[Editor’s note: Selected reviews are posted on the Web. In some cases, they are either unpublished in the Journal itself or published in an abbreviated form in the Journal. Visit www.mitpressjournals.org/loi/comj and, under “Inside the Journal” at the left, click on “CMJ’s Web site.” Then click on “Reviews” at the top.]

Events

International Symposium: Iannis Xenakis—The Electroacoustic Work

Musikwissenschaftlichen Instituts, Universität zu Köln, Cologne, Germany, 11–14 October 2006.

Reviewed by Gerardo Scheige
Cologne, Germany

Five years after the death of Iannis Xenakis (1922–2001), the Musicological Institute of Cologne University, in cooperation with the Center for Composition of Music Iannis Xenakis (CCMIX), Romainville, France, and the Groupe de Recherches Musicales de l’Institut National de l’Audiovisuel (Ina-GRM), Paris, France, organized an international symposium, funded by the German Research Foundation (DFG), the German Federal Cultural Foundation, and the Ernst von Siemens Foundation for Music. The symposium focused on compositional reflections of the electroacoustic output of this influential Greek-French composer and architect. For the very first time, all of his electroacoustic pieces, some in audiovisual form, were successively presented in five accompanying concerts. The symposium aimed at developing multifaceted approaches to this special domain of Xenakis’s creative activity, which has until now met with only rudimentary research, and to define its relevance for the music of the twentieth and twenty-first centuries.

The grand opening began with greetings from Wolfram Steinbeck, acting director of the Cologne Musicological Institute, Gérard Pape, director of CCMIX, and Daniel Teruggi, director of GRM. Afterwards, in his opening remarks, musicologist Christoph von Blumröder pointed out bright spots of present Xenakis research and affirmed the composer’s importance for contemporary music.

Over the following three days 22 scholars from ten countries illuminated Xenakis’s electroacoustic work as well as its theoretical and aesthetic premises from various viewpoints in the context of six thematically focused sessions.

The first session, with lectures by James Harley, Daniel Teruggi, and Anastasia Georgaki, delivered new insights into the continuities and changes in Xenakis’s electroacoustic music, the composer’s relationship with the GRM, and his influence on electroacoustic music in Greece. After that, Gérard Pape, Martha Brech, Jan Simon Grintsch, and Agostino Di Scipio dealt with the interdependency between Xenakis’s philosophical concepts of time and synthesis and the compositional techniques in his early tape and computer music. Xenakis’s intermedial concepts, realized in electroacoustic film music, programmatic compositions, and the Polytopes, as well as their philosophical background, were the subjects of presentation by Ralph Paland, Joris de Henau, and Makis Solomos.

In the fourth session, Rudolf Fri...
A Wavelet Tour of Signal Processing (AWT) is a complete guide to not only the important results and applications of wavelets—also known as multiresolution analysis—but also many of their lesser-known aspects. It contains eleven well-written chapters, two appendixes, and 361 references. Each chapter, except for the first, contains several theorems—most accompanied by thorough proofs—and concludes with a set of problems for students and further exploration. Stéphane Mallat, having made seminal contributions to the theory behind and application of wavelets to signal processing, is certainly qualified to be an official tour guide to the world of wavelets.

The history of multiresolution analysis is quite diverse, extending from contributions made by mathematicians, physicists, statisticians, and engineers. As such, it has found application in a broad range of disciplines, of which signal processing is only one. In fact, it is especially applicable to signal processing, whether working with sounds, images, or higher-dimensional data. Mr. Mallat makes this clear in his first chapter, where he motivates the utility of wavelets by discussing problems difficult to approach using Fourier methods, but easier using wavelets. He writes, “If we are interested in transient phenomena—a word pronounced at a particular time, an apple located in the left corner of an image—the Fourier transform becomes a cumbersome tool” (p. 2). Wavelets provide an intuitive means of analyzing signals at various scales for, among other things, segmenting and representing these transient structures.

The formal definition of the wavelet transform (WT) is no different from the Fourier transform, save for the fact that the signal is correlated with a basis created by scaling and translating a single zero-mean time-localized function. In contrast, the Fourier transform basis consists of a set of infinite duration sinusoids, and the short-time Fourier transform (STFT) uses a basis of windowed sinusoids at a fixed time resolution. Therein lies a world of difference. A wavelet basis allows one to resolve a signal at multiple resolutions in a very efficient manner, which is not possible with the Fourier transform. Like the fast Fourier transform, fast methods exist for computing wavelet transforms. Furthermore, one is free in designing wavelet functions that are “intrinsically well adapted to represent a class of signals” (p. 11). Indeed, the largest chapter in the book is devoted to this subject.

AWT functions as an indispensable guide to any serious “tourists”—be they students, teachers, or professionals—intrigued by the technical aspects of wavelets and how they are and can be applied to signal processing. It is a beautifully produced book with nice paper, crisp text, and plenty of well-produced and thought-out graphics complementing the contents. One cannot help but want to visit these places after viewing the pictures alone. Like a good tour guide, AWT provides many paths of interest suited to particular levels of complexity and depth. Material is graded throughout the text by three levels of “difficulty.” Essentials and easy proofs are marked with a “1.” Important results for particular applications are marked “2.” And items “at the frontier of research” [p. 18] are marked “3.” This makes it easy to know where time must be necessarily spent, and which content can be skimmed. AWT is in no sense an introductory text; it is rigorous and complete in its presentation. The first four chapters, however, provide an excellent and thorough introduction to time–frequency (TF) representations, and motivate the utility and applicability of wavelets.

