[Editor’s note: Selected reviews are posted on the World Wide Web at mitpress2.mit.edu/e-journals/Computer-Music-Journal/ Documents/reviews/index.html. In some cases, they are either unpublished in the Journal itself or published in an abbreviated form in the Journal.]

Events

Audible Interfaces Festival

Ensemble Mosaik, Kulturbrauerei, Berlin, Germany, 19–21 February 2002

Reviewed by Christine Anderson (translated by Peter Castine) Berlin, Germany

Even in Berlin, a town that sees concerts of new music practically every day, this mini-festival had something special about it. The three concerts performed by Berlin’s Ensemble Mosaik attracted a diverse audience, not only the usual “friends and family” of the composers and performers, but also a broader audience ranging from youngsters in knitted caps to people from the art-opening scene. The venue was the vat house of what was once a functioning brewery, now transformed into a cultural center while retaining the essence of its original atmosphere.

Ensemble Mosaik is an initiative formed by graduates from Berlin’s Hochschule der Künste. Since its founding in 1997, the ensemble has, under the direction of composer Enno Poppe, built a reputation both for high quality musical performances of the newest in new music—performances often prepared in close association with the (mostly younger) composers—as well as for artistic virtuosity as anywhere else on these evenings.

The first concert presented premiere performances of Harald Muenz’s The Self Composer [1999–2002] and Keiko Yamanaka’s Resound [2001], as well as two older pieces: Marco Stroppa’s Spirali (1987/88) and Claude Malherbe’s nosun [1984]. On the following evening, Arnulf Herrmann’s Sextett [2000/01], Enno Poppe’s Holz [1999/2000], and Jörg Mainka’s Skalenwirbel [1992/93] were performed. The final event commenced with a sound installation by Orm Finnendahl, which had also been presented as a concert dénouement on the first two evenings. In the closing concert we heard performances of Calving Ground by Ed Osborn [2002, world premiere], TEXTURE-MULTIPLE by Agostino Di Scipio [1993–2000, German premiere], as well as Mr. Finnendahl’s Kommen o’r Gehen [2000], and a revised version of El jardín de senderos que se bifurcan [2001/2002] by Ana Maria Rodriguez.

Rather than reviewing all 12 works here, it seems more interesting to look at the means taken and goals followed in seven selected pieces, with a particular focus on the use of electroacoustic media.

The first piece in the festival, The Self Composer for sight-reading oboist and laptop computer by Harald Muenz [born 1965], marked one extreme in the use of computer technology. This concept piece is based upon a collection of 23 orchestral excerpts from the oboe repertoire, prepared and stored in computer memory. Of these, two are selected at random immediately prior to a performance, with the computer generating a new part by combining elements from the two and the oboist sight-reading the result as it is displayed on the computer monitor. In this way, an open competition between performer and computer is created: human and machine play in unison. In the course of the three sections of the work, increasingly strong contrasts are staged: the noble timbre of the brilliant soloist [Simon Strasser] versus the rather cheesy synthetic computer sound, a more human (and approximate) intonation versus the mechanically perfect. However, the composition leaves one question open: is it [and to what extent] generally possible to succeed in opposing or breaking with the overpowering historical aura of tonal materials?

Arnulf Hermann [b. 1968] presented, with his Sextett for three strings, two winds, piano, and electronics, an essay on the difficulties of recollection and on the unnoticed re-structuring of memories that takes place in the process. The third movement—entitled 8 Takte im Gegenlicht [“Eight backlit bars”—is based on a passage of particular rhythmic and harmonic interest, taken from the Cavatina movement of Ludwig van Beethoven’s String Quartet, Op. 130. Both the original version and deviated forms of the extract are interwoven in numerous structural...
layers, with glimpses of the familiar appearing beneath strata of the unfamiliar, a sort of interrupted or broken speech. For instance, the original harmonic structure is present as a kind of scaffolding encompassing the entire movement, at the same time it appears in foreshortened form, linearly shifting [not transposing!] frequencies. On top of this, the original melody is carried by the viola accompanied by a pointillistic, accented version of the same tune. A series of prepared soundfiles, triggered by the pianist during the performance, pick up and spatialize noise-like sonic materials in a five-channel configuration.

The second movement, “Artificial Flavor,” has, as a middle section, a cleverly devised rhythmic and spatial canon, in the course of which instrumental timbres imperceptibly give way to concrete sounds. This is followed by a transition to the third movement, a solo intermezzo of electronic tones with slowly sinking pitches. For this section, Mr. Herrmann had recorded crotales, subjecting the samples to extreme time-stretching and filtering, letting the sounds wander around the room at varying speeds. “Disruptive activities” were composed into the music, preventing the music from becoming too obvious or smooth. Instead, attention was kept high by the remaining uncertainties in attempting to recognize the familiar.

In his composition Holz [“Wood”] for clarinet and ensemble, second in a recent series of three pieces for ensemble [the others are titled Knochen and Öl—“Bones” and “Oil”], Mr. Poppe [b. 1969] makes thorough use of a harmonic technique he has experimented with in earlier works. The harmonic organization of a musical idea [for instance, a polyphonic melodic passage] is generated by calculating the frequencies that would be generated by a ring modulation of two or three pitches in the underlying polyphonic structure. These would then be “simulated” by harmonic structures consisting of anywhere from four to nine pitches. These structures, played by MIDI instruments, naturally contain further partials and different tones. As a further step, these harmonic structures would be taken up by the instrumental ensemble. In consideration of the limits of human intonation capabilities, microtones are quantized to the nearest eighth of a tone. During the performance, a keyboard preset to an appropriate scale served as a reference point for the instrumental intonation. The threat of this systematic harmonization capsizing into downright out-of-tune performance in the more complex passages is a risk Mr. Poppe takes with a smile. In his words, “staging a conflict in which a compositional system comes under question through its own rules” is a matter of personal interest. The microtonally enhanced harmonic structures [or “polyspectral chords,” to use Mr. Poppe’s phrase] resulting from this process elicit a tonality with a characteristic all its own. This, together with the distinctive musical character of the work, constitutes the fascination of this instrumental composition.

In Codex II, by Richard Barrett [b. 1959], for oboe, saxophone, piano, and live electronics, the composer was present on stage with the other performers, playing LiSa, a “software instrument” developed at STEIM [Studio for Electro-Instrumental Music] in Amsterdam. This software allows direct manipulation and playback of both previously sampled sounds as well as sounds recorded during the performance. Mr. Barrett values the flexibility of the interface as well as its palpably tactile aspects—reminiscent of acoustic instruments—in an instrument that still offers the variety of timbres available in the electroacoustic medium. The form of the piece, a series of strongly contrasting states, was developed during rehearsal. The score is, accordingly, more a system of what Mr. Barrett terms “frames” for the ensemble music rather than a finalized performance instruction.

Ana Maria Rodriguez’s El jardín de senderos que se bifurcan refers to a tale with the same title written by Jorge Luis Borges. She picks up Borges’s image of a temporal labyrinth, branching subterraneously from each of its points, reminiscent of hyper-text. In the original version of the piece, performed at the Donaueschingen Festival in 2001, Ms. Rodriguez projected this image of a temporal labyrinth onto a spatial one, making use of a two-story gallery under the roof of the royal library in Donaueschingen. In that situation, the audience could wander through the space during performance. In the Berlin version, with only a single room, the piece was presented in a condensed form while retaining the basic concept. Each of the three instruments [bass flute, oboe, and cello] was assigned, prior to the performance, 15 short, mostly noise-laden, passages. The piece is created by the computer during the performance by choosing random combinations of these phrases and displaying the calculated parts on monitors for the musicians to play. The two woodwind parts, resynchronized to a common meter again and again, play against long cello pedal points that remain in an independent meter. The instrumental sounds are fed back into a Max/MSP-based system and transformed. The Max patches themselves generate their own meters, creating a third temporal layer. Ironically, it was the
temporal linearity—the very aspect that Ms. Rodriguez was trying to break with—that became predominant in the listener’s perception of this performance. The presentation in Berlin whets the interest for experiencing the spatial version of this composition.

TEXTURE-MULTIPLE for two winds, two strings, percussion, piano, and live electronics, by Agostino Di Scipio [b. 1962], is a piece that has been extended in every new performance since its premiere in 1993. Each of the instrumental parts is independent, taken from a very limited stock of practically identical elements but developed autonomously. Nonetheless, the voices can become transparent parts of a whole. During performance, the individual parts repeatedly come together as a collective ensemble, only to be destroyed. The computer intervenes in the instrumental action through a special technique of multiple granularization with different time-scale factors. This granularization is dependent on the resonant properties of the performance space, which is tracked by a microphone placed in the middle of the room. Mr. Di Scipio calls the resulting feedback loop an “ecological system . . . in the triangle between musician, machine, and space.” In his words, the composition is not so much a piece of interactive music as an attempt to “compose interaction through which music is created.” The result is a highly exciting affair, not only for the audience but also for the performers.

Both the composition Kommen od Gehen, for solo violin and live electronics by Orm Finnendahl [b. 1963], and his sound installation of the same name were originally conceived for the German Pavilion at Expo 2000 in Hanover. Starting with three prerecorded violin samples and sounds recorded directly from the violin during performance, a special recursive process of granular resynthesis takes place. Time scaling and overlapping of materials (at times on the order of a thousandfold) is used to generate the extremely thick sonic material of the piece. The interaction between soloist, with its hesitant, deliberately unstable tone, and the electronic manipulation of this material to overpoweringly engulfing waves of sound, is made evident for the listener through effects such as the apparent “switching off” of the computer-generated sound through Bartók pizzicati coming from the violin. Mr. Finnendahl’s ability to simulate an almost tangible spatialization with eight loudspeakers was impressive.

For the composers presented here, all born in the period from 1959 to 1969, it has long since become the natural course to make use of computers at all levels of their compositional efforts, even in purely instrumental works. The musical results are accordingly widely diverse. The composers make use of available software, or develop their own extensions, without relying on dogma, working independently, for the most part, of larger studios.

The computer is used for a wide variety of tasks: as an aid in simulating the solution of harmonic questions [Mr. Poppe, Mr. Herrmann]; for the creation of aleatoric works in which random number generators select and combine elements taken from predefined materials, transporting the resulting score to the performers directly on monitors [Ms. Rodriguez, Mr. Di Scipio, Mr. Muenz]; or in pieces that work explicitly with spatial elements [Ms. Rodriguez, Mr. Herrmann, Mr. Finnendahl, Mr. Di Scipio]. In concept works, which often critically scrutinize the relationship between human and (supposedly perfect) machines, the computer appears with an apparently subjective character as partner to the performer [Mr. Muenz] or meets the musician more as a traditionally “playable” instrument [Mr. Barrett]. The composers play, more or less openly, with the effect of direct confrontation between musician and a rack of technical equipment, or the musicians’ reactions to sounds echoing back at them from the concert hall. The associations generated in the audience by these effects are reminiscent of many communicational processes—both successful and failed—taking place between humanity and technology.

Publications

Eduardo Reck Miranda: Composing Music with Computers


Reviewed by Robert Rowe
New York, New York, USA

Eduardo Reck Miranda’s new book, Composing Music with Computers,
is an indispensable contribution to the scarce literature on algorithmic composition. In algorithmic composition, composers use formal processes to generate musical material, forms, or even entire pieces. *Composing Music with Computers* focuses on generative processes, those that formulate output from the operation of mathematical functions rather than from the manipulation or transformation of existing musical material.

Early on, the author identifies abstraction boundaries between the microscopic level, the note level, and the building-block level. The microscopic level is basically that of sound synthesis; the note level is traditionally represented by notation in a score; and the building-block level is a higher, formal abstraction combining and arranging sequences of notes. The processes described in the text can be applied to any of these levels, but for the purposes of discussion, the book focuses primarily on the note level.

Mr. Reck Miranda is certainly well placed to write this study: he has extensive experience as both a composer and a programmer of large-scale artificial intelligence systems. Moreover, he makes cogent use of cognitive arguments to characterize the nature of the composer’s craft. The scope of the discussion, then, is daunting: from general principles of music composition through the cognition of composers and listeners to the algorithmic techniques of generating musical materials and form. Given that scope, the book is relevant to several different audiences. Of those audiences, including computer scientists, mathematicians, and researchers in artificial intelligence, the book is addressed most directly to composers.

For example, the second chapter, “Preparing the Ground,” leads the reader through some fundamentals of discrete mathematics, set theory, logic, matrices, formal grammars, probability, and computer programming. This material would be familiar territory to those with a technical background, but is very clearly explained and demonstrated for the benefit of those with more purely musical training. Brief introductions to serialism and formalized music follow that fill the opposite role: informing those with more technical training than musical.

Subsequent chapters extend the introductory material and relate it to compositional applications. Chapter 3 is devoted to probabilities, grammars, and automata. Building on the foundation of chapter 2, the reader is shown applications of random distributions, Markov chains, and so on, to music generation. Similarly, chapters 4, 5, and 6 cover iterative algorithms, neural computation, and evolutionary music, respectively.

