memories of wartime experience. The layering of imaginative “filters” of memory and interpretation over real experience creates an audible tension between the emotional distance in the mother’s speech and the composer’s strong and direct response to the re-telling.

As if to highlight the veiled apprehension of truths and perhaps to promote a sense of aesthetic distance in the listener, the composer employs a resonant filtering device, which hangs mistily over the recordings. This sonic pointer to temporal and imaginative distance makes audible the metaphor of resonance. Another layer of subjective association is interposed in the listening as a result of this harmonic and occasionally tonal content.

The sound of this piece has a perceptibly raw quality. The surface is rough and abrasive. This surface texture speaks of the composer’s emotional proximity to the subject. Despite the obscuring layers of the compositional process this proximity defies the inherent distancing.

Formally, the composition is punctuated by brief episodes where banks of tones replace the voice. The material comprises interviews between the composer and her mother recorded in various locations. The sections of monologue and interview are composed of overlapping sequences that draw themselves out of the tone banks and emerge sometimes gradually and at other times abruptly.

London E17 (22'49'')

This movement contains elements of ecological study, sound walk, and musical montage.

How often is a sense of place represented or evoked in literature through the description of sound environments? Here, we are given the raw material itself. However, similar to a work of fiction, the author has selected, edited, and elaborated the details that define her personal sense of the place. Having lived for many years in East London myself, these scenes resonate in my imagination, transport me back, and bring back to life that personal sense born from my experience.

Working at the intersection between poetry and music, the composer manipulates the sonic material, highlighting and revealing its intrinsic rhythms, textures, and timbres.

The piece takes us on a journey through various linked scenes. We start in the idyll of the suburban backyard and move out to the ever-present traffic of urban reality. Next, we venture into the explicitly identifiable London Underground complete with the local “soundmark” announcement reminding us to “mind the gap.” We soon emerge into the local “greasy spoon,” a typical East London cafe where you can almost taste the strength of the tea. Next, we find ourselves in the local market complete with cheeky Cockney “spruikers” [haranguers]. Here, the compositional process reveals itself with orchestrated rhythmic editing. Subsequently, we are treated to a passage of musical jackhammers that transform themselves delightfully into the ever-present London drizzle. Finally, we return to the domestic environment and finish with a BBC Radio weather report.

During various sections of the piece the sound is shaded or colored.
with gentle, resonant signal processing. This treatment transforms the material from mere document or artifact and invites the listener to augment the sounds with their imagination.

**People Underground (17’33”)**

*People Underground* takes us into the unique but real acoustic environment of the underground foot tunnels that pass under the Thames. The composer exposes not only the sounds of this environment but also the effect of this acoustic immersion on the people within it. She captures the interactions of the more exuberant pedestrians with the echoes and reverberation that surround them.

A recurring motif within the piece is the slamming of the concertina steel lift doors that excite the full spectrum of reverberation within the tunnel. A confusion of footsteps, masked conversation, and echoes leaves the listener straining to decipher the sounds and feeling slightly numbed. At the conclusion of the piece we emerge up the stairs and out to the exterior world.

As a brief observation on the three pieces that constitute the *London* suite, I would like to make a comment about some technical issues in these recordings. In compositions of this nature, the listener is continually oscillating between different modes of listening or levels of listening relationship with the material. At times we are attending to the timbral evolution of sonic gestures, guessing at sources. At other times we are following our own imaginative journey or establishing formal relationships between what we have heard earlier in the piece and subsequent material. As some of us are involved in sound production in one form or another, occasionally we find ourselves trying to identify the techniques employed in the compositional process. Personally, I have attempted to discipline my listening away from this level of engagement as it inevitably interferes with the aesthetic impact of the music. However, when the listener is confronted with the sound of distorted, clipped, or over-compressed location recordings, the illusion that is achieved through the application of refined craft is momentarily destroyed. This results in a disruption of the gentle ebb and flow of aural engagement as the artifact is exposed. Perhaps this is my own weakness not to be able to hear beyond these artifacts which occur in only a few very moments throughout these works. However, I note this here as plea for the importance of production skills in creating electroacoustic music.