AWT begins with an introduction to the TF domain and transforms. A well-known example is the STFT, alluded to as early as 1946 by Nobel
Prize physicist Dennis Gabor (inventor of the hologram). The discrete STFT partitions the TF plane uniformly, but with a trade-off between resolution in time and frequency. The “narrow-band” STFT has excellent frequency resolution but poor time resolution. The “wide-band” STFT has those relationships reversed. Though one can never escape the inverse relationship between time and frequency resolution, the WT instead provides excellent frequency resolution at low frequencies and excellent time-resolution at high frequencies. With the logarithmic nature of human hearing, this makes wavelets attractive for analyzing and representing musical signals.

After introducing the subject of wavelets, the next two chapters present the essential background upon which wavelets in signal processing is based. Chapter 2 provides a review of linear shift-invariant filtering and Fourier theory. Here we are reminded of properties of the Fourier transform, the significance of the Heisenberg uncertainty relation (trade-off in time and frequency resolution), and the Gibbs phenomena. The third chapter reviews the principle results of sampling continuous one and two-dimensional signals: the Shannon-Nyquist-Whittaker Sampling Theorem, discrete time-invariant filters, and Fourier series. Fast implementations of the discrete Fourier transform (FFT) are also discussed.

The fourth chapter, “Time Meets Frequency,” is where the real meat of AWT starts. In the first part, Mr. Mallat describes in detail the STFT; the second part discusses the WT. For these two TF transforms many essential properties are proven, such as energy conservation, uniqueness, and completeness. Uniqueness ensures that the original signal can be obtained from its TF representation. Completeness means that the entire TF-plane is fully partitioned by the transform. The spectrogram [squared magnitude of STFT] and scalogram (squared magnitude of WT) are introduced with several figures. These essentially show how energy is distributed in time and frequency or scale. Another visualization of time–frequency energy, the quadratic Wigner-Ville distribution, is presented in the last section.

Chapter 5 presents frame theory, which provides a formalized way to determine various properties of a given set of discretized TF functions. For instance, it gives the necessary conditions under which the discrete STFT is stable and complete. It also provides a way to make the WT translation-invariant, a result also known as the dyadic WT. Frame theory is essential for designing computer implementations of any TF transform possessing desirable properties.

A unique aspect of the WT is its ability to resolve a signal at multiple levels. By reducing the scale of a wavelet one in effect “zooms in” on the signal. Chapter 6, “Wavelet Zoom,” discusses this ability in the context describing the type of “singularities”—spots that are not infinitely differentiable—that may exist in the signal (for instance in fractal signals). The Fourier transform can do this only on a global level, and its trouble efficiently representing any type of singularity is well known. These signal aspects are important because singular regions may reveal something of interest, such as edges in images, or transients in musical signals. As the author says in the introduction, “The world of transients is considerably larger and more complex than the garden of stationary signals” that are efficiently analyzed with Fourier methods [p. 1].

Chapter 7, the longest of AWT, discusses the heart of multiresolution analysis: the wavelets themselves. Here we see the design of wavelets, their properties, and their utility in multiresolution approximations. This chapter also reveals an important relationship between wavelets and multirate filterbank theory, an interpretation due to Mr. Mallat’s seminal work. An orthogonal wavelet basis is shown to be equivalent to the impulse responses of a conjugate mirror filter bank. This relationship provides an avenue for fast wavelet transforms. Whereas the FFT makes Fourier analysis of real signals tractable, the fast wavelet transform does so for multiresolution analysis.

Although the discrete STFT results in a uniform tiling of the TF domain, and the WT gives a tiling that is logarithmic in time and frequency, more exotic tilings can be creating using “wavelet packets.” This is the subject of Chapter 8. Additionally, the author discusses lapped transforms, of which the discrete STFT, and the lapped discrete cosine transform (for instance the modified discrete cosine transform used in MPEG-1, Layer 3 audio coding), are examples.

Chapter 9, “An Approximation Tour,” takes us from linear to non-linear signal approximations. A signal can be approximated using a linear combination of any subset of basis vectors. Choosing the first 20 terms in a Fourier series analysis of a signal creates a low-frequency approximation of it. If, instead, the 20 terms with the largest energies are selected, a better approximation may result. Such a procedure, choosing basis functions depending on the signal, is non-linear. One can go a step further and instead build a basis on the fly, adapting in a sense to the structures in the signal. The goal here is to create a representation that is at once sparse, efficient, and meaningful for
the signal. Here one is not restricted to conditions of orthogonality, functions can be selected from any collection desired. This is currently a very exciting area in signal processing [I may be biased, however, because this is the subject of my doctoral dissertation]. In the world of computer music, this method provides the analytical equivalent to granular synthesis.