In my experience, the greatest difficulty for students trying to compose algorithmically is not learning the procedures—it lies in imagining how the procedures might be used to produce their own music. Mr. Reck Miranda points to this issue himself when discussing the musical applications of iterative processes:

However, finding an effective method for mapping the orbits [of an iterative process] onto musical parameters is not an easy task. This is one of the greatest difficulties composers face when working with algorithmic composition systems that use the output from essentially non-musical processes, that is, non-musical in the sense that they were not originally developed with a musical perspective in mind.

Some composers simply never will have a need to compose procedurally, no matter which tools they have, and others will see immediately how to employ algorithms in their work. For those in the middle, *Composing Music with Computers* is an essential guide. That said, the book may have been even more valuable to such readers with a greater range of worked-out examples. Throughout the body of the text, there are helpful illustrations with musical material provided at every appropriate juncture. These illustrations tend to be short and didactic, however, rather than elaborated and evocative.

The most useful bridge between theory and practice is provided by chapter 7, a group of three case studies showing in greater detail how finished musical material can be derived from algorithmic techniques. In particular, the first case study, titled “From content to form,” shows how to generate chordal material using a collection of generative modules and then to shape that material with a group of “moulding rules.” For example, Moulding Rule Two states that “all ascending sequences . . . of notes are slurred in order to form an articulatory unit.” At the end of the discussion is a measure of music for six instruments, complete with articulations, that clearly demonstrates the musical potential of the formalizations that are the subject of the book.

Beyond that, the accompanying CD-ROM includes many applications for algorithmic composition in full-blown or demonstration versions. These include Roger Dannenberg’s Nyquist language, the OpenMusic programming system developed by Gérard Assayag and Carlos Agon at IRCAM, a prototype of Music Sketcher, an algorithmic composition tool designed by Daniel Oppenheim and his colleagues at the IBM Computer Music Center, and
several others. There are entries for both Windows and Macintosh platforms, with documentation and supporting material. The CD-ROM alone makes the book well worth the investment for a serious study of algorithmic composition. With this toolbox, readers can immediately test their ideas using established and relevant software.

The references are both a valuable resource for further study and an interesting indication of the author's influences in writing the book. From Paul Larivaille’s “L’Analyse morphologique du récit” to Mikhail Malt’s “Reflexiones sobre el acto de la composición,” we are introduced to intriguing writing on form and composition that does not come from the usual English-language suspects.

Eduardo Reck Miranda’s *Composing Music with Computers* addresses a field that is widely practiced but little described: probably the closest equivalent is Phil Winsor’s *Automated Music Composition*, published in 1989. Not only is the book needed, but it is exceptionally well-written and, above all, clear. Composers, student or otherwise, will find a valuable resource for ideas, software, algorithms, and their underlying mathematics. This lucid and scholarly text will be read not only by computer musicians, but by everyone with an interest in the artistic possibilities of technology.

**Fred Lerdahl: Tonal Pitch Space**


**Reviewed by Bruce Quaglia**

Salt Lake City, Utah, USA

*Tonal Pitch Space*, by composer-theorist Fred Lerdahl, continues about 20 years of work that the author began with cognitive psychologist Ray Jackendoff in the late 1970s. The “Generative Theory” project’s first major manifestation was the publication of the seminal book, *A Generative Theory of Tonal Music* (GTTM), by Lerdahl and Jackendoff in 1983 (MIT Press). The present volume (TPS) represents a coming of age of that project and the culmination of much of Mr. Lerdahl’s published work from the 1990s.

Like GTTM before it, TPS is a broad synthesis of music theory and music cognition. It relies heavily upon a rule-based grammar of listening that descends from the original work that is presented in GTTM but which undergoes several important modifications in the first chapter of TPS. GTTM established four primary hierarchical structures for how a musical surface is “heard”: Grouping Structure, Metrical Structure, Time Span Reduction, and Prolongational Reduction. I won’t attempt to define these categories in detail here, but, roughly speaking, they translate how an experienced listener may be assumed to listen to a piece of music. In GTTM, this grammar was developed specifically to be applicable to how a listener parses common-practice Western art music. Some extension for application to non-Western musics and to post-tonal Western music was also proposed, but remained largely undeveloped in GTTM. In TPS, Mr. Lerdahl proposes the modification of both time span and prolongational reduction to include what he calls stability conditions. These are global features that are innate to the tonal system and which may be enforced across the common practice repertoire. These global stability conditions are treated in TPS through a richly developed theory of pitch space. The author’s initial formulation of stability conditions was proposed ten years ago in his widely remarked article, “Cognitive Constraints on Compositional Systems” (*Contemporary Music Review* 6[2], 1992). TPS expands extensively upon that proposed model.

Pitch space itself is by no means a new concept. In recent years there has been a resurgence of interest in the late 19th-century music theorist Hugo Riemann, and from that interest has developed a variety of neo-Riemannian transformational theories. The *tonnetz* is the essential pitch space proposed by Riemann about a century ago and is probably...
still the best-known historical model for a geometric tonal pitch space. Mr. Lerdahl does a very good job of tracing the historical development of the idea of pitch space from Baroque theorists such as Johann David Heinichen and Johann Andreas Kellner up through the present day’s interest in neo-Riemannian pitch space. The author, however, is not just interested in providing a historical overview of pitch space in the development of music theory over the past two centuries; he is primarily concerned with developing a critique of it.

Historical music theorists may at first bristle at the notion of such a critique, but Mr. Lerdahl’s aim is to develop a concept of pitch space that is grounded in historical precedents but that is also compatible with the cognition research that his own work references so frequently. This point is instructive because it reveals his essential orientation toward music theory: to treat it as a sub-category of music cognition. Of course, music cognition is a relatively recent [albeit burgeoning] enterprise, and music theory itself has a rather long history as a sub-discipline of musicology. A thorough evaluation of Mr. Lerdahl’s work requires that it be appraised also as a music theory in the more traditional sense and so his own evaluation of the historical models of pitch space is particularly useful when placing it along that historical continuum. His treatment of the history of music theory, particularly as it applies to the broad concepts that he invokes, is quite thorough in its scope. Historical theorists [and others] may potentially still take exception with how accurately he interprets some of these historical concepts, but they serve the purpose of defining the context for his own ideas very nicely. In particular, he treats concepts such as prolongation, which have held a relatively narrow and restricted definition in the Schenkerian tradition, much more generally than many Schenkerians will be comfortable with. Still, I believe that many of the objections that were leveled at GTTM by the Schenkerian community are substantially addressed by TPS. Certainly the limited inter-applicability of Schenkerian theory and Mr. Lerdahl’s pitch space is made rather clear and explicit in TPS.

The author’s model of tonal pitch space is highly numerical and includes a large number of formulae for calculating relative distance between pitches, chords, and tonal regions that reduce that distance to a single integer. This integer-distance normalizes not only geometric musical distance based on fifth-cycles (the referential interval cycle of the diatonic system), the tonic triad, the diatonic collection, and the chromatic collection, but also such factors as the number of common tones between chords or collections. Mr. Lerdahl concedes that this procedure may at first appear to be unintuitive, but defends it on the basis of the support lent to it by recent psychological research. In doing so, he privileges a non-geometric cognitive space that is more suited to the ambitions of his theory and which sets it apart from many historical precedents for tonal pitch space. I’m inclined to leave the reader to make up his or her own mind about that justification (although I will take it up again in a moment), but it points up an aspect of the book that I think is worth remarking. Throughout the volume, the author has a distinct propensity for what might seem to some readers as a self-conscious deflection of potential criticisms. This is notable primarily because music theorists rarely engage potential objections to their theories while still forming them even though that is certainly normal within most critical methodologies in other fields of research. Aside from the admirably honest and scrupulous quality that it lends to this work, it also serves to continuously clarify how Mr. Lerdahl has chosen to address the problems that he encounters in his work.

The critical aspect of the author’s (tonal) pitch space that distinguishes it from other historical models such as Riemann’s tonnetz, is that it is multi-dimensional as opposed to strictly geometric. It is essentially a reductional model of pitch space that transfers cognitive distance across several levels simultaneously. The resultant model reduces that distance to a single integer value. The multi-dimensional model proposed is consistent with a large body of referenced research in the fields of psychoacoustics, cognition, and, perhaps of particular note, recent brain-function research on neural nets.

One of the most powerful applications of Mr. Lerdahl’s model of tonal pitch space lies in his development of the theory of tonal tension and attraction. This model largely supplants and revises the earlier formulation of prolongational strategy that the author articulated in GTTM. The harmonic tension model proposed in TPS is, of course, still a rule-based grammar for how an experienced listener might perceive the relative tension of two harmonic events. The author first models the relative tension of sequentially ordered events [as a “naïve” listener might be assumed to listen “close to the surface”]. He then goes on to model how a more experienced listener might perceive relative tension between hierarchically related events.

Mr. Lerdahl’s theory of melodic attraction is developed through rules based on the relative stability of tones and their proximity to one an-
ner's Prelude to Tristan und Isolde. The analysis of Richard Wagner—especially in his work on the topic of pitch space as a model for tonal and atonal music—provides a rich context for the music-theoretical literature for composition, performance, and cognition. Mr. Lerdahl's analyses, not surprisingly, must rely more heavily upon considerations of saliency. This point, in his view, reflects the difficulties that attend how a listener structures the musical surface. The final section of TPS takes on the topic of pitch space as a model for metrical attraction that I will not comment on here.

The section on chromatic music is filled out with a chapter on prolongational structures in this space that includes a variety of compelling analytical examples drawn from Richard Wagner, Claude Debussy, Alexander Scriabin, and Béla Bartók. These analyses, as usual, are contrasted with relevant examples from the music-theoretical literature for comparison. I expect that in the near future further application of these concepts to this repertoire will produce increasingly fruitful analytical results. As the theory further progresses away from the basic tonal pitch space of the diatonic world, Mr. Lerdahl's analyses, not surprisingly, must rely more heavily upon considerations of saliency. This point, in his view, reflects the difficulties that attend how a listener structures the musical signal in a less familiar space and will become an even more critical feature in the "flat" pitch space of atonal music.

The theory of harmonic attraction derives almost directly from the melodic attraction rules. Voice leading is modeled as the convergence of the upper voices of a chord toward their relative attractors taken together with the simultaneous bass motion. Bass motion, Mr. Lerdahl observes, is often governed less by melodic attraction than by other considerations such as root motion. This model is further qualified by the formulation of an "attractional context" that defines referential pitches, chords, and regions (in other words, the parameters of the pitch space itself) through which the attraction strength of two events may be quantified. The section on melodic attraction and tension closes with two developed analytical examples. The analysis of Richard Wagner's Prelude to Tristan und Isolde is especially interesting given the plethora of approaches that theorists have taken with this passage over the years. The theory of attraction and tension is perhaps one of the most promising aspects of TPS. It will doubtless undergo further revision in not only the hands of its author but also of others involved in cognition and music theory and certainly by all those who address the broader topic of musical expectation in their work.

Although GTTM addressed itself primarily toward tonal music, TPS devotes extensive space to a more thorough development of pitch space in highly chromatic and atonal music. These remain perhaps some of the more controversial applications of the concepts developed earlier, but they underscore the ambitious nature of Mr. Lerdahl's work—to define a sort of general field theory for music cognition.

The application of pitch space to chromatic tonal music can, depending on the music under consideration, be as simple as partially modifying the shape of the tonal pitch space. The alteration of the pitch space will generally reflect interval cycles other than the fifth. Cycles based on intervals such as the third become increasingly important in late Romantic music. Further, the torroidal structure must be partially collapsed to overlap regional spaces and facilitate the free motion between parallel mixture chords that also characterize much of this music. In other instances, entirely new spaces such as octatonic and hexatonic pitch structures must be constructed to account for the change in the underlying referential collection at the level of the basic space. These are built along lines quite similar to the basic tonal pitch space under consideration for diatonic music. Distance rules still apply in this new space and concepts of modular shift to new octatonic and hexatonic regions transfer nicely, although, as the author notes, these spaces are qualitatively different than diatonic space.