**Trilling Wire (10’01”)**

*Trilling Wire* for clarinet and tape, performed by Jonathan Cooper

This composition for clarinet and tape exemplifies the successful integration of electroacoustic and instrumental forces. The rhythm and energy of the instrumental part is supported and complemented by the tape, which comprises digitally synthesized material and pre-recorded, edited, and processed clarinet material. The spectral qualities of the tape part provide a timbral palette in which the clarinet is comfortably placed and is never crowded or out of place.

As the title suggests, the piece is characterized by a fair amount of trilling in among the various melodic motifs and aleatoric material that make up the instrumental part. The electronic part is characterized by a series of slowly evolving, shimmering additive timbres up until a point about halfway through the piece where new contrasting material is introduced in a brief linking passage. Jonathan Cooper’s performance on this recording is delightfully subtle and nuanced. The recording is well produced and makes for highly pleasurable listening.

**Paul Koonce: Walkabout & Back**

Compact disc, 2000, mode 90; available from Mode Records, P.O. Box 1262, New York, New York 10009, USA; telephone/fax (+1) 212-979-1027; electronic mail mode@mode.com; World Wide Web www.mode.com/

Reviewed by Tae Hong Park
Princeton, New Jersey, USA

*Walkabout & Back* reveals a panoramic view of Paul Koonce’s electroacoustic music from the 1990s. *Hothouse*, which is chronologically the first of the four pieces, was completed in 1992, and an additional piece was composed every other year through *Walkabout* (1998), the longest work on the disc. These pieces are the product of painstaking manipulation of pre-recorded materials on a microscopic level, and the thoughtfulness and precision that is present in virtually every sample can be heard in each beautifully sculpted moment, perhaps explaining the long gestation period between each composition.

One exceptionally intriguing quality of all four works on the CD is the constant “enharmonic change,” whereby sounds reveal several identities that interact and reference each other while taking on different functions. In the tradition of classical music, enharmonic change can be simply explained as a respelling of notes in accordance with changing function. For Mr. Koonce, such modulations also exist in the everyday sounds vividly revealed on this CD.
In *Hothouse*, for example, familiar sounds of car horns gradually build up vertically and horizontally in pitch and rhythm. Slowly, these horns begin to modulate into the sound of a chugging train, expelling steam as it approaches a station filled with people, or so it seems. The train’s sharp release of steam gently glides down in pitch to become—the sound of a teakettle. These modulations essentially create both a functional and timbral resonance between the teakettle, train, and car horns. Mr. Koonce states he basically had a simple plan when starting to compose *Hothouse*: “to see what I can do to go from one place to another... I am here, what next?”

However, as mentioned, the connections and intersections between sounds and moments are not characteristic of *Hothouse* alone, but are characteristic of all the pieces on the CD.

In *The Flywheel Dream*, the sounds of bouncing ping pong balls change into dripping water sounds and just as quickly change to what resembles a ticking watch. The listener is often unable, however, to clearly identify the sounds at a particular moment in time, adding a sense of ambiguity which creates a heightened sense of attention in the listener. The techniques used to render such enharmonic changes, whether clear or ambiguous, are not only achieved through complex signal processing techniques using software systems such as CARL and the composer’s own PVC, but are also brought about by precise timing and careful juxtaposition in the time domain. Indeed, Mr. Koonce achieves surprising results with straightforward techniques widely used in tape-based compositions. Mr. Koonce calls these techniques the “Mask of Orchestration,” whereby two or more carefully placed sound objects appear perceptually different when put on top of each other. Such techniques, which cause sounds to undergo change in identity, are abundantly present throughout this CD.

*The Flywheel Dream*, composed in 1994, is one of the most interesting pieces on this CD. As the title suggests, it is a journey into Mr. Koonce’s dream world, an exploration of the surreal, savoring the transitions both dream-to-dream and moment-to-moment. In this piece, the dream is a sequence of episodes that last only ephemerally, successively decaying to yet another. About two-thirds of the way into the piece, a gamelan-like riff gels into focus. The riff, however, is constantly interrupted by silences, as if the dreamer intends, but fails, to subdue the music. The riff itself, which is of strong tonal character, growing in density with percussive sounds of familiar and unfamiliar timbral origins, seems very much out of place in the context of the piece and the CD itself. But this is exactly how dreams sometimes are, rarely logical in content or in sequence, jumping from one place to another, much like *The Flywheel Dream*. The music ultimately succumbs to the will of the dreamer and the segmented stories and passing moments subside by the end of the piece as the dreamer victoriously falls into silent sleep.