The final two chapters discuss in detail the application of wavelets to problems of signal estimation, and efficient coding of signals in the transform domain. In Chapter 10, Mr. Mallat demonstrates one of the most useful aspects of wavelets: denoising of signals. In contrast to methods using Fourier analysis, denoising can be effectively done using wavelets and thresholding of coefficients. More advanced techniques have been used to denoise, for instance, an early wax cylinder recording of Johannes Brahms playing the piano. Chapter 11, “Transform Coding,” discusses the application of wavelets to signal compression, of which the best-known result has produced JPEG2000. After reviewing quantization, entropy coding, and compression optimized with respect to distortion, the author presents image and video compression using wavelets.

One of the most unique aspects of AWT is its “reproducible experiment” approach. “The reproducibility of experiments thus requires having the complete software and full source code for inspection, modification and application under varied parameter settings” [p. 17]. Taking a bow to lessons learned from the history and philosophy of science, Mr. Mallat has made available the MATLAB code used in producing all figures in the text in order to more fully demonstrate vital aspects of wavelets. Indeed the real results of much of this work are not embodied in terse mathematical expressions, but in the actual implementation with computer code. Working with the code of this book is just as important as reading it. The second appendix provides a list of this software.

The title of AWT makes it clear that this book is about the world of signal processing seen through the lens of multiresolution analysis. Whereas Fourier methods are quite well established in the field of computer music through uses such as pitch-detection and sound transformation, wavelets have found more use in practical applications, such as denoising, than in creative ones.

Computer musicians have learned that wavelets are fragile entities, and even a minimal amount of modification in a wavelet representation can result in undesired artifacts. Interesting effects can be created, but to produce a desired effect, for example, pitch shift, is profoundly difficult. Wavelets will not replace Fourier analysis. Instead the two will complement each other and provide efficient and meaningful representations of signals. With the continuing development of decompositions using redundant and over-complete “dictionaries” of wavelets—so called “pursuit strategies” discussed in Chapter 8—such meaningful transformation of signal content will be possible with great precision in time and frequency.

There is nothing in AWT that I would suggest be changed. Mr. Mallat has done a remarkable job producing a rigorous and complete text that can serve as a textbook and a reference. It is refreshing to read a technical book written by an expert that remains approachable at many levels. A Wavelet Tour of Signal Processing is truly an essential guidebook to accompany travel through the some-times steep, but never treacherous, slopes of wavelet theory.

David Borgo: Sync or Swarm: Improvising Music in a Complex Age


Reviewed by Steven M. Miller
Santa Fe, New Mexico, USA

General

According to the publisher's introduction on the book's dustcover, Sync or Swarm is a “study of musical improvisation, using theories from cultural and cognitive studies and the emerging science of chaos and complexity . . . including perspectives from the study of embodied cognition, nonlinear dynamics, self-organizing systems, social networks, and situated and distributed learning.” In investigating both solo and group improvisation through the theoretical constructs of complexity science, cognition, networking, and so on, Mr. Borgo brings new tools to bear on the study of a long-standing, though comparatively little-theorized, field of creative endeavor.

An audio CD of music examples is included with the text. Tracks by both well-known (Evan Parker, Sam Rivers, George Lewis) and lesser-known (the author's own ensemble Surrealestate) improvisers are offered.
up as examples that are to varying degrees analyzed within the text itself. This is a welcome addition, as the ideas and concepts broached in the text are often rather abstract in nature (no pun intended). The music examples make the connections the author wishes to draw much clearer than they might be otherwise.

**Organization and Overview**

The first chapter, “The Sound and Science of Surprise,” lays out the general terrain, providing a general introduction to the topics the book will cover and then laying out a chapter-by-chapter synopsis. Over the course of the book, an effort is made to balance the extra-musical ideas and concepts with specific applications and/or examples from the musical literature. After a survey of the contemporary improvisation scene and “the growing body of scholarship on the subject,” the book in turn tackles concepts and ideas from fields as varied as cognitive linguistics, embodiment, and general systems theory in relation to the solo improviser (in this case, Evan Parker); nonlinear dynamical systems, state space transitions, and “phase space” applied to improvising ensemble dynamics (the Sam Rivers Trio with George Lewis); and chaos, complexity science, and analyses of “fractal correlation dimension” in a number of solo and ensemble improvisation recordings. Network theory, physical coupling, biological entrainment, emergent behavior, self-organizing systems, “scale-free” networks, and basic concepts of statistical distributions are all discussed in relation to the complex dynamics of ensemble improvisation. A final chapter, “Harnessing Complexity,” examines “the ways in which learning and cognition are situated within and distributed across physical and social settings” (p. 11). The chapter culminates in a number of observations and propositions regarding current music pedagogy and the efficacy of integrating improvisation into the music classroom.

**Strengths and Weaknesses**

One of the major strengths of the book is Mr. Borgo’s ability to summarize the issues and insights of dynamical systems theory and other recent developments in cognitive, biological, and computer sciences for the scientific layperson. Clear and concise explanations with just enough detail to flesh out the concepts make for a reasonable understanding of the significance of the theory in question and serve as entry into the author’s application of it to the field of improvised music. Another positive aspect of the book is the degree to which examples of specific pieces of music—some of which are included on the accompanying CD—are integrated into the explanations and explorations. He subjects a recorded performance of the piece *Hues of Melanin* by the Sam Rivers Tri, to an extensive “phenomenological analysis” and charts out in detail the prominent musical transitions during the course of the 33-plus-minute work. In another chapter, visual displays of “fractal correlation dimension” analyses and correlograms (plots of periodicities in the spectrograms of the recordings) of recorded excerpts by Evan Parker, Derek Bailey, Peter Brötzman, The Art Ensemble of Chicago, as well as the aforementioned Sam Rivers Trio recording, are integrated into a discussion of fractal (self-similarity across hierarchic levels) aspects of musical development. Mr. Borgo’s facility with the concepts and vocabulary, as well as his novel and creative applications of them to musical improvisation, are commendable.