Despite a paucity of evidence upon which to model how a listener navigates this kind of space, there are striking commonalities across some of the theories that have been applied to this music, and these collectively lend support to the modeling of distance rules for octatonic and hexatonic spaces. In addition to the alteration of the basic underlying collection, the referential harmonic unit itself, the triad or seventh chord for example, can be modified to suit the particular music under consideration. Other basic collections can also be substituted at the scalar level. Mr. Lerdahl describes, for example, a "Mystic Space" that applies to a number of Alexander Scriabin works derived from that composer's "mystic" chord. One might be troubled at first by the fact that such a priori assumptions about the musical space are therefore required before the preferred basic space can be determined. He likens this problem to that of determining a metrical structure: one utilizes a "best fit" approach in choosing among a number of relatively limited options. The choice that most closely corroborates the structure of the basic space with the musical surface is then preferred. The chapter on chromatic pitch space also includes a lengthy section on metrical attraction that I will not comment on here.
for atonal structures. This endeavor is fraught with difficulties which do not find a resolution in the present volume and which in fact may remain intractable. Mr. Lerdahl is plainly aware of these problems and attempts to proceed by recasting many of his earlier rules and definitions to a very modest and limited scope. I am, however, troubled by many of the simplifications that are therefore required, the notion of prolongational grouping in particular, given how much of this repertoire is characteristically aperiodic and the overwhelming degree to which set theory and twelve-tone theory has revealed the frequently non-isomorphic relationship of pitch to rhythm [and therefore by extension to metrical grouping] for many composers of the modernist tradition. Another basic problem, and one freely acknowledged by the author, is the apparent necessity to reference interval-class content in calculating the cognitive distance of related sonorities. In particular, for sets with higher cardinalities, this quickly becomes a rather meaningless exercise. The structuralist nature of these elements of set theory has generally precluded theorists from making any serious claims for the cognitive possibilities for such parameters, and, although introducing them into this present theory may bring important phenomenological questions about such tools to the forefront, it does very little, in my view, to strengthen their application to the idea of pitch space as it may be applied to post-tonal music.

The analysis of Arnold Schoenberg’s Klavierstücke, Op. 11, no. 1, presented in this chapter does little to alter my impression. The salience of certain associative aspects of the opening of the work, in particular the prolongation of the pitches C and B throughout most of the movement, is consistent with many analyses of this work [including my own—c.f. “Compositional Process and Analytic Technique in Schoenberg’s Atonal Works: Reconciling Approaches to Sets, Lines and Developing Variation,” Ph.D. Dissertation, 1999, University of Utah, UMI], but I question the degree to which cognition is still being modeled in the same manner as it was in diatonic pitch space. Further, I question whether the pitch space of this work is truly flat. My own analysis reveals that there is a distinct stratification of space based upon register and augmented triads. This space becomes more clearly defined as the movement proceeds [in my own analysis this results from the working out of the grundgestalt of the opening motive’s G-B major third]. Perhaps a stratified whole-tone pitch space much like those chromatic spaces Mr. Lerdahl proposes for Wagner, Debussy, et al., would be useful in this context.

The further application of flat pitch space to twelve-tone works [drawn almost exclusively here from Schoenberg’s music] is similarly unrevealing. I believe Mr. Lerdahl is most successful in pointing out what a listener cannot follow through such a work: the twelve-tone transformational operations and the row itself. As he observes, compositional systems and cognitive processes are apples and oranges in many instances in modernist music. The variables in the idealized “experienced listener” that has been posited since the very beginning of the GTTM work become so complex in this instance that it is no longer possible to “go along for the ride” in my opinion and simply accept that such a listener has any meaningful definition here. Finally, how this “idealized listener” would model prolongational structures in other music [by Elliott Carter, Edgard Varèse, Donald Martino, Milton Babbitt, or György Ligeti, for example] would most likely reveal an enormous range of strategies based almost exclusively on learned behaviors such as the listener’s own compositional and analytical predilections. (Surely the “experienced listener” for this repertoire is limited primarily to other composers and theorists.)

Tonal Pitch Space is one of the most important books to come along in music theory and music cognition in a while. The degree of detail that Mr. Lerdahl builds into his model is extraordinary, and the consistency with which he references not only the research literature of cognitive psychology but also that of the full breadth of the history of music theory will ensure its importance to both groups of scholars for some time to come.
out of the Sixth International Conference on Systematic and Comparative Musicology, held in Oslo in 1999. As such, the volume mainly displays European research [although 5 out of the 19 authors are from North America], research that is very much practice-oriented as well as intra- and inter-disciplinary in nature, especially with regard to psychology, philosophy, education, cognition, ethnology, and technology. [Such interdisciplinary music research falls, in Europe, under the category of Systematic Musicology.] 

Musical Imagery is the fifth volume in the series Studies on New Music Research, edited by Marc Leman.

The editors of this volume are professors of music pedagogy [Mr. Jørgensen] and musicoLOGY [Mr. Godøy]. Mr. Jørgensen is a specialist in instrumental music education at the Norwegian Academy of Music, Mr. Godøy is an expert on phenomeno-logical music theory, cognitive music theory, music analysis, and music technology at the University of Oslo.

The book is about mental images of musical sound and their relationships to musical behavior. In the call for papers of the aforementioned conference, the term “musical imagery” was defined as “our mental capacity for imagining musical sound in the absence of a directly audible sound source, meaning that we can recall and re-experience or even invent new musical sound through our ‘inner ear’” [p. ix]. However, the contributors have provided such a variety of perspectives on the topic, with various definitions of musical imagery, that the reader finds a refreshing broadness in this volume. It is refreshing in the sense that it shows how different approaches to such a complex area may have different results through the choice of research method.

The book is structured in two parts. Part one focuses on theoretical perspectives on musical imagery. Albrecht Schneider [Hamburg, Germany] and Mr. Godøy give a historical overview of the problem of musical imagery by summarizing many philosophical, psychological, and music-theoretical approaches. Petr Janata [Hanover, New Hampshire] discusses “neurophysiological mechanisms underlying auditory image formation in music” [p. 27], and Virpi Kalakoski [Helsinki, Finland] investigates the relationship between musical imagery and the working memory. The latter article convincingly presents a number of studies that “applied a dual task method in order to study the effects of speech, melodies and articulatory suppression on musical imagery. Musical imagery was measured by pitch comparison and melody recognition/recall tasks” [p. 52].

Further “theoretical perspectives” that are presented in part one include a piece on mental images of musical scales by Christiane Neuhaus [Hamburg, Germany], on complex inharmonic sounds and perceptual ambiguity related to musical imagery by A. Schneider, on sensory processing and ideomotor simulation by Mark Reybrouck [Ware-nare, Belgium], on schemata of emotional expression in music by Dalia Cohen and Edna Inbar (Jerusalem, Israel), and on the relationships between visual and musical images by Kostas Giannakis and Matt Smith [London, UK].

Part two focuses on the application of musical imagery in performance and composition. The most interesting question here is probably how musicians can enhance images of musical sound through expressive performance, whereby expressivity denotes the “human” aspect of performances [in tempo, articulation, dynamics, etc.] as opposed to “machine-like” performance. Bruno Repp [New Haven, Connecticut], for instance, shows that expressive timing in music is not only an essential part of musical imagery, but is also linked to the motor intentions of musicians. Associations between metaphorical [verbal] attributes and timbral qualities are explored by Wolfgang Auhagen and Victor Schoner [Berlin, Germany]; they were able to observe strong correlations between the attributes and musical results and that such a correlation is often realized through a feedback process in which performers adjust their technique until the desired sound quality is achieved [p. 215]. Tellef Kvifte [Oslo, Norway] has studied imagery of musical form in Norwegian Hardingfiddle music. Empirical evidence as well as personal experience let him conclude that “formal structure should be viewed as a dynamic quality of the perceived music, not as a static property of the music score” [p. 234], i.e., there are several possibilities for such musical experiences. “Formal analysis should be regarded more as an empirical than an analytical discipline, and draw on a variety of evidence of musical and other behavior” [ibid].

The final four articles of the volume are on motor images and how they can create and enhance musical images [Mr. Godøy], on the relationships between keyboard imaging and
David Cope: Virtual Music

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Reviewed by Michael Theodore Boulder, Colorado, USA

David Cope’s newest book, Virtual Music, arose out of a weekend of papers, panels, concerts, and discussions devoted to Mr. Cope’s extraordinary Experiments in Musical Intelligence [EMI] software. EMI is a program which, when given a set of compositions by a particular composer [or composers] as input, attempts to autonomously compose new pieces in the style of the source music. The weekend’s events included a highly distinguished panel of presenters, including Mr. Cope, Douglas Hofstadter, Eleanor Selfridge-Field, Bernard Greenberg, Steve Larson, Jonathan Berger, and Daniel Dennett, each of whom also contributed at least one chapter to the book.

Virtual Music is divided into four parts. The first provides a context for EMI by giving a historical overview of algorithmic composition, and also includes an informal description of the mechanics of EMI [given by Mr. Hofstadter]. The second part provides a detailed “case study,” demonstrating the composition of an EMI work from beginning to end. The third part consists of scholarly evaluation and commentary on the program. The concluding section includes Mr. Cope’s response to the criticisms of other scholars, as well as his speculations on the directions the software might take in the future. The book’s multiple appendices contain generous amounts of musical examples, and an audio CD of EMI compositions is included as well.

Mr. Hofstadter’s segment in the first part of the book is one of the highlights, both for his excellent overview of EMI and for the humorous manner in which he is able to raise some of the troubling philosophical questions that the software provokes. Mr. Hofstadter reduces EMI’s voice-leading rules stipulate that “the initial note of the melodic line of fragment /2 should coincide with the next melodic note to which fragment /1 led in the original context.” In other words, a given fragment’s melodic line should link up smoothly with the melodic line of its successor fragment.”

The succession of fragments is also guided by a framework of “tension-resolution,” which EMI quantifies by attaching one of the letters S, P, E, A, or C to the fragment. The letters stand for Statement, Preparation, Extension, Antecedent, and Consequent. This framework attempts to capture where on the tension-resolution continuum the fragment is situated. EMI determines the appropriate label for a given fragment by examining such things as the level of dissonance in the sonority as well as the metrical
placement of the fragment. The software attempts to determine the tension-resolution status of a fragment not only on the local level but also on multiple hierarchical levels (the level of the phrase, of the period, of the section, etc.). Mr. Hofstadter sums up the core local and global processes of EMI as follows: 1) “Sequential assembly of fragments that have the highest possible degree of agreement of SPEAC labels on all hierarchical levels,” and 2) “Stitching-together of fragments so as to respect voice-hooking constraints and so as to match local textures.”

EMI also takes steps to mitigate against the possibility that the segmentation process might have disassembled important musical patterns that extend beyond the boundaries of the resultant sections. One of the most important of these types of patterns is the “signature,” which Mr. Cope defines as “contiguous note patterns which recur in two or more works of a single composer and therefore indicate aspects of that composer’s musical style. Signatures are typically two to five beats (four to ten melodic notes) in length and usually consist of composites of melody, harmony, and rhythm. Signatures typically occur between four and ten times in any given work.”

Signatures can be thought of (perhaps crassly) as special “licks” that are dear to a particular composer. The inclusion of signatures immediately causes EMI’s output to sound considerably more convincing (this is especially true in the case of “signature-happy” composers such as Wolfgang Mozart).

EMI has several other higher-level principles guiding its process, including “earmarks,” which are patterns that announce upcoming important structural events (such as the cadential trills in Mozart’s piano concerti that prepare listeners for the upcom-

‘The Game’ thus establishes that something very real is going on here. Mr. Hofstadter then asks, “what does this mean?,” and finds himself unsettled by the implications. He had previously expressed great reservations regarding the composition of music by machines, as in the following passage from his landmark book, Gödel, Escher, Bach:

Question: Will a computer program ever write beautiful music? Speculation: Yes, but not soon. Music is a language of emotions, and until programs have emotions as complex as ours, there is no way a program will write anything beautiful. There can be “forgeries”—shallow imitations of the syntax of earlier music—but despite what one might think at first, there is much more to musical expression than can be captured in syntactical rules.

Hofstadter has always had a special affinity for the music of Chopin, and indeed has felt that the experience of listening to this music was akin to receiving messages of the greatest profundity directly from the composer’s soul. But the fact that EMI can compose similarly “emotionally-charged” music without having a soul (or any human attributes) directly challenges Mr. Hofstadter’s deeply held view of music. What if music is “no deeper” than the manipulation of patterns? What if the “meaning” that music seems saturated with is simply an illusion (i.e., what if music simply sounds as if it means something, but really doesn’t)? Would this mean that Chopin was in fact not an artist,
but rather a skilled artisan? Mr. Hofstadter spells out these fears in many strains of doggerel.

The contributions of the other scholars as they weigh in on these (and other) issues make for fascinating reading. Mr. Cope himself seems to think that most of Mr. Hofstadter's concerns aren't really an issue. Indeed, he is as uncomfortable talking about things like "emotional substrate" as Mr. Hofstadter is obsessed with them. He is also uncomfortable with the idea of "communication" in music, and says that he never thinks about "communicating" when composing his own (non-EMI) works. Rather, he is interested in "creating well-balanced structures within which [he] hopes to weave inventive musical ideas." Mr. Cope marshals as support for his stance a hyper-formalist quote from Igor Stravinsky who claimed that music is incapable of expressing "anything at all" (adding "expression" to the list of musical issues that Mr. Cope thinks are smoke-screens). Yet, Mr. Cope hasn't add, the inability to express anything doesn't make music "meaningless." This reader wishes that these particular ideas were fleshed out more, for how can music have a "meaning" without any "expression" of that meaning? If music is incapable of expressing anything at all, have countless composers simply been deluding themselves and their performers by including expressive indications as part of their scores? Perhaps performers should take an eraser to all of those "expressivo" markings!! On a related front, Mr. Cope writes that he "does not believe that any work of art is intrinsically better than any other work of art," and casts aspersions on the "Western tradition of ascribing 'greatness' to some composers, while other are of lesser quality." His statements seem to contradict the very idea of "quality" (or at least any sense of quality that is not entirely subjective). Yet clearly some notion of quality drives Mr. Cope's own work with EMI (as he judges some works better than others) as well as his choice of music for the database—after all, he seems to favor "major" composers like Bach and Mozart over "minor" composers such as Albinoni.