The works on this disc show traces of large-scale form in a loose sense, as is evident in the closing of *Walkabout* and *Pins*, both hearkening back to the timbres of their respective openings. However, the pieces also strongly adhere to a genre that might be called “tape improvisation.” Little strategic, goal-oriented development seems to take place: each micro-movement leads to another, but each subsequent movement is unpredictable and seemingly unplanned, giving the piece an open form. All the pieces are very complex and so carefully put together that a back-to-back listening of all four pieces is a task not to be taken lightly and definitely not suited for dinnertime listening. *Walkabout & Back*, however, is a beautiful set of four works which I have enjoyed over a period of two years, listening on and off, again and again, whenever I feel like going on to another piece and still discovering new, wonderful things.

**Fon: Fakt**

Compact disc, 2000, Werkzeug; available from Werkzeug; World Wide Web www.wrkzg.net/

Reviewed by Greg Hooper
Brisbane, Queensland, Australia

_Fakt_, by the Austrian duo Fon [M. Soellner, J. Groiss, no first names are given anywhere] comes in a nondescipt grey cardboard package with a single page of hermetic writings. Fon has a fairly impenetrable Web presence as well, via the label Werkzeug [www.wrkzg.net/]. Here, one can access and then read text files such as “about fon.txt,” or go to...
The 11 tracks are listed as 0+0, 0+1, 0+2, . . . 0+9, End. The times are given in seconds, the longest track (0+4) lasting 491 of them. Total CD time is 42:46. By describing the durations in seconds Fon flags the granularity of the attention that is required, or desired, for appreciation of the pieces found on Fakt.

Stylistically, the pieces on Fakt fit within the clicks-and-cuts, glitch-and-noise school, with the strongest pieces on the CD benefiting from an attention to detail at the micro level. In these, the shorter pieces, relatively sparse lines of glitches express a structural intention with hyperclarity. The recording quality is beautiful—nothing lush, nothing seductive—every element standing out in the non-referential non-space digital music has made its own. Fon plays with the spatial attributes of this non-space very successfully, sometimes harshly or clumsily, at other times with subtlety and humor. Track 4 has a particularly effective and humorous use of panning and volume to give the impression of being buzzed by some bizarre insect car. The longer pieces tend to be (vertically) denser, and I found my attention flagging as they began to sound like just one sound after another.

Sonomically, Fakt has a limited palette, lacking in mid-range frequencies, with upper-mid-range frequencies and rapid transients particularly apparent. Most sounds appear to be derived from digital glitches or file trawls for structure—standard techniques of the glitch school. This limited palette does not restrict or diminish the quality of the music. On the contrary, it is most apparent in those tracks I found the strongest. For example, Track 6 approaches a microsound sensibility, with variants on a single sound, rhythm, and space: a beautiful, percussive, filtered noise with subtle modulation over the amplitude and frequency envelopes. Throughout the CD a number of sounds are reminiscent of early computer and console games. Some sounds have an almost “retro” feel: microphone taps and tape echo, pulse modulation, amplitude-modulated sine waves. At times, this is a weakness in the integrity of the CD, as these sounds seem to appear without reference and can border on the cliché. This is particularly apparent with the vocoder-like sound used in Track 5, and the pulse-width modulation used in Track 7.

Rhythms underlie most tracks, generated by both synchronous and asynchronous loops and fragments. Rhythmical structures are generally simple and are derived from patterns of pop and dance music. At best, the rhythms are tightly integrated into the overall structure of the piece; at worst they seem a little gratuitous. They are never as oppressive or tedious as those found in much of dance-derived electronica, however.

Overall, then, Fakt is an interesting disc. It is not easy-listening, and at times can be harsh to the point of unethical. Nonetheless, Fon has produced a work of overt intention that is worth repeated listening.

**FMOL Trio: Live at Metronom**


Reviewed by Ross Feller

Milledgeville, Georgia, USA

The FMOL Trio is a computer-assisted free improvisation group spearheaded by Sergi Jordà, a Spanish software engineer and computer music instructor at Pompeu Fabra University in Barcelona. FMOL (which stands for Faust Music On Line) is a real-time software synthesis package that Mr. Jordà and Toni Aguilar created in response to a commission from the experimental Catalan theater group, La Fura dels Baus.