A major flaw of the book, however, at least for this reviewer, results from the author passing quickly beyond using the complexity science models as mere metaphors into what often constitutes a very real case of “misplaced concreteness” (as defined by philosopher Alfred North Whitehead). Mr. Borgo makes the following disclaimer on page 12: “My comparison often occurs on the level of metaphor, but this should not be perceived as an inherent shortcoming.” It is precisely, however, when he concretizes the relationship(s) between his models and the musical phenomena he is discussing that the trouble begins. When he states on page 69, for one example, that “[a]n important goal of this chapter is to study the structure of the phase space of improvisation,” he goes beyond metaphorical description. In the ensuing section he directly applies the concept of “phase space,” a very specific descriptor of nonlinear dynamical behavior predicated on the measurement of discrete values of a limited
set of behavioral dimensions, to a phenomenon [collective musical improvisation] that displays continuous variations across a virtually infinite set of behavioral dimensions. The problem is not merely philosophical. By concretizing his metaphorical relationships, he sets himself and his theories up for certain failure. Beyond a very real and limited degree, the mechanisms are often incompatible with the musical features he uses them to describe and explain. The comparisons simply do not hold up to deeper scrutiny. These mistakes of misplaced concreteness recur throughout the book.

A related problem is that of appropriate scale. Mr. Borgo’s use of complexity models to explain behavioral mechanisms at work, rather than merely describe similarities between different domains, ignores disjunctions across micro- to macro-level descriptions of behavior (e.g., subatomic particles display quantum behavior yet individual humans can be unambiguously located in terms of both position and velocity). This is an example of what Leonard B. Meyer, in his book *Music, the Arts, and Ideas* (1967, Chicago: University of Chicago Press), refers to as “the assumption of hierarchic uniformity.” Mr. Meyer observes that “it is . . . a serious mistake to assume that the principles or ‘laws’ governing the organization of one hierarchic level are necessarily the same as those of some other level” [p. 258]. I take this to be relevant to Mr. Borgo’s project in the following way: As anything other than descriptive metaphor, the mechanisms of complex dynamical systems operate on a behavioral hierarchic level incommensurate with many of the author’s propositions. The level of conscious individual artistic choice, intimately involved with improvisation [and creative production in general], is not the level at which dynamical systems theory articulates with the fields of psychology and social dynamics. An individual’s autonomous conscious choice is at a different hierarchic level than that of, for example, social and cultural conditioning, large-scale group dynamics, or evolutionary biology, each of which displays a high degree of complex interdependence among autonomous subsystems characterized by, for example, strength of coupling, degree of hysteresis, co-evolution, and so forth, which are statistically modeled at a hierarchic level above or below that of individual autonomous choice. To take individual artistic behavior so far out of the realm of autonomous decision-making assumes for it a degree of classical mechanistic causality no longer typically recognized in the social sciences. Any study of improvisation that leaves aside issues of autonomous conscious choice in deference to underlying or overarching issues at other hierarchical levels seems at least somewhat misguided.

When he restricts his explanations to sonic phenomena on the level of sound waveforms, however, he’s on safe ground. In subjecting recordings to analyses of fractal correlation dimension he deals with the sonic tracings of musical behavior rather than the behaviors themselves. In applying ideas of coupling and biological entrainment to an examination of ensemble rhythmic interaction, the author is again on solid footing, discussing the contribution of biological mechanisms to the embodiment of complex physical tasks. Unfortunately, Mr. Borgo slips rather seamlessly back and forth between appropriate and inappropriate applications along the continuum between metaphoric description and concrete comparison, without seeming to notice the difference.

Another lesser problem with the book is a serious omission in the section “Time and the Qualia of Experience” in the chapter “Rivers of Consciousness.” Though he is dealing with the hierarchical nature of music perception, parsing the continuous flow of musical sound into “chunks,” from sections and phrases to individual elements, etc., Mr. Borgo never mentions the groundbreaking work of James Tenney in this field, in particular *Meta-Hodos* [1971], META Meta-Hodos [1977], and *Hierarchical Temporal Gestalt Perception in Music* [with Larry Polansky, 1978]. In this trio of writings Tenney lays out the gestalt psychology and cognitive science underpinnings of a new phenomenological approach to music theory. Long available from a variety of sources, these writings form a very sophisticated basis from which to explore the hierarchical nature of music perception and cognition. Mr. Borgo’s discussion of the qualia of music perception, and the hierarchical nature thereof, would undoubtedly have been considerably strengthened to the degree it referenced and built upon this earlier set of works.