Similarly thorny issues come up in the commentary by Bernie Greenberg, who limits himself to EMI's J. S. Bach emulation. Mr. Greenberg, a believer in "strong" Artificial Intelligence (AI), is convinced that "beautiful, arbitrarily interesting, emotionally challenging music can be created programatically." However, he feels that EMI's Bach-style music is lacking on two interrelated fronts: "high level emotional architecture," and "low-level contrapuntal technique." He cites as an example of both Bach's sublime handling of form in the C Minor Passacaglia, BWV 582.1. The dramatic architecture of the piece includes a steady ratcheting of dramatic intensity, with perfectly placed slackenings along the way. For Mr. Greenberg, this work demonstrates a level of mastery that EMI has not yet attained.

Although Mr. Cope has clearly made great progress in modeling formal architecture, this type of modeling does not address what Mr. Greenberg claims is the distinct notion of "emotional architecture." Mr. Greenberg cites the work of Roger Schank and Robert Abelson on the modeling of drama as an example of the type of work that he believes will lead to the solution of this problem, and suggests the use of a "state" network to model this kind of dramatic rhetoric. The network would control, for instance, the degree of harmonic and contrapuntal "liberty." Bach is continually regulating these features of his compositions (they often track the dramatic profile of the work), but EMI does not seem to have this capacity built in. Indeed, Mr. Greenberg finds EMI's Bach-style counterpart far too "timid." He thinks Mr. Cope's SPEAC model is a good beginning for modeling this specific aspect of music, but that this problem is highly non-trivial and needs much future research.

Jonathan Berger also suggests other important avenues for future research. In particular, he calls attention to the critical role that listeners play in the shaping of a musical experience, and suggests that a connectionist approach (involving neural networks) is the best way to model the cognitive processes that are activated in the listening process. He therefore built (with Dan Gang) a neural network that is intended to be EMI's "sister"—Experiments in Musical Listening. Mr. Berger's chapter (titled "Who Cares If It Listens?"") describes the manner in which the network yields insight into the interplay between musical expectation and realization.

Although the authors discussed so far seem to believe that the shortcomings of EMI can be solved with time, Daniel Dennett's intriguing commentary suggests that there are certain problems that may be fatal. His chapter highlights the "continuity between all sorts of creativity," which he believes is ultimately algorithmically based. Life itself was created through a variety of algorithmic processes, and these same processes in turn gave rise to the relatively recent branching between the plants and the animals. He argues that the compositions of EMI are special cases of the same processes that created the compositions of Bach, "the apples and spider webs, and the organisms that made them."
Mr. Dennett asserts that all invention and creativity is derived from generate-and-test algorithms. Various combinations are spun out, and then particular elements are chosen out of the many possible instances. In addition, all invention is firmly built upon previous invention. The “invention” of homo sapiens (three to four billion years), the invention of human culture (three million years), and 42 years of living were all in place before Bach composed his St. Matthew’s Passion. Therefore, “no human being, no matter how great a genius, does all of the creative work that goes into a work of art.”

Mr. Dennett uses the Hofstader-coined term “spontaneous intrusion” to describe what he believes is another central element of the creative process. “In the real world, almost everything that happens leaves a wake, makes shadows, has an aroma, makes noise, and this provides a bounty of opportunities for spontaneous intrusions. It is also precisely what is in short supply in a virtual world.” The world inhabited by EMI is many orders of magnitude simpler than the world of human musical composition. EMI demonstrates to an astonishing degree just how much can be accomplished in such a “clean” environment, but is also perhaps limited by the clarity of the model. Thus, one strategy to more closely model creativity would be to add noise to every component of the program, which would provide the opportunity for the serendipitous creative transformation of noise into signal. However, one eventually reaches a point of diminishing returns, “for in order to get closer and closer to the creativity of a human composer, your model has to become more and more of the incidental collisions that impinge on an embodied composer.” Mr. Dennett implies that this issue might be a barrier that could prevent EMI (or its offspring) from crossing the threshold into the highest level of musical creativity.

Also included in the book is a humorous letter from Steve Larson to “Emmy,” treating the program as if it were a student who should perhaps show up at some of Professor Larson’s office hours (and expertly pointing out specific instances in which some of Emmy’s Bach works fall short of the ideal), and a thought-provoking chapter by Eleanor Selfridge-Field highlighting the continuity between EMI and earlier historical examples of algorithmic composition.

If you have any interest at all in this field, you should absolutely read this book. It is also a good place to start if you are interested in what you’ve heard about (or of) Mr. Cope’s work, but haven’t yet read any of his work. EMI is without question a seminal achievement, and it is fitting that the collection of brilliant thinkers represented in this book came together around its axis. It’s true that EMI still has shortcomings, but it really represents just the start of an exciting human/machine journey. How close will we be to “Chopin’s Fifth Ballade” in 20, 80, or 200 years? No one can really say, but reading Virtual Music offers a fascinating glimpse into some of the technical and philosophical questions that will frame the upcoming adventure.

Recordings

Bill Alves: The Terrain of Possibilities

Compact disc, EMF CD 002, 1997; available from Electronic Music Foundation, 116 North Lake Avenue, Albany, New York 12206, USA; telephone (888) 749-9998; (518) 434-4110; fax (518) 434-0308; electronic mail emf@emf.org; Web www.cdemusic.org.

Reviewed by Laurie Radford
Edmonton, Alberta, USA

The Terrain of Possibilities brings together six computer music works from the mid to late 1980s by composer Bill Alves, a professor at Harvey Mudd College in Claremont, California. Mr. Alves has been simultaneously investigating the seemingly unrelated worlds of indigenous world musics and music with computers since that time, bringing them together in a series of works involving computer and instrumental resources as well as specially designed tuning systems. All of the pieces on this compilation were created using a Synclavier II computer music system. The disc offers an example of a mode of making music that served as a stepping-stone to our present-day digital audio workstation-based composition environments. The Synclavier II offered a compositional world in a package, including an attractive hardware performance interface, sound and sequence editing features, and a host of
Mr. Alves’s works offered here range from pulse-driven essays and graceful ambient forays to the exploration of a variety of tuning systems and rhythmic procedures. The opening piece, *Redundant I* (1985), uses a recording of a soprano voice as its point of departure. The composer isolates individual phonemes of a sung text to provide the timbral element of the piece. Rhythmic animation and the permutation of pitch-order are generated by the technique of change-ringing. A noteworthy aspect of this pulse-driven essay is the gradual introduction of consonants from the voice recording resulting in a gradually revealed vocal origin for the melodic and harmonic materials of the work. An appropriate concluding passage fully reveals the solo voice and a punctuating laugh provides a conclusion.

*Bending Space* (1988) is one of several works on the disc that were written in collaboration with robot choreographer Margo Apostolos. A non-tempered tuning system is used in this drone-based work with various harmonics of the spectra drifting in and out of focus. A fabric of rich sonic clouds are gently nudged forward from time to time by the intervention of contrasting sounds as well as changes of gestural speed and movement. A second dance collaboration, *Time Auscultations* (1987) refers to the “act of listening to internal organs,” and this serves as the point of departure for Mr. Alves’s compositional strategy: the recording of the internal motors and joints of the robot used in the dance work with subsequent modifications to these sounds. It is perhaps the most successful of these three dance works in terms of proportion, exhibiting a well-designed sense of structural evolution and sonic transformation. A third “robot dance,” *Spectral Motion* (1988), draws its thrust and energy from the polyrhythms of West African drumming ensembles and employs a tuning system favored for many of the works on this disc. All three of these dance pieces undoubtedly served as fitting canvases for choreographic exploration, but fare less successfully as engaging solo audio works.

A range of sampled Indonesian and Korean percussion instruments in addition to human voices are shaped by a just tuning system and propelled via Mr. Alves’s characteristic pulse-driven musical style in the title track, *The Terrain of Possibilities* (1987). The composer’s fascination with [and later studies as a Fullbright Scholar in] Indonesia are foreshadowed in this piece. The broader range of sound sources expands both the sonic and expressive palette in this work, but the piece remains somewhat constrained by the repetitive structures and timid harmonic language.

*The Question Mark’s Black Ink* (1986) is the most extensive and explorative work on the disc. It involves live performers on piano and percussion in synchronization with an electroacoustic component on tape. Mr. Alves’s fascination with the rhythmic possibilities of change-ringing and 14th-century vocal polyphony results in tight webs of sound in which the live performers are completely integrated with the prerecorded electronic materials. The flowing, gently undulating opening section is very successful in creating a pensive ambiance that prepares for the rhythmic inventions that are predominant through the remainder of the piece. A sprightly interchange between Synclavier materials, piano, and metal percussion leads to a long, somewhat sluggish series of sections that increasingly feature the bombastic character of the piano. An appropriate (but rather predictable) return to the opening reverie concludes the work.

Many of the works on this disc tend to wander off, some momentarily, some for long periods of time, into classic minimalist territory with little but pulse and an appropriately sonal sonority to offer. Attempts at asymmetrical rhythms in *The Question Mark’s Black Ink* provide some contrast but lack the precision of execution that would have lent an edge and impetus to the materials. The sound quality of the mix may have been first-rate in the late 1980s but seems rather dull and lacking in dimension by today’s standards. Nonetheless, these six works represent a coherent set of pieces emanating from a classic computer music system and the collection serves as a document of one composer’s exploration of that system’s possibilities.

**CCMIX Paris: Xenakis, UPIC, Continuum**

Compact discs (2), mode 98/99, 2001; 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; Web www.mode.com/

Reviewed by Olivia Mattis
Buffalo, New York, USA

This recording requires an active imagination on the part of the listener. The sounds presented make reference to a host of extramusical associations that must be imagined:
visually startling scores, hidden narratives, and spatialization effects, as well as the relationship between the live performer and pre-recorded sound. This two-CD set is a historical compilation of works either by Iannis Xenakis [1922–2001], inspired by him, or else composed on the UPIC computer music system that he designed. The recording begins with Xenakis’s aggressive Mycenae Alpha [1978], but is on the whole an inviting and accessible compilation, including works by Nicola Cisternino, Julio Estrada, Gerard Pape, Jean-Claude Risset, Curtis Roads, Brigitte Robindoré, Takehito Shimazu, and Daniel Teruggi. Les Ateliers UPIC, recently renamed CCMIX (Centre de création musicale Iannis Xenakis), is a computer music studio on the outskirts of Paris where most of these works were composed.

The UPIC system enables the composer to create a graphic score whose every free motion of the pen (or computer mouse) results in an analogous sound. With the UPIC system, the basic compositional unit is no longer the note, but rather an arc that travels from pitch A to pitch B. The polyphonic potential here is enormous, as a UPIC score can contain up to 64 simultaneous arcs. The UPIC/CCMIX studio, established by Xenakis in 1985 and directed by Gerard Pape since 1991, is a veritable United Nations in terms of the composers who have worked there, and these discs well reflect its international flavor. This is the first compilation to emerge from this important center, and it has therefore been long awaited.

Xenakis is represented by two works on this disc, both written for his sound-and-light Polytope “spectacles”: Polytope de Cluny [1972], written for presentation in the Roman baths of Cluny in the St. Germain district of Paris; and Mycenae Alpha, written for presentation in Xenakis’s native Greece. A sound-only stereo presentation of these works, without the laser lights or full spatialization effects, is like a black-and-white photo of a sunset. Nevertheless, Xenakis’s strong personality and meticulous technique shine through in these sturdy works. Xenakis was a student of Olivier Messiaen, and Mycenae Alpha, the first piece composed on the UPIC system, was performed in Paris as part of the celebrations honoring Messiaen in his 70th year. The title of this work, which sounds like the name of some astronomical constellation or galaxy, simply refers to the city [Mycenae] where the work was premiered.

Polytope de Cluny, the longest work on the CD [25 minutes], predates the establishment of the UPIC system and was composed using eight-track magnetic tape, with seven tracks used for the sound, and one used for the light control signals. In this piece, the composer builds up the musical texture strand by strand, with each line clearly distinguishable by timbre [wind chimes, low thuder, muffled bells, etc.], allowing the listener to follow the sound as it moves around the performance space in tandem with a dazzling light show. Gradually the musical texture is thickened so that by the end of the piece, all the strands merge into a single wash of sound. The Polytopes and the UPIC system are both ultimately derived from Xenakis’s work in the 1950s with architect Le Corbusier, conductor Hermann Scherchen and composers Messiaen and Edgard Varèse, all of whom envisioned a future utopian art-form combining sound with visual images through the use of electronic means. [Alexander Scriabin and Richard Wagner are further ancestors in the history of this utopian vision—minus the electronics.]