The commission required music that would be collaborative and Internet-based for the group’s play, *Faust 3.0*. In order to include as many people as possible, FMOL was designed with an intuitive, graphical interface that can be run on inexpensive personal computers (the Windows-only free software can be downloaded at www.iua.upf.es/~sergi/FMOL). It is a stand-alone program requiring at least Windows 95 and a Pentium processor of 100 MHz or more. FMOL’s eight audio channels only support sampling rates up to 22 kHz, and each track provides only two seconds of memory. The developers were more interested in a large array of performance possibilities than in complex algorithms. Additionally, they sought to avoid...
Mr. Jorda’s interest in real-time computer interaction is further illustrated in his controller invention known as the QWERTYCaster Guitar, an expressive guitar-shaped computer keyboard instrument that he sometimes uses during FMOL Trio concerts.

The present FMOL Trio compact disc was recorded during a week-long improvisation festival in Barcelona. It was recorded onto an eight-channel ADAT recorder and later mastered with Sound Forge and Vegas, using such plug-ins as TC Native Verb and Waves Ultra Maximizer. One of the “charms” (or weaknesses) of this recording is the fact that there are no overdubs or edits. [The reader may wish to compare this live trio recording to a previous, studio-produced FMOL compact disc, reviewed in Computer Music Journal 25(1), Spring 2001.] An example of the small scale, independent nature of this project resides in the fact that only about 250 discs were produced—burned one at a time. The FMOL Trio are members of the Spanish anti-copyright CDR disc label called Hazard Records.

As with much free improvisation, the first piece is not usually the best. Improvisers need time to warm up their craft. The FMOL Trio does not prove to be an exception in this regard. The first title, Noise, no doubt refers to the raucous live bass clarinet and tenor saxophone sounds, which include stock timbral alterations such as slap- and flutter-tonguing, overblowing, and multiphonics. They are played without any real-time audio processing over a background of staunchly low-budget sampled sounds.

Bass Clarinets, the second piece, consists entirely of bass clarinet sounds both live and pre-sampled. It starts out with more live slap- and flutter-tonguing, overblowing, and various sound effects from a dismantled bass clarinet. About halfway through there is an intriguing textural shift from short, choppy gestures to long sustained sounds that index some well-known insects as well as a kind of virtual Tibetan chant.

Ghosts is a version of a well-known composition by the great [and largely under-appreciated] free-form saxophonist, Albert Ayler. After some inharmonic bell sounds the theme is stated first vocally and then by the tenor saxophone. This is followed by some highly charged saxophone and computer textures. Later the voice comes back in with variations on the theme, one of which is yodeled. The music ends suddenly, as did Ayler’s life.

String Quartet takes its material from sampled recordings of Franz Schubert’s String Quartet in D Minor, which itself is a set of variations on the composer’s lied, Death and the Maiden. The samples are layered and undergo various time- and pitch-scaling operations. The effect is not far from something you might encounter from The Residents except without the catharsis of a steady beat.

Sinus, the fifth track, uses a palette of courageously under-processed sine waves combined with lightly-processed alto saxophone sounds. There is an uncomfortable incongruity between the sax player’s attempt to make legato melodies and the raw, obnoxious beauty of the waveforms. Difference tones are produced as the saxophonist strikes a note a half step away from a sine tone. This is the only piece in which the live saxophone part is processed in real time. The processors used seem to be mostly of the flange, chorus, and reverberson variety: more accoutrements of a low-budget aesthetic.

The last track, Density II, features more extended-technique, free im-

Recordings
provisational sax conventions over a wildly pulsating FMOL backdrop with some highly effective filter sweeps. The speed and polyrhythmic variety of the FMOL part is reminiscent of a free-jazz drummer.

The FMOL Trio and software are ambitious, if not wholly original, contributions to the world of computer-assisted improvisation systems. But the short memory and low sampling rates, while appropriate for a large Internet collaborative project, fall short in a live concert situation, especially because of the lack of real-time audio processing. But, in the end, the FMOL phenomenon and do-it-yourself stance should be applauded for their alternative vision, possibly with the power to combat commercialism even as it partakes in the fruits of this contradictory labor.