Lastly, the operational definition of “music” that Mr. Borgo explicitly adopts in the introductory chapter caused me some concern. On page 5, among the other requirements listed for his “understanding of music,” is the proposition that “[m]usic is an event centered on the real-time production of sound; music is not an abstraction, such as a score, transcription, or recording.” This is tantamount to declaring that visual art is centered on the real-time production of visual images, leaving no room for studio art practices. By carefully, not to say conservatively, circumscribing his domain of interest to live performance, the author clearly leaves a great deal of the electroacoustic and computer music of the last six or so decades outside the declared scope of the book. He is apparently uncon-
cerned with (or unaware of) the possibilities of non-real-time improvisation. Whether Mr. Borgo is ignorant of the long-standing studio practice of electroacoustic music is unclear. That his current book’s insights into the relationships between musical phenomena and dynamical systems theory, and so on, is not intended to apply there, however, is not. Given the very real applications of various scientific, mathematical, and cognitive science concepts within the domain of electroacoustic music over the past 60 years or so, this seems unfortunate indeed. Mr. Borgo’s narrow definition of music (or at least the music with which he is concerned) would seem to have needlessly impoverished his set of source materials.

Summary and Conclusion
On the whole, there is much to commend in this book. It applies a number of recent developments in the sciences to a musical domain that, until recently, has received relatively little serious academic attention. It provides clear and concise explanations of complex concepts for the scientific layman, and profitably uses numerous musical examples in doing so. The downsides are real enough, though perhaps not fatal. Given a reader with a sharp eye and discerning intellect, they should not stand in the way of the important contributions the book makes to the study of improvisation.

Recordings

Lydia Ayers: Virtual Gamelan
Compact disc, Albany Records TROY874, 2006; available from Albany Records, 915 Broadway, Albany, New York 12207, USA; telephone (+1) 518-436-8814; electronic mail infoalbany@aol.com; Web www.albanyrecords.com/.

Reviewed by Elizabeth Hinkle-Turner
Denton, Texas, USA

Virtual Gamelan provides a thorough documentation of the research of Lydia Ayers in the areas of Csound synthesis, just intonation, and both real and virtual instrument design. Featuring computer gamelan pieces in just intonation composed from 1977 to 2006, the listener is treated to Ms. Ayers’s compositional and research evolution during a time period of almost 30 years. For persons unfamiliar with Ms. Ayers’s work, the Hong Kong-based composer has a variety of interests and accomplishments including two books and several articles about Csound, dozens of publications in the field of music education, flute performance, and just intonation; and years of teaching and study with the likes of James Beauchamp, Charles Dodge, Morton Subotnick, and Robert Dick. Ms. Ayers is also an accomplished flutist and was co-host of the 1996 International Computer Music Conference [Hong Kong].

Ms. Ayers writes in the recording’s liner notes that the music on this CD “is inspired by the music of composers such as Harry Partch and Lou Harrison, the antics of the family cats and experiences in Indonesia . . .” Her music features microtonal experiments with many scale systems and tunings, compositional structures based on Eastern musical forms, and sound synthesis modeling of a traditional gamelan and the Woodstock Gamelan, a tubular percussion instrument developed by the composer and built to her specifications by Woodstock Percussion. Several of the works on the recording show variations on a composition and research theme. For example, Tala Malika Jak (2005), Catjak (2005), and Tala Malika Gong (2006) are inspired by different aspects of the Indonesian “kecak” [monkey chant, pronounced “ket-jack”] and the Indian “tala malika.” According to Wikipedia, talas (“claps”) are rhythmic patterns that determine the rhythmic structure of a composition. Tala Malika Jak utilizes recordings of Ms. Ayers’s students saying the word “jak” and these samples are developed in a solo and chorus format into a variety of rhythmic structures in a three-part compositional form. Fairly literal and rhythmic layering of the samples is featured first with the second section utilizing a less rigorous rhythmic structure in which the sounds are elongated and further processed. The more straightforward rhythmic patterns return in the final section but at a faster pace and in a canonic form. The sounds are treated spatially in a circular fashion. The composer herself shared with me that both Tala Malika Jak and Catjak were partly written to show her beginning composition students the possibilities they had in sounds they could make themselves. This three-part formal structure is
featured in all three of the “tala jak” pieces. Catjak uses cat sounds and descriptions for its source material, and the fun juxtaposition of the texts must make this a real audience-pleaser during a concert (what a welcome relief to all those “loud swooshes” we are bombarded with at electroacoustic music conferences lately!). Because of the variety of text material, this work is more interesting than Tala Malika Jak. Tala Malika Gong is a new “orchestration” of Tala Malika Jak substituting gamelan gong sounds for the sampled text. The transformation is striking: Very little rhythmic patterning is noticeable because of the long decay of the gamelan sounds and the piece becomes much more a study of pitch layering rather than of rhythm. Listening to all three pieces in succession is an excellent way to get an idea of the composer’s musical research and concerns and provides a bit of fun along the way as well. None of these pieces are my favorites on the recording but in them I was informed by the exploration into the composer’s studies and experiments. Stronger by far are the composer’s works that reflect her experiences and impressions of nature and natural phenomena, especially in Indonesia. Pendopos (2000) is reflective and enchanting, and creates an imaginary journey up a mountain past open pavilions where gamelan music is being performed. The listener at last reaches the top where she is treated to the sounds of the birds and the sense of being on a summit looking downward.