Jean-Claude Risset (b. 1938) is rightly considered one of the pioneers of computer music. His Little Boy and Mutations, written at Bell Labs in the late 1960s, were among the first in the genre and set the standard for generations to come. Mr. Risset’s Saxatile [1992], for soprano saxophone and UPIC, performed plaintively by Daniel Kientzy, is one of the highlights of this recording. This gentle piece is based to some degree on Xenakis’s Metastaseis, a work from the period of Xenakis’s association with Le Corbusier, Scherchen, Messiaen, and Varèse and known to all four of them. By quoting this piece, Mr. Risset is placing himself within this lineage. Moreover, just as Xenakis’s Mycenae Alpha was performed in homage to the 70th birthday of Messiaen, so was Saxatile written to honor the 70th birthday of Xenakis. In Saxatile the solo part is predominant, with solo and tape serving the functions of picture and frame. On its own, the high saxophone part is strongly reminiscent of Claude Debussy’s Syrinx or Varèse’s Density 21.5, pieces for solo flute in which the soloist uses extended techniques in order to articulate a single, unbroken line.

Curtis Roads (b. 1951), well-known to readers of Computer Music Journal, is represented on this disc by two works: Purity [1994] and
Sonal Atoms (1998), both first movements of multi-movement works for tape. Purity is a captivating microtonal work based on a spiraling 13-tone scale whose intervals repeat every octave and a half (instead of at the octave). This composition was inspired by an exhibition of photography in which each photograph was presented not in a traditional frame on the wall, but rather as the central focal point of a free-standing three-dimensional sculpture. However, as we experience music differently from the visual arts, it is difficult to hear, or even fathom, how this concept has been translated into sound. The title of Sonal Atoms is based on a 1936 quotation apocryphally attributed to Vare`se: “Every tone is a molecule of music, and as such can be dissociated into component sonal atoms.” When Vare`se was asked by Milton Babbitt in 1947 about this concept of the tone as complex entity, he replied: “I should like to know where you found this misquotation? I don’t even know what ‘I’ means.”Indeed, this concept of subatomic musical particles has little to do with Vare`se, yet has everything in common with Xenakis’s concept of “sound granulation.” Therefore, although this piece was not created with the UPIC system, its inclusion in this compilation makes perfect sense.

The Mexican-born Julio Estrada [b. 1943] is also represented here by two works: eua’on (1980) for UPIC [the composer’s sole electronic composition], and an expanded version for large orchestra titled eua’on’ome (1995). The titles are in the Aztec language (for reasons left unexplained in the notes) and mean “he who departs for far away” and “he who departs for far away, II.” These works are, according to their author, “a long massive cry made of a hundred voices” that express Mr. Estrada’s grief at the sudden loss of his father. We hear washes of white noise moving up and down the pitch spectrum. The composer considers spontaneous drawing to be the closest representation of the unconscious mind, which is why he was attracted to the UPIC system. “I conceived the drawing of my music as a precise representation of sonic movements that were emanating from my musical imaginary.” The orchestral version was commissioned by the Donaueschingen Festival and is performed here by the SWF Orchestra of Baden-Baden under the able leadership of Olaf Henzofel. This version is three minutes longer than the electronic form. The final section of the orchestral version is startling, and presents a clarity of pitch following the wash of indeterminant sound that precedes it, leading up to a shimmering ending.

Brigitte Robindoré [b. 1962] is likewise represented by two works. L’Autel de la Perte et de la Transformation (“the altar of loss and of transformation,” 1993) is, according to its author, “a piece about noise—its nuances, flavors, transparency, richness and turbulence” reflecting “the voluntary sacrifice of something very precious” that causes “a silent transformation” in the individual experiencing the loss. The source sounds of this dreamy work are those of wind and water, substances that are calm or in motion, ever-changing, yet always remaining the same. The piece ends by drifting into nothingness. In her Comme Etrangers et Voyagers sur la Terre (“as strangers and pilgrims on the Earth,” 1994), for two percussionists and UPIC, it is the complex question—“Where is home?”—that Ms. Robindoré explores. As the composer is a Franco-American who has spent many years in each country, one imagines that this question, and hence this work, is a highly personal one. Percussionists Roland Auzet and Claire Talibart deliver a spirited and sensitive performance.

Gerard Pape [b. 1955], Director of CCMIX, is another expatriate who has spent many years living in France. He presents his twin vocations of music and psychology in Le Fleuve du Désir III (“the river of desire III,” 1994) for string quartet and UPIC, performed by the versatile Arditti Quartet [Irvin Arditti, Graeme Jennings, Garth Knox, and Rohan de Saram]. This work, using water imagery, depicts the stages of male sexual arousal—resulting in a sort of Ravel’s Bolero of electronic music. Italian composer Nicola Cisternino [b. 1952] uses the prodigious talents of singer Nicholas Isherwood in his Xöömji (1997) for bass voice and UPIC. Xöömji is the name of a particular type of throat singing [a technique popularized by the famous Tuvan Throat Singers]. Source sounds for the electronic portion of this work are Mr. Isherwood’s voice as well as a prior work by Mr. Cisternino for clarinet [although the clarinet timbre has been well disguised]. This work is an example of the composer’s “sonic graffiti” and is intended to represent the sonic equivalent of the abstract painting style of Australian Aborigines. The voice part consists largely of low guttural groans, hicups, and sputters, along with the whooshing of the wind—all sounds reminiscent of the Aboriginal didgeridu.

Illusions in Desolate Fields (1994) by Takehito Shimazu [b. 1949] is a work for voice, san-gen, and UPIC, that features the sounds of electronically simulated rain in combination with the san-gen, or shamisen, a three-stringed plucked instrument long associated with the Kabuki theater. The use of pitch bending by the performer Kazuko Takada [on both
The voice is the dazzling and elaborate stained glass windows inside the great cathedrals, were all designed to “heighten the devotion.” These aesthetic devices were perceived as noise by the conscious mind, yet had a profound effect upon the recipient’s inner self. That is the meaning of the word “truth” in Morton Feldman’s statement of 1958: “It is only noise which we secretly want, because the greatest truth usually lies behind the greatest resistance.”

One regrets in this release that the graphic scores are not reproduced in the program booklet; instead, we get handsome close-up photographs of the composers. One would like to see not only Mr. Teruggi’s “phonemes,” Mr. Cisternino’s “graffiti,” and Mr. Estrada’s “precise representation of . . . my musical imaginary,” as well as Xenakis’s laser lights, but also how the visual side of the UPIC system has changed and evolved over the past 25 years. Surely, the UPIC system—whose existence goes a long way toward fulfilling the utopian vision of a unification of the arts through technology—would seem to require that the listener be confronted by more than mere sound in order to reach Feldman’s “truth” or Ms. Robindore’s “silent transformation.” So, buy this recording, but bring your own imagination.

Cex: Oops! I did it again!

Compact disc, Tigerbeat6 Records, meow031, 2001; available from Tigerbeat 6 Records, 310 Oakland Avenue, Oakland, California 94611, USA; fax (+1) 510-465-3213; electronic mail cex@tigerbeat6.com; Web www.tigerbeat6.com or www.rjyan.com.

Reviewed by Billy Gomberg
Iowa City, Iowa, USA

I’m not gonna front, I’m keeping it straight pop—accessibility is, like, really important to me. I see music a lot like writing; if you write a book and only like a thousand people can understand it—that’s a bad book. I’m always trying to get more people to understand what I’m doing and use that sort of like a marker of where I need to go.

Cex [also known as Rjyan Kidwell] reveals this statement to us via an answering machine recording just after the last beat falls on the second track, Eleven Million Dollars Worth of Bearer Bonds. His youthful voice betrays no insincerity, yet his earnestness hides a smirk. It is difficult to take such a statement too seriously these days, especially on a contemporary electronic release. Cex is serious, but he wants everyone to get in on the fun. There is definitely a “pop” sensibility at work here; Cex is determined to entertain his audience. In other words, Oops! I did it again! is not a “difficult” album. Cex knows about highbrow electronics and digital signal processing, but does not feel compelled to make that kind of a record. One look at the cover art, a mysteriously bloody scene juxtaposed with the not-quite-
Britney title previews Cex’s multifaceted electronic ride.

A good portion of Cex’s compositions share three elements: ambient synthesizers playing a simple chord progression, a serious hip-hop-infected bass line, and Cex’s critical beats and percussive manipulations. Cex’s beats are definitely unique, showing the influences of both more accessible rhythmic styles and the hyper-abstract work of Aphex Twin and Autechre. Never favoring either extreme, his beats stay tasteful, elements and effects coming in and out, rarely letting repetition feel repetitious, complex rhythms never overpowering themselves, and never drowning his work in effects. Usually Cex’s beats are prominent in the mix; on a track like Eleven Million Dollars, brutal, manipulated percussion plays off distant, lightly effected synthesizers. However, on the next track, Destination: Sexy, the binary of beat and ambient synthesizer feels rather dull. Instead of building on a simple arrangement, letting it move in its space, the track is more content to simply repeat.

Cex’s palette is not necessarily so limited, nor are his arrangements necessarily “minimal.” First for Wounds brings in simple acoustic guitars, and they fit well in an otherwise purely electronic space. Starting with the guitar, Cex builds up the texture with beats and electronics, slowly blending the acoustic and electronic sonic spaces. Musically, the progressions and arpeggios are simple, but not basic, benefiting from a very good arrangement and mix. The addition of multiple Theremin-esque instruments later in the composition definitely makes First for Wounds a stand out track, exemplary of Cex’s sensibility in the electronic realm, but also of his talent for keeping a hook in his listener. This emphasis on hooks over complex synthesizer patches and DSP washes may be a bit shocking to some listeners, but simple tones haven’t been used this effectively in years. The mix is generally on the dry side, but great tracks are not made from effects.

When Cex allows his tracks to develop, his work gets most interesting. I don’t think you do sin, julia is one such composition. Opening with some manipulated voice samples floating in an undefined space, Cex brings in the beat at just the right moment, taking the track from DSP excursion to serious songwriting. His melodies are especially clear here: a simple synthesizer, dry as a bone, interacting with some of the best beats on the album. Here, the artist is the least content with repetition; the composition moves along, willing to evolve, briefly mangling some samples, taking a breath, changing, and then returning to a variation on the main theme. It sounds simple, and it sounds good.

Cex’s music is catchy, but not restrained to any generic conventions, be they electronics or popular genres. Like Cex himself, Oops! is playful, willing to move from the adolescent confessional of (you’re) off the food chain to the laptop hip-hop of not trying in under an hour. Cex is able to make his different influences make sense within his own style and then communicate that to his audience. He wants us to get it, he wants us to share his sense of music as well as his sense of humor, which is in full evidence onOops!

By no means is Oops! I did it again! a groundbreaking or revolutionary or mind-blowing album, and I’m pretty sure Mr. Kidwell would agree with me. What he has made is 55 truly enjoyable minutes of unpretentious electronic music, throwing in some very nice surprises along the way. As this is only the second full-length release from Cex, there is plenty more on the way. This album is also available as a 12-in. LP featuring four tracks from the CD, two remixes, and an example of Cex’s incomparable live performance style.

Margaret Lancaster: Future Flute

Compact disc, Sound’s Bounty SB 001, 2000; available from Sound’s Bounty; electronic mail pegs@webspan.net; Web home, earthlink.net/~malancaster/recordings.html.

Reviewed by James Bohn
North Dartmouth, Massachusetts, USA

Haven’t we all pondered the future of music written for flute from time to time? The question of the future of this repertoire is actually more of an enigma than a query. Welcome to the stage an oracle by the name of Margaret Lancaster. Ms. Lancaster is a flautist extrordinaire, a star of the silver screen (Rockabilly Vampire, Ultraviolet City, and Balletbootcamp), a dancer, and a former Secretary of Education under Calvin Coolidge (alright, I made that last one up!). Her album, Future Flute, features music by four composers associated with the annual Bonk Festival (www.bonkfest.org) in Tampa, Florida: Robert C. Constable, Jr., Eric Lyon, Paul Herman Reller, and David Rodgers.

Margaret “The Lung” Lancaster has an amazing track record for new music. She has premiered more than 45 works from composers including Herbert Brün, Michael Frangell, Leo Kraft, and Drew Krause. More than 30 works have been composed specially for her, including pieces by Jon Appleton, Eve Beglarian, Phil Kline, and Larry Polansky. In fact every composition on Future Flute was written for her.
Ms. Lancaster has performed annually at Bonk since 1994, the third year of the festival’s existence. She has also appeared at the ThreeTwo Festival, Bargemusic, Musical Observations 2000, the Lincoln Center Festival, and Spoleto Festival USA. Recordings featuring Ms. Lancaster also appear on OO Discs, Columbia Records, and Tzadik.

The centerpiece to this fin de siècle altarpiece to the future is Robert Constable’s Once-a-thon. The composer reports in his notes that “the saying ‘You only go around once in life’ does not seem to apply to the many levels of cognition, intellect, and emotion through which we gather experience.” Philosophically, the work deals with the oxymoronic relationship between the unique and the repetitious in societal rituals. As Mr. Constable puts it, “are we feeding the baby or are we cleaning the shotgun?”

This interconnection between the unique and the repetitious is explored in Once-a-thon through the guise of the annual year-end Toyota sales event. The work also seems to deal with the culture of the car in America. The equating of car with freedom, with power, is accomplished by the recurring appearance of male and female voices which deliver platitudes connected with driving. These voices have a sort of disembodied insincerity to them that references standard practices in “classic” advertisements of the 1950s. By the end of the work, the voices lead the soloist in a session of free association, and ultimately, the work ends insidiously with the announcement: “these messages will now become subliminal.”

This composition features a number of motives that are presented in a very discrete manner. One is a repeated pattern in a hemiola-ridden environment, reflective of the philosophical underpinning of the work. Many of the motives involve the soloist playing in unison with the tastefully quirky tape part. Much of this tight unison playing is somewhat acrobatic for the soloist, and shows off Ms. Lancaster’s facility with the instrument. One of the key motives, featuring a reiterative harmony in the tape part, slows down over the course of the piece, suggesting a sense of slowing inertia, and the piece itself gradually takes on an eerie dreamy feeling.

The sounds that comprise the tape part are varied and rich. Besides the drum machine parts and the large synthetic piano chord hits, the work also features reversed tones and samples of acoustic musical sounds. The backward envelopes of many of the sounds is often imitated by the soloist, and in general there is a high sense of coordination between the soloist and the tape part, again allowing Ms. Lancaster to shine.

Mr. Reller’s In Praise of Buddy Hackett is a rhythmically intricate, vibrant work that again allows Margaret “Thatcher” Lancaster to prove her athleticism and grace through shifting accents and tricky skips and runs, often without being permitted much of a chance to breathe. Throughout the piece, the composer mixes triadic and atonal materials freely, without it coming off awkwardly or as a pastiche. There is also a nice mix between somewhat more subdued material and the faster more acrobatic music, giving the listener a decent amount of variety in the course of the thirteen-plus minutes that the piece lasts.

The concluding work of Future Flute, Mr. Reller’s excerpt from Salvation Army, uses samples from television, including bits from the Jerry Springer Show, and commercials for psychics. These samples were pulled from a video tape that Ms. Lancaster had taped for the composer and sent to him. The work often seems cartoonish and carnivalesque, with a rhythmic sense that is oddly square and funky at the same time. There is a bit of a “retro” flavor in some of the sounds in the tape part, including an emphasis on sample-and-hold–type sounds in particular. Like Mr. Constable’s work, much of the piece features the soloist playing in unison with odd versions of the same melodic line in the tape part.

Eric Lyon’s Heavy Rotation was written in a style that Mr. Lyon himself calls “The New Sensitivity.” Having just moved to Japan, this was the first instrumental piece that he wrote in that country. The piece is scored for flute and percussion, and features the multifaceted Paul Reller performing on percussion. There is a bit of an Eastern approach to the percussion writing in the emphasis on woodblock and bass drum.

Paraphrasing the composer, “The New Sensitivity” is a reaction to “The New Complexity,” and plays upon the public’s fear of science, replacing it with something warm and fuzzy, something to which someone can groove. The work also refers to the idea of the “hook” in popular music. The flute lines in the work...
are generally very complex, but much of the material recurs throughout the work, “in the hope that it becomes popular with the audience.” The piece also presents a conflict between the two instruments, with the percussion reinforcing the beat and the flute struggling against it.

Once-a-thon II: The Kiss of Constable by Mr. Lyon was written in a style that he calls “Pre-marital Classical.” The estimable composer defines this genre as “any Classical music that contains excerpts from Christian marriage counseling tapes.” This is a quirky, eclectic work featuring abrupt stylistic changes. Much of Once-a-thon II features satirically “cheesy” material with some interesting twists. Other sections have an odd serial feel to them.

Once-a-thon IV: They Taught Her How to Kill is a work by David Rogers for flute and percussion trio. This is perhaps the most straightforward piece of new music on the album. Unlike the others, it contains no popular music influences of any overt sort. Sectional changes are relatively more gradual in comparison to its brethren. The work is highly dynamic, with some interesting twists. Other sections have an odd serial feel to them.

Review of by Ian Whalley

Hamilton, New Zealand

This audio compilation was released along with Leonardo Music Journal 10 (The MIT Press, 2000), subtitled Southern Cones: Music Out of Africa and South America. Full program notes and composer biographies for the CD are provided in the journal (pages 71–79) rather than in the disc booklet. The 14 tracks are by Lukas Ligeti and Beta Foly, Diego Luzurriaga, FELEMA (Mark Grimshaw, Feya Faku, Monde Lex Futshane), Eduardo Reck Miranda, Daniel Wyman, Damión Keller, Aldo Brizzi, Jürgen Bräuninger, Rodrigo Sigal, Bruce Cassidy and Pops Mohamed, Didier Guigue, and Kurt Dahlke.

It is an enormous task to cover such a vast and diverse area in a single disc. However, editor Nicolas Collins (LMJ 10:2) notes: “A composer’s job is to make a fine muddle of cultural legacies and technological resources... That fine muddle is as much a product of historical and geographical circumstances as it is the result of individual willpower and intent.”

Regardless of time or place, the same thorny issues in cross-cultural artistic practice, such as cultural sensitivity and cultural imperialism, seem constant. In more pragmatic compositional terms, how do you move beyond just sticking two things together? How do you compose creative new works that respect both traditions? Is the brutal opposition of material part and parcel of the process of cultural negotiation? Further, even with contemporary tools, can one do anything that has not been achieved with analog equipment, or improve on the acoustic traditions being drawn upon? The various approaches on the disc, including interactive computer music and electroacoustic music, yield some surprising results.

Remarkable in first reading the notes is that many of the composers featured were born in Europe and the USA, or are expatriates living in the Southern Hemisphere, and many are from academic backgrounds. Perhaps the disc would be more aptly named “electroacoustic music experiments influenced by South American and African Music,” because technology remains a central focus in contrast to most of the music of both continents that remains largely acoustic, communally owned, and unrecorded.

Most tracks on the disc are complete works. The overall outcome is

102

Computer Music Journal
a refreshing, diverse, and stimulating collection that takes some of the best aspects of the Northern Hemisphere’s sometimes cerebral approach to sound and composition, and the Southern Hemisphere’s sense of musical corpularity. Aiding this is a North American emphasis of combining live performers with electronic processing.

Track 1, Balanama, is by Lukas Ligeti and Beta Foly. Background to the project is given by Mr. Ligeti in “Beta Foly: Experiments with Traditions and Technology in West Africa” [LM] 10:49–54. The group includes musicians based in the Ivory Coast who came from different regions of West Africa. The music is for balafon, a percussion instrument, with Lukas Ligeti on electronic drums triggering samples. It is an improvised dialogue between two players that gradually merges acoustic and electronic approaches into one instrument. The sound is spontaneous, the composition being delicately balanced with a clear shape.

Track 2 is an extract of Diego Luizuriaga’s Viento en el Viento (Wind in the Wind), a work for two flutes, percussion, and electronics recorded at IRCAM in 1994. Music of the Andes is the main sources of “acoustic, spatial and poetic imagery,” where the electronic parts are manipulations of samples. This is a haunting work, leaving a sense of wanting to hear the entire piece.

The group FELEMA next present I wish you strength and inner peace (1998), recorded in the Music Department studios, Natal, Durban. The work attempts to mix South African traditional music, jazz, and Western popular music production techniques. A background loop provides the rhythmic basis for Xhosa lyrics.

Eduardo Reck Miranda’s Electro-acoustic Samba (1991) is created using only a microphone, two tape recorders, and a vocoder. This “low tech” approach, out of sympathy for Brazilian pop musicians, is a wonderful balance of the poetic and political, technical and musical. It creates a unique synthesis of approaches beyond the input of the stylistic components.

USA-born Daniel Wyman’s Wenda-lova (He is a great elephant) is based on collected sound material from a Zulu wedding ceremony from the Natal province in South Africa. It involves electronic manipulation of aspects of the original recordings in a stream-of-consciousness approach. The effect is evocative, aided by the structural approach.

Palabras and El Escrache are by Damian Keller, both are extracts from a 50-min composition for eight-channel computer-generated tape, actor, and hypertext. The audio quality is stunning, as is the textural depth. The cross-cultural approach is influenced by Latin American and Argentinean intellectual practices. Aspects of the compositional techniques are outlined in the article “Compositional Processes From an Ecological Perspective” [LM] 10:55–59, that discusses “the conceptual basis of an ecological approach to music composition.”

Aldo Brizzi, an Italian now working in Brazil, contributes the track L’Epreuve du Labyrinthe [1997]. The work is based on a biography of the same name that looks at the challenges and choices in life. It is constructed of viola sounds superimposed on rhythmic fragments taken from Afro-Brazilian popular music. The aim is to create a temporal labyrinth that reflects many different cultures. The musical result is hypnotic and the mood captivating.

The CD curator Jurgen Braenger’s Ithlathi is a setting of the poem “Amahlath’ Amnyama ase Afrika” by neo-traditional workers’ praise-poet Alfred Temba Qabula. The production is outstanding, as is the spatial and semiotic sense. The work is for voice and tape, combining acousmatic and soundscape techniques.

The dramatic approach taken in track 10—an extract by Rodrigo Sigal called Dolor en Mi for guitar, tape, and live electronics—is immediately striking. The full work takes soundscape source material from France, Spain, and Mexico City, transformed in the studio. The work is a dialogue between guitar as a musical navigator and a collection of voices that speak of pain and death, underpinned with soundscape textures.

The next two tracks, Closet Blues (1998) and The Phoenix’ Call, are by Bruce Cassidy and Pops Mohamed. In Closet Blues, Mr. Cassidy plays an electronic valve instrument, and Mr. Mohamed plays a Chinese Jew’s harp and percussion. Recorded live, it combines aspects of South African music with a blues feel, and has a solid dramatic sense. The Phoenix’ Call again sees Mr. Cassidy on his electronic valve instrument, with Mr. Mohamed on karimba and vocals. The duo’s “world music” approach was developed on an earlier album, Timeless (1997, Ambient World Music), that won a South African FNB-SAMA Award for Best Instrumental Performance.

Track 13, Aquele que ficou sozinho by French-born Didier Guigue, is a standout, a subliminally dramatic work whose text comes from fragments of writings by Brazilian poet Augusto dos Anjos. The work reflects the poet’s pessimism, and is made up of polyphonic layers of rhythmic textures generated through a variety of sound processing and algorithmic techniques.

The final track, Brontologik 3.44, is an improvised work by the group Beta Foly, with Kurt Dahlke on com-
puter and Aly Keita on balafon. The software is written in Max, with the balafon output being fed into a computer that follows the pitches and creates an accompaniment, allowing the player to respond accordingly, while the computer in turn adds new timbres and melodic ideas. The result is a layered melodic and rhythmic approach with a spontaneous and subtle sound.

The associated issue of *LMF* includes the following quote (p. 71): “The North seems to be all form and no content, the South all content and no form.” Of course, it is not this simplistic, but the notion does point to occasional differences between intellectual and community approaches to music-making. This CD is a brave attempt to bridge this gap, leaving a sense of wanting to hear more. Most interesting are the works that create new forms and styles combining technology and local acoustic approaches, or that take the source material and develop a new synthesis. Where successful, the results are outstanding.

**Electro-acoustic Music From The Netherlands 2000**

Compact disc, PEM Productions PEM CD-1, 2000; available from Gaudeamus Foundation, Swammerdamstraat 38, 1091 RV Amsterdam, The Netherlands; telephone (+31) 20-694-7349; fax (+31) 20-694-7258; electronic mail info@gaudeamus.nl; Web www.gaudeamus.nl/.

Reviewed by Ian Whalley Hamilton, New Zealand

The festival Terza Prattica, held in Amsterdam from 30 November to 3 December 2000, was organized by the Gaudeamus Foundation and The Dutch association Producers Electronic Music (PEM). It included six categories of compositions: works for tape, live-electronics/computer music, installations, film and video music, multimedia, and electronic music theatre. Electronic and electroacoustic music was covered in eight concerts, and included the work of members of the New International Community of Electroacoustic Music (NICE).

PEM unites some 52 composers and performers active in The Netherlands. Their CD compilation, *Electro-acoustic Music from the Netherlands 2000*, was presented as part of the festival. It includes 28 works each less than two minutes, most realized in 1999.