Merapi (1995) gets its title from Java’s most active volcano and, like Pendopos, features randomly generated music in the style of the Indonesian gamelan. Bioluminescence (1990), referring to the ability of animals to give off their own light, uses several Indian raga tunings, just into-

Barry Schrader: Lost Atlantis


Reviewed by Elaine Lillios
Bowling Green, Ohio, USA

Two aspects of Barry Schrader’s music that have always attracted me are its timelessness and its meticulous attention to detail. These elements are evident in this composer’s two compact disc releases Lost Atlantis (2004) and Beyond (2005). Lost Atlantis features two re-mastered analog pieces from the 1970s: Trinity and Lost Atlantis. Beyond contains newer works dating from 1992, 2002, and 2004. When listening to these recordings side-by-side, Mr. Schrader’s strong sense of compositional style and detailed sensitivity to time, space, and timbre are evident. His music flows over the listener, ebbing and flowing through a gamut of emotional states. At times it demands the listener’s attention with strong motivic gestures, frenetic contrapuntal activity, and punctuating timbres. At other times its undulating textures and gentle, organic sounds lull the listener into imagined realities and dream states.

Lost Atlantis (2004) presents digital re-masters of two historic analog compositions, Trinity (1976) and Lost Atlantis (1977). Both pieces were created with the Buchla 200 analog modular synthesizer, combined with four unique modules built for the composer by Fukishi Kawakami of Yamaha. Engineer Gary Chang assisted Mr. Schrader in re-mixing and re-mastering the original four-channel versions into stereo, giving the pieces a new life in the digital domain.

Trinity is a single-movement work with a clear dramatic structure mov-
vibrations that grow slowly and purposefully into a large gong-like background punctuated by a synthetic melody. The melody unfolds slowly and remains somehow incomplete, as if heralding something that never reaches fruition.

*Beyond* includes some of Mr. Schrader’s newer electroacoustic works: *First Spring*, *Beyond*, Duke’s *Tune*, and the multi-movement *Death*. Bebe Barron aptly overviews the compact disc (in a review on the disc’s Web site), saying “The music conjures up a whirlwind of emotion from some primeval source that permeates the listener with awe.” Indeed, the composer’s ethereal textures, natural-sounding (yet synthetic) timbres, and organic temporal unfoldings, guide the listener on reminiscent, imaginative, and even self-reflective journeys through life, death, and renewal. Notable is the ritualistic *Beyond*, whose low, droning chords and metallic-edged, round timbres coupled with organic temporal development, evoke a sense of wonder and mystery. *Death* guides the listener through the ultimate unknown journey with its first movement, *Before Death*, a brief yet satisfying foray into a haunting, sweeping soundworld whose character is simultaneously lulling yet unsettling, and *After Death*, with its surging textures suggesting infinity, followed by floating drones portending a moment of reckoning.

Barry Schrader’s *Lost Atlantis* and *Beyond* contain remarkable examples of meticulous, dynamic, and evocative electroacoustic music. The casual listener might criticize the composer by suggesting a textural self-similarity among pieces. The careful listener, however, will note each work’s *sui generis* nature by assessing temporal development, timbral content, programmatic focus, and spatial sensitivity. In doing so, one will discover the composer’s careful craft and technique that makes each piece singular. Mr. Schrader is hardly a composer who can be criticized as employing the color “blue.” His compositional palette incorporates azure, cerulean, indigo, sapphire, and other equally provocative shades. Barry Schrader’s music is crafted with infinite patience, critical attentiveness, and meticulous listening. In adhering to these ideals, this music withstands the test of time and stands uniquely in the American electronic music genre.

**Rodney Waschka II: Saint Ambrose**

Compact disc, Capstone Records CPS-8708, 2002, available from Capstone Records, 252 DeKalb Avenue, Brooklyn, New York 11205, USA; telephone (+1) 718-852-2919; fax (+1) 718-852-2925; electronic mail mail@capstonerecords.org; Web www.capstonerecords.org/

Reviewed by Mary Simoni
Ann Arbor, Michigan, USA

*Saint Ambrose* is an opera in one act for saxophonist/actor, computer music, and visual projections composed by Rodney Waschka II. Commissioned by saxophonist Steve Duke in 1999, the twelve-scene opera is performed by a single saxophonist who also acts the role of Ambrose Bierce. The libretto is by the composer.

Ambrose Gwinnett Bierce (1842–1914) was a Civil War veteran and American author who is best known for his sardonic *Devil’s Dictionary*, a published collection of words with definitions that codify the unabashed mockery and derogations of “Bitter Bierce.” The *Devil’s Dictionary* is an invaluable reference for anyone who grapples to find humor in such farci-
cal realities as immoral politicians, religious zealots, or any other phenomenon that captured Bierce’s cynical eye. According to Bierce, a politician is “an eel in the fundamental mud upon which the superstructure of organized society is reared,” and a Christian is “one who follows the teaching of Christ so far as they are not inconsistent with a life of sin.” We can thank the composer for sanctifying the memory of Ambrose Bierce by declaring him a saint: “A dead sinner, revised and edited.”

Mr. Waschka’s “Saint Ambrose” should not be confused with the real St. Ambrose, the fourth-century Bishop of Milan duly declared through the arduous process of canonization by the Roman Catholic Church. The Church’s St. Ambrose is credited with contributions to music, notably Ambrosian Chant, a staple in the musical repertoire of the early Church, and the “Te Deum laudamus,” a hymn of praise to God. The “Te Deum” is still used today and is performed during special liturgies, such as [oddly enough] the canonization of a saint.

The score contains detailed instructions on staging, equipment, props, costumes, lighting, and sound. Essentially, the milieu is that of a lecture by the famed Ambrose Bierce. The stage is stark, equipped with only a lectern and a music stand, so that Ambrose can demonstrate his newfound skill in playing the saxophone interspersed with his lamponing rhetoric. Performing Saint Ambrose is a technically straightforward endeavor, with only two microphones: a lapel mic for the speech of the performer and another for the saxophone. The computer music is pre-recorded on compact disc and the score includes specific instructions for the start and stop times of these pre-recorded tracks. Optional visual projections that generally display the text of the libretto may be used to assist with intelligibility. The score, accompanying computer music on compact disc, and visual projections are available from Borik Press, Raleigh, North Carolina (www.borikpress.com/).

Mr. Waschka classifies Saint Ambrose as an opera. An opera, according to the Devil’s Dictionary, is “[a] play representing life in another world, whose inhabitants have no speech but song, no motions but gestures and not postures but attitudes.” Furthermore, Bierce describes an opera saying that “all acting is simulation, and the word simulation is from simia, an ape; but in opera the actor takes for his model Simia audibilis [or Pithecanthropos stenata] —the ape that howls.” One cannot help but wonder if the witticism of the composer’s libretto is imbued with the burlesque of Bierce. Is Bierce an ape with an attitude? Is his speechgestured howling? Or does Saint Ambrose present a novel genre where the practices of extended performance techniques include acting? Whatever the case, the brilliance of Mr. Waschka’s Saint Ambrose is its parody of parody.

The twelve scenes of Saint Ambrose are: Overture: Nothing Matters, Good Evening, Interlude #1, Unlike William, Interlude #2, After the War, Interlude #3, In 1913, The Definitions Aria, Interlude #4: Clementine Variations, Now, as promised, and Saintly Jam. Between the compositional bookends of Overture: Nothing Matters and Saintly Jam, the macro-formal organization of the work essentially alternates between scenes with predominantly spoken passages and scenes comprised of saxophone solos, both types of scenes accompanied by computer music. The spoken passages effortlessly interleave the monologue of the libretto with quotes from the Devil’s Dictionary. The saxophone part was composed with the assistance of genetic algorithm software written by the composer and scored using traditional music notation. The sparse texture of the computer music part seldom assumes musical prominence and seems to have been synthesized using established synthesis and signal processing techniques.

Like the libretto, the computer part employs musical quotes from the popular music of Bierce’s day such as La Cucaracha from the Mexican Revolution and the American western folk ballad Clementine. A mockery of George Handel’s popular Sarabande in the Overture retains the rhythmic rigidity of the Sarabande but is satirized by the timbre of a toy piano interspersed with growling, incomprehensible speech. A genetic algorithm unfolds the musical allusion of Taps, originally composed by Major General Daniel Butterfield during the Civil War. Mr. Waschka’s use of Clementine first appears in Scene 9 in The Definitions Aria, followed by the Clementine Variations in Scene 10. The Clementine Variations, warped in the style of Paul Lansky’s idlechatter, concludes with the pure and angelic voice of the composer’s daughter, Lana Kurepa Waschka, proclaiming, “That’s not the way it goes!”
The performance by Steve Duke is remarkable. He effortlessly traverses the development of Bierce’s technical mastery of the saxophone throughout the chronology of the opera. From Bierce’s statement, “By the way, lately I’ve taken up the saxophone,” in scene 2, to the accomplished virtuosity of The Definitions Aria and the beautiful Saintly Jam, Steve Duke magnificently performs a convincing array of blues and jazz creating a gifted partnership with the elegance of Mr. Waschka’s algorithms.

**Saint Ambrose** represents a milestone in the repertoire of computer music. The strength of the work is the artful presentation of a period in American history rendering it accessible to and enjoyable by people of all ages. As the old adage goes, “Those who have not learned the lessons of history are destined to relive it.”

Rodney Waschka gives us an entertaining glint into an American life during the late 19th century with a derisive parody fitting for the 21st century.

**Products**

**Monome 40h Multi-Purpose Hardware Controller**

US$ 500, available from Monome, 153 West Jefferson Street, Philadelphia, Pennsylvania 19122, USA; electronic mail info@monome.org, Web www.monome.org/.

Reviewed by Jared Dunne
Denver, Colorado, USA

The 40h, by Monome, is a reconfigurable hardware controller for multimedia applications. The 40h measures 17 centimeters square and consists of an 8 × 8 grid of backlit silicon pads, encased in sturdy anodized aluminum [see Figure 1]. The unit communicates serial, MIDI, and OpenSoundControl (OSC) messages over USB 2.0. There is no need for power adapters as the unit is powered over USB as well. There are no computer operating system-specific drivers to install with the 40h, which allows the unit to communicate clearly over Mac OS X, Windows XP, and Linux. To get the 40h communicating with your computer you will need to first download and install the FTDI virtual COM port driver. This driver will cause the 40h USB device to appear as an additional COM port on your system. Each of the 64 pads is fully configurable. The user is able to assign MIDI Continuous Controller (CC), MIDI Note, or OSC messages to each of the individual pads.