The aim of the disc is to illustrate the range of electronic and electroacoustic music being produced in the country, and to introduce some of the PEM members’ works. Including very short works allows many PEM composers to be represented on the disc, although a good percentage were also left out.

The brief booklet notes are in Dutch, and I thank Anke Spry for her English translation. Perhaps it would be helpful to provide listeners outside The Netherlands with a more uniform and extensive set of biographical details and program notes, preferably in English as well, so that the CD might gain a wider audience outside the country? Further, CD credit notes and production addresses would also be helpful.

Given the number of tracks on the disc, it is not possible in a review of this length to comment on each work, but only to trace general trends and make observations.

Contributions fall into four areas: computer-generated works, with or without spectral shaping, sample-based works that borrow techniques from acousmatic music, live/interacti-
acoustic music in The Netherlands is largely introverted, intellectually focused, at times dated sonically, and exploring a narrow dramatic range. This may be because of the homogeneity of the contributors’ cultural base, or a reflection of its current conditions of production.

Not widely represented are the corporal aspects of performance characteristic of acoustic crossover work typical in North America, or the depth of textural control common in the Anglo–French acousmatic school. Many composers from these other backgrounds are comfortable writing in electronic and acoustic idioms, and the cross-fertilization of approaches helps to enrich both practices.

The first eight tracks on the CD largely take similar approaches, many of which focus on using electronically generated sound and spectral shaping. Typical is Richard Barrett’s Involuntary, the opening track, and Huib Emmer’s Agitato. There is depth and interesting moments here, but many of the techniques have been absorbed into mainstream international popular electronica, and sound immediately familiar.

Some interesting byways are found in Cor Fuhler’s Hu, which includes a wider emotional range by using vocoder processing, and Konrad Boehmer’s Reflexe from the late 1950s and still sounding remarkably fresh in the context of this collection. Arthur Sauer’s pop-influenced Staking provides light relief in context, but the accompaniments of pop musicians such as Björk have considerably extended the possibilities of this approach.

Tracks 9–15 include a broader variety of styles through greater use of sample manipulation, and they tackle a wider dramatic gambit. Arno Peeters’ Don’t breathe a word, for example, is notable in context for its use of dialogue and subtle textural manipulations. Wim de Ruiter’s Priet and Huib Folmer’s De Spiegel Etude introduce more stylistic variety with their hints at popular music and the use of tonality. Cas de Marez’s Sens, an extract from 1998, stands out for both its sensitivity and its shaping.

With Tracks 16–19 we see a return to the approach taken in the first eight. Hans J. Kulk’s Corbu is refreshing here because of his different means of sound generation in context, and René Uijlenhoet’s De telescoop van Galilei is notable for its programmatic and theatrical approach.

The final ten offerings include a range of technical approaches: soundscape, acousmatic, work with live instruments, sample manipulation, and spectral shaping. For originality of approach, Paul Panhuysen’s The electro-acoustical bowling, based on an amplified bowling alley is of interest, as is Ronald Philippi’s Elektriciteitsveld II, with its influence from tango culture.

Eric de Clercq’s The present-day environment refuses to be silent is revitalizing in context due to its soundscape approach, as is Kristooffer L. Zegers’ Klarinet Synthesen for its use of sampled clarinet sounds that are manipulated. For sheer humor, Armeno Alberts’s Small Monkey Business, a tape work with the unlikely scenario of monkeys from all over the word meeting each other, is a fitting conclusion.

The final selection is a 12-min 34-sec mosaic of the other tracks by Armeno Alberts called DUTCH PEMYAM. This gives a good summary of the disc in terms of the general mood and various semiotic approaches taken.

In retrospect, then, one is left with a sense of wanting to hear both less and more. Perhaps fewer and longer works showing the diversity intended may have been a better approach! It would allow an appreciation of the way the composers handle the extended development of material, dramatic juxtaposition, balance, and resolution. These aspects of composition as reflections of national approaches are of equal interest to composers’ sonic fingerprints.

Diane Thome: Bright Air/Brilliant Fire

Compact disc, CRC2527, 2001; available from Centaur Records, Inc. 8867 Highland Rd., Suite 206, Baton Rouge, LA, USA; telephone (+1) 225-336-4877; fax (+1) 225-336-9678; electronic mail info@centaurrecords.com; Web www.centaurrecords.com.

Reviewed by Mary Simoni
Ann Arbor, Michigan, USA

The compact disc Bright Air/Brilliant Fire is another milestone in the career of Diane Thome, aptly documenting her burgeoning insight into the composition of electroacoustic music. As typical of Ms. Thome’s electroacoustic works, her mature aesthetic is never subservient to the technology but instead dominated by a musical sensibility achieved through time-honored practice. The four works on the disc span a period of three years. Three of the works combine electronic sounds with acoustic sources and one is for computer-realized sound alone.

The title track, Bright Air/Brilliant Fire (1997), is an 11-min 6-sec dialog between computer-realized sound and flute, expertly performed by Sarah Bassingthwaighte. Throughout the composition, the flute asserts
its dominance in the dialog by assuming a more prominent role than the computer through copious and well-developed musical ideas. The computer part creates a wall of sonic texture consuming the stereo field as an ambient accompaniment for the soloist. Although largely unpitched, the computer part embraces the sonic characteristics of the flute as well as other traditional acoustic sources.

The flute part begins pensively by emphasizing the tritone that serves as a unifying interval throughout the composition. Extended performance techniques such as flutter-tongue and breath sounds pierce the computer’s sustained textures. A second section (at 3:49) begins by emphasizing an ascending major third that is filled in by stepwise motion and quickly shaped into a tritone. The flute part is masterfully developed into an agitated melodic line foreshadowing the coming rage of wind and fire, as the title suggests. A third section (4:47) emphasizes a descending fourth with embellishments of repeated notes and trills. The melodic line becomes increasingly disjoined restating the importance of the tritone. The composition reaches its climax (7:58) with flourishes of flute trills. The computer supports the climax through a sustained crescendo that builds seemingly without end. The computer assumes a solo role after the climax and gracefully winds things down through a condensing of textures. The flute reenters in a cadenza-like restatement of several motives accompanied by a sustained descending computer part. The computer’s prolonged diminuendo guides the way to the final flute cadence.

UnfoldEntwine (1998) was commissioned by the 1998 International Computer Music Conference and choreographed by Jessica Fogel for the University Dancers of the University of Michigan. Ms. Thome describes the formal organization of the piece as “the process of unfolding, disclosing, interleaving, and entwining.” This composition, a 15-min computer-realized work, poignantly juxtaposes pitched and unpitched timbres. The pitched timbres, although entirely electronic, are seemingly derived from traditional acoustic instruments such as flute and voice. The composition begins with a synthetic timbre resembling a low-flying helicopter pulsing at approximately 12 Hz. This timbre serves as a unifying element throughout the composition. The pitched timbres intermingle with waves of unpitched sounds creating well-defined regions of pitch clusters generally comprised of three notes. The final four minutes of the composition feature imposing ascending and descending waves of sounds that eventually subside into silence.

Like A Seated Swan (1999) is nothing short of beautiful. The performance of violist Dorothy Shapiro has a captivating musical sensitivity that complements the superbly crafted computer part. The composition begins modestly with the computer asserting a G drone as the viola states a folk-like melody. From this simple beginning, seemingly influenced by Ralph Vaughan Williams, the composition yields to increasingly angular melodies and intricate timbres. Unlike Bright Air/Brilliant Fire, both viola and computer parts are fully developed, each with its own distinctive musical personality. The computer sounds have timbral characteristics reminiscent of Witold Lutoslawski’s String Quartet, which has been processed and featured in this composition. For a 16-min composition, the music holds together very well, with moments of surprise in both the viola and computer parts.

There are stunning and extraordinary timbres in the computer part, particularly around 12 minutes in. The piece closes with a quiet grace, just as beautifully as it began . . . like a seated swan.

Unseen Buds (1996) is composed for mixed choir and computer-realized sound. This recording features the University of Washington’s University Chorale under the direction of Geoffrey Boers. Unseen Buds is a setting of the Walt Whitman poem of the same name included in the “deathbed” collection of poems, Leaves of Grass. The poem vividly describes the mystery of unseen buds and masterfully evokes images of spring, birth, and an unsuspecting universe on the brink of bursting with life. The composition does not capture this pregnant anticipation but instead is austerely “deliberate in its pacing.” The liner notes state that the tape part is purposely subservient to the chorus to allow for maximum comprehension of the words. Sadly, the words are so difficult to understand that I was compelled to find the poem. Many factors contribute to the poor intelligibility of the text but the overriding reason seems to be diction.

This CD is a must-have for every electroacoustic music collector. The three tracks that include human performers are good models for composers interested in combining computer-generated sounds with traditional acoustic instruments using a Mario Davidovsky–like approach. My personal favorite is Like A Seated Swan. With this disc, Ms. Thome makes the definitive statement that it’s okay to write beautiful computer music. Let’s hear more!

Robert Scott Thompson: Shadow Gazing

Compact disc, Aucourant Records AUREC 9401-2-CMS, 1994; available
from Aucourant Records USA, P.O. Box 2231, Roswell, Georgia 30075, USA; Web www.gsu.edu/~musrst/aurec0.html.

Reviewed by Laurie Radford
Edmonton, Alberta, USA

The explosion of musical sub-genres and categories in electronica and other current musical styles is fascinating as composers vie for a slice of the musical identity pie. Robert Scott Thompson’s recent work tends toward a synthesis of numerous musical currents such as ambient, pop, and world music styles. His work is listed under the Ambient Music, Computer Music, Alternative Classical, and New-Age/Electronica sections of Aucourant Records’ online catalogue. Most of the music on Mr. Thompson’s Shadow Gazing was produced between 1988 and 1994 while he was in residence at the Computer Audio Research Laboratory (CARL) and the Center for Music Experiment (CME) at the University of California San Diego. Additional work undertaken at the Danish Institute for Electroacoustic Music (DIEM) in Aarhus, Denmark, is also represented here as are the venerable toolboxes of cmusic, Csound, and Max. The early works offered on this 1994 collection provide an insight into the composer’s technical and stylistic origins.

The opening piece, Metanoia, draws upon both intuitive and algorithmic sources for compositional organization. A myriad of acoustic materials, from traditional flutes and strings to a variety of percussion, is joined by directly synthesized timbres to provide the sonic elements for this colorful work. Careful temporal control of timbral evolution, coupled with a sensitive ear for balance between register, density, and choice of sound materials are some of Mr. Thompson’s principal guides at work in this piece. The slowly ebbing waves of color are interrupted from time to time by brittle splashes of rich, metallic outbursts. A foghorn-like climax of trumpeting and wailing forcefully leads the piece back to its instrumental beginnings, now immersed in a twittering of birds and vehicular rumblings.

Timeless Steps is a virtual chamber ensemble work in which synthetic piano, flute, strings, and percussion are transformed and extended. Flurries of angular melodic lines are placed in relief next to considerably leaner solos and duos. A wreath of reverberation hovers over the entire work lending a coherent color and texture. The “stochastic formulae” employed to generate the musical gestures do not always create the most attractive combinations of pitch and timbre, but the composer’s careful control of global design comes to the assistance of the less successful local events.

Two short companion pieces, In the Shade of Brilliant Trees and Snapshot, employ the same sound sources and similar techniques of computer music synthesis. Rapid florishes of instrumental-like polyphony are gracefully shaped and focused by both dynamic and timbral means in the first piece while a plodding low string and flute framework anchors a voice and synthesized string duo in the second. Their singular preoccupations and similarity to several of the longer works on the disc lend them an etude-like air.

The title track, Shadow Gazing, returns the listener to Mr. Thompson’s ambient style of computer music composition. The continuously evolving “fusion of timbre and texture” of this extensive three-part work emulates in sound “the Native American concept of ‘shadow gazing’ wherein a practitioner watches the slow evolution of shadows cast in order to penetrate the nature of existence and see into the future.” The opening section of long voice-like melodic fragments supported by a backdrop of cascading iterative gestures gives way to a rich texture of sustained crystalline tones and vibrant ruses of sound. Mr. Thompson is obviously in a favored clime here, his careful attention to details of timbral mixing and balance producing a shimmering, entrancing sonic environment.

RuST is a musique concrète combination of transformed acoustic materials, additive synthesis, filtered noise, ring modulation, and cross-synthesis. Garrulous interchanges of richly contrasting sound materials and granular-like textures are sewn together by a variety of drones and chants.

The second longest work on the disc, Soul Rejoinder, revisits some of the characteristics of Metanoia and Shadow Gazing in its combination of transformed acoustic instruments and voices with slowly evolving synthetic webs of sound. The vast soundscape of Soul Rejoinder is a powerful characteristic of Mr. Thompson’s more extended frescoes. A diverse palette of sounds co-exist without necessarily vying aggressively for particular attention, but
rather inviting the listener to move
and explore amid a grand and endless
sonic space.

Although representative of early
experiments and studies with com-
puter composition, many of these
works already indicate Robert Scott
Thompson as a composer with a
masterful ear for structural propor-
tion as well as a host of promising
stylistic inclinations and technical
approaches to sonic design. Shadow
Gazing is an excellent starting point
to discover and place in context his
current musical activities.

Products

PulsarGenerator Synthesis
Software for MacOS

Available from CREATE (Center for
Research in Electronic Art Technol-
ygy), Department of Music, University
of California, Santa Barbara,
California 93106, USA; electronic
mail info@create.ucsb.edu; Web
www.create.ucsb.edu/
PulsarGenerator/.

Reviewed by James Bohn
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USA

PulsarGenerator is a Macintosh pro-
gram written in SuperCollider, a
sound synthesis software system de-
veloped by James McCartney (re-
cently made available for free at
www.audiosynth.com). [Editor’s
Note: Installing SuperCollider is not
necessary in order to run Pulsar-
Generator.] Available for free in a
demonstration version [from
www.create.ucsb.edu/Pulsar-
Generator/], the full version can be
purchased for US$ 49.00. The pro-
gram is not officially supported, and
there is no indication of any forth-
coming updates. After 1 January
2003, however, the program will be
distributed for free.

Written by Alberto de Campo and
Curtis Roads, the program utilizes a
series of pulse trains. Pulsar Synthe-
sis is named after “the spinning neu-
tron stars that emit periodic signals
in the range of .25 Hz to 642 Hz.”
The program includes a Read Me
file, a manual [PDF], and Help
menus. These resources are moder-
ately helpful, but for more funda-
mental questions about pulse train
synthesis, Mr. Roads cites a few arti-
cles he has written on the topic, in-
cluding “Sound Composition with
Pulsars” in the March 2001 issue of
the Journal of the Audio Engineering
Society (Vol. 49, no. 3).

The interface for the program (see
Figure 1) largely consists of 13 win-
dows that correspond to functions
controlling the various aspects of
the pulse train (frequency, panning, am-
plitude, etc.). A 14th window allows
one to add ring modulation using an-
other PulsarGenerator file. Ulti-
mately, I found this to be a
rewarding function, resulting in
some relatively complex patterns.
The main window of the program al-
ows the user to turn the sound on
and off, to record the sound to disc,
to control the burst ratio, as well as
other functions. This window also
allows the user to spawn a Table
window [which permits the organiza-
tion and access of different patches]
and a Scope window [which is par-
ticularly helpful when dealing with
sub-audio waveforms].

Besides being able to save and load
wavetables, you can also draw a wave-
table by Command-clicking to draw
straight line segments, Option-
clicking to add exponential seg-
ments, and Control-clicking to add
cosine segments. Thus, any drawn
wavetable can be a mixture of these
three types of segments. Windows
can be resized so as to draw wave-
tables more accurately. By clicking

Figure 1. PulsarGenerator
user interface.
the “E” key, one can spawn an Edit window which indicates the various key commands available, and allows for further editing possibilities. Due to the unique approach of the program, the editing system is not the most intuitive. Once one is comfortable with it, though, wavetable editing is relatively simple, and very rewarding. One aspect of the program that is particularly useful is that most changes can be done while the sound is being played in loop mode, allowing for instant feedback.

Most of the functions of the program are accessed through two menus: Fill and Alter. The Fill menu offers “Fourier & Chebyshev” synthesis, “Phase Modulation,” “Buzz” waveforms, “Grain Envelopes,” and “Noise.” The “Fourier & Chebyshev” synthesis function is particularly fun. One can draw amplitudes and phases for each of 40 harmonics in order to generate a complex additive waveform. One can also randomize the amplitudes of the harmonics or the phases of the harmonics. In addition, by using the “Fourier & Chebyshev” synthesis function, one can make minor changes to the harmonics of wavetables that have been drawn or have been generated by other means.

The “Phase Modulation” function allows the user to specify the Carrier Frequency, the Modulator Frequency, and the Modulation Index. The “Buzz” function allows one to enter the number of harmonics, the frequency of the lowest harmonic, and the amplitude series coefficient. The “Grain Envelope” permits Hanning, Parzen, or Welch envelope shapes.

The Alter menu offers many functions for changing wavetables, including: Normalization, Reversing, Inverting, Absolute Value, Squaring, Cubing, Distorting, Negative Clipping, Smoothing, Scaling, and Comb Filtering. Some of these functions, such as Scaling, Inverting, Normalizing, and Negative Clipping, can also be accessed through the wavetable’s Edit window. The Alter menu offers the same three basic envelopes to apply to the wavetable: Hanning, Parzen, and Welch.

I tried the program out on a brand new Macintosh iBook (600MHz PowerPC G3, 128 MB). It crashed the computer on three separate occasions, and I couldn’t determine the reason.

I personally think the program could benefit a bit from more randomization functions, and possibly a function that would allow one to gradually oscillate between two wavetables through interpolation. Not being a SuperCollider programmer, I’m not sure whether the latter is possible, though certainly the former would be.

The demonstration files that are included with the program indicate that PulsarGenerator is capable of creating a rich variety of interesting sounds, and are certainly worth of study for a beginning PulsarGenerator user. Studying these Demo files, and reading through the Help menu (which is located, confusingly enough, in the “lib” menu) can help one get accustomed to how the program works. Once one gets familiar with the interface, it is somewhat reminiscent of working with analog synthesis in terms of thinking about signals and control voltages in a somewhat interchangeable manner.

Free is a nice price for any software package. I am a big fan of the great variety of freeware available on the Web for sound synthesis. Utilizing a method of synthesis that is often overlooked, PulsarGenerator is certainly one of the many unique pieces of such software out there. This program can be used to create rhythmically interesting sonorities with a unique sound that harkens back to the days of analog synthesis, and is therefore worth the time it takes to become familiar with the interface.

**Ableton Live Sequencing Instrument, Version 1.5**

US$ 299.95; available from Ableton AG, Schonhauser Allee 6–7, D-10119 Berlin, Germany; telephone (+49) 30-288-763-0; fax (+49) 30-288-763-11; electronic mail contact @ableton.com; Web www.ableton.com.

Reviewed by Bill Perison
Lantzville, British Columbia, Canada

Live, Version 1.5, from Ableton, is a powerful audio looping program that is at home on-stage as well as in the studio. Even if you immediately think of bass heavy techno and dance club grooves when the term “audio looping” is mentioned, and that is not your personal favorite genre, do not dismiss Live. The program does acquit itself very well in the area of dance grooves but its tools and extremely intuitive interface can be used in many other musical explorations. The name on the box is “live sequencing instrument” and it really can be viewed as an instrument that can you “play.”

Describing Live as being like Sonic Foundry’s ACID or Phrazer from Bitheadz is a beginning but would stop well short of the capabilities found in this wonderful program. Live introduces some new ways of doing things and in that respect it is a difficult program to explain. Its feature set and time-warping engine are very powerful and need to be experienced. Live needs to be shown and used to begin to understand it.
Overview

A document in Live is referred to as Live Set. A Live Set contains an Arrangement View (see Figure 2), which looks and behaves like many other linear, left-to-right horizontal audio sequencers, and a Session View. The Session View appears like most on-screen mixers—faders, pad, sends, input/output (I/O)—but where you would expect to insert plug-ins, you can instead add multiple audio loops per mixer channel and then toggle them on and off with the mouse or user-assigned keys of the computer or MIDI keyboard.

A collapsible browser window is available in both Session and Arrangement modes, allowing access to your desktop without opening a dialog box. It has buttons for access to Live plug-ins, VST plug-ins, and three folders on your hard-drive allowing you to quickly preview and select audio loops. Below this is a Clip View or Track View, giving access to a wide variety of loop manipulation tools.

Although there is extensive audio manipulation available, there is no destructive audio editing in Live. If you want to destructively change a sound then you will need an external editor.

Arrangement View

To add audio, simply drag a clip or loop from the browser window and drop it at the respective bar. The time-warping engine automatically adjusts the audio in real time to fit the tempo without changing pitch. Dragging the right edge to the right creates multiple copies of the clip on the time line (i.e., dragging the end point of a one-bar loop over eight bars creates eight instances of the loop). Adjusting the beginning and end points of a particular instance of a loop is done in the clip view. Clips can be of any length as the data is being read from the hard drive and does not need to be loaded into RAM. Placement of the clip on the grid is dependent on the zoom level so if you want to start a clip on beat 2 the zoom level will need to be high enough to show each beat in a measure rather than whole bars.

The track name, mixer level, send, and I/O settings can be optionally viewed to the right of each track.

Session View

In Session View (see Figure 3), clips can be dragged and dropped into each mixer channel in the place where plug-ins would go in a program like Pro Tools or Digital Performer. This matrix of audio clips is where the unique power of Live resides, making it truly an instrument to be played.

Clips are adjusted to fit the current tempo and they can even be added while the set is playing. Multiple clips can be added simultaneously provided they are on the same audio channel but only one clip at a time can be played in a channel. All the audio is synchronized with the Quantize setting which can be adjusted from resolutions of one bar to 32nd-notes (or set to have no impact). If Quantize is set to one bar, a triggered clip will wait for the next available down beat to begin but if it is set to a quarter-note it will only wait until the beginning of the next beat before playing.

The clips can be triggered from a mouse click, a computer key, or a MIDI event. Setting the triggers is very easy and can be totally arbitrary. For a MIDI event, toggle the MIDI map button on the screen, select a clip and press the MIDI key. Toggle off the MIDI map button and the assigned MIDI key will trigger the clip. Continuous controllers such as Volume are also assigned this.
way, allowing the use of real knobs and switches to control plug-ins.

Clip View

Clip View allows the adjustment of parameters such as pitch in semitones and cents, gain, clip name, and color. It also gives access to what part of the clip will be played, whether it is offset, as well as the warp settings that determine how to compress or time-stretch the clip. With each clip, Live calculates the original tempo and this affects how the warp engine will manipulate the clip. There is also a setting for transients, which tells the warp engine how often transients occur. A setting of 1/8 will inform the warp engine to assume there will be a transient every eighth-note. This setting ranges from 1/32 to one bar and can be different for each clip within a session or arrangement.

The Clip View also contains a waveform view where the warp settings are adjusted. Warp markers are used to put a rhythmic grid on a sample and they can be adjusted to obtain a perfect loop.

Ableton calls the process of audio compression and expansion Time-Warping and the results are usually very clean. Adjusting the tempo of an audio clip beyond certain points leads to undesirable artifacts, but being able to adjust the transient grid to fit the tempo allows for some extreme stretching and very interesting effects. The amount a clip’s tempo can be adjusted will of course vary depending on the material. For instance, I was able to adjust a drum-set shuffle loop with an original tempo of 80 bpm and a transient setting of 1/16 down to 60 bpm and up to about 160 bpm. Alternatively, using a clip of a children’s choir performing the Papagena/Papagena duet from Wolfgang Mozart’s The Magic Flute, I increased the tempo to almost double with a 1/8 transient setting. The voices were still clear but the piano accompaniment was not, the eighth-note transient grid gave the piano an interesting percussive feel, however.

Zooming into the Clip and Arrangement View is accomplished in a way I hope all audio programs will adopt. To zoom in, click on the waveform and drag down and zoom out by dragging up. Even if you never buy the program you should check it out for this feature alone.

Recording

You can record new clips while the set is playing, adjust the end points, loop the start point, insert warp markers, and add the clip into the mix without ever stopping the session. If your audio hardware supports separate headphone monitoring, all the manipulation can be done and auditioned before the audience hears the result. The tools in the clip window allow you to select only the portion of a clip you want. You could record a performer for, say, 30 seconds, go in and select only a few seconds of it, and then add it to the mix. No need to copy, paste, or discard the portions you are not using. You could copy the same 30-sec clip, put it on another channel, and use a different portion of it to loop.

The possibilities for interaction with live performers and prerecorded audio are very exciting.

Automation

All standard controllers such as Volume and Pan can be recorded for automation, as well as the manipulation of effects parameters such as the frequency of an EQ band. The recorded data is then editable along the time line of the Arrange- ment window in much the same way.
one would edit them in an audio editor such as Pro Tools.

**Plug-in Effects**

The eleven effects Live ships with—Auto Filter, Chorus, Compressor, 4-band EQ, Erosion, Filter, Grain, Ping Pong, Simple Delays, Vinyl Distortion, and Reverb—are well done and very clean. Live is also able to use VST plug-ins. All the settings can be edited in real time and recorded as editable automation data. Plug-ins can be copied from one track to another using drag-and-drop but there seems to be no way to save a setting for use in another set. There are a few VST plug-ins that are known to not be compatible with Live 1.5 and these are listed on the Ableton Web site.

An unlimited number of plug-ins can be inserted on each channel, the four send buses, or the master channel. To insert a plug-in, simply drag one from the browser window and drop it in the Track View window. Parameters can be adjusted using the mouse or assigned controllers