Besides having the ability to control your favorite commercial audio-, MIDI-, and OSC-compatible software, the Monome community provides applications designed specifically for the 40h. Currently, the majority of these have been developed in the Max/MSP environment. These applications will also operate with the free Max/MSP Runtime version, so users who haven’t purchased a full license for Max/MSP can still take advantage of the 40h patches. The community is also developing 40h-specific applications with Pure Data (pd), Chuck, Bidule, Reaktor, Ruby, and Processing.

After you have installed the FTDI virtual COM port driver you should visit the Monome Web site and download a folder named “base patches.” This folder contains utility applications, developed in Max/MSP, which allow you to route serial, OSC, and MIDI messages to and from the 40h. These utility applications are needed if you are planning to use the 40h in tandem with the Max/MSP patches designed specifically for the 40h. If you are planning to use the 40h to control applications outside of the Max/MSP environment, you can also use the wonderfully handy applications called Moma (Windows) and MAPD (OS X). These two programs allow the user to graphically assign and specify the type of message (serial, OSC, MIDI) that each of the individual pads will communicate.

The 40h has no labels on the unit itself. At first, this may seem confusing or intimidating, but after spending a short time with the unit you will realize that this ambiguity is one of its major strengths. The lack of labels leaves the user with an open palette to choose from. Flexibility is of greatest importance with the 40h. You can easily assign the first two rows to send MIDI note messages, you could have the next two rows send MIDI CC messages, you could have the last two rows send OSC messages.

Also included in the “base patches” folder are a few of the audio/MIDI applications designed by the community for specific use with 40h. MLR2 [see Figure 2] is a live sample-cutting platform. A single soundfile can be loaded into each row of the 40h interface. The soundfile durations are mapped across the chosen row of the 40h. Playback position, in relation to the specified tempo, is indicated by a lit pad. Pressing a pad within a row jumps play-
back to this position. The jumps are quantized according to a specified grain. Multiple rows or groups of sounds can play simultaneously. Like mute groups in a traditional sampler, the user can have certain sounds cancel another. A level, mute, and meter are available for each group. You can also record and playback sequences with the pattern recording module.

There are many other community-developed applications for the 40h that can be downloaded from the Monome Web site. Balron maps 8-tone scales across the 40h grid. Scale, key, and transposition values can be set to define the tonal range. Velocity can be set for the original note and each delay. To create repeating patterns, four MIDI delays can be used and will occur from unison to eight bars. To create complex harmonies or chords, delayed notes may be shifted on 40h’s 8 × 8 grid, with individual velocities assigned for each delay.

Phoenix (see Figure 3) is a 40h application developed in Pure Data. According to the description on the Monome Web site, “Phoenix is a probabilistic arpeggiator. It creates a model by keeping track of the last five values that the user has chosen for each of the 8 steps of the arpeggiator and the largest interval between values that appears. The user can choose between MIDI out (press the MIDI button), sine wave oscillator (default), or a dynamic wavetable oscillator (press the waveform button) for sound output.”

Monome is more of an artist collective than a brand name. It manufactured only 400 40h units, with no plans to produce more. Monome states: “It’s not our intention to flood the market, as we’d like to keep our designs hand-made, high-quality, and short-run.” The next project is to expand on the 40h idea with the 100h, which will be a 16 × 16 grid controller. All of the hardware and firmware of the controller are open source. As with all open source projects, the community is heavily depended upon to help the development flourish. To that end, software contributions and hardware hacking from the community are highly encouraged.

One foreseeable drawback for the potential 40h purchaser might be that, because the project is open source, there is no guaranteed technical support if you are having problems. In my experience, though, support hasn’t been an issue. The community is a tightly knit one, and if you visit the Monome Web site forums, you are likely to have your question answered within a very reasonable amount of time. Actually, I’m more satisfied with the Monome community support than I have been with technical support from major developers.

Another problem for potential customers is that the 40h is not an instant plug-and-play device like a lot of the MIDI controllers available. It
takes a little more effort to get the 40h up and running, but this effort is well worth it. If you have any installation questions, the Monome Web site provides a step-by-step guide to installing all of the appropriate software to get the 40h running. The Web site also provides tutorials for interfacing the 40h with a growing list of applications, including Bidule, Chuck, Reaktor, and Ableton Live. If you are the do-it-yourself type, Monome also sells the logic boards separately and provide tutorials on how to customize your own 40h.

Overall the 40h is a deceptively simple and extremely flexible hardware controller. The 40h is one of only two hardware controllers on the market that speaks OSC natively, which creates fantastic opportunities to interface the 40h with not only audio and MIDI applications like Pure Data and Max/MSP, but also with audiovisual software like Eyesweb and VVVV.

In watching a computer music performance, audience members often feel disconnected from the musician because they can’t relate a mouse click to a musical gesture. With the 40h, Monome has created an interactive and tactile interface that greatly improves the performance aspect of the computer musician.

You can purchase the 40h directly from the Monome Web site for US$ 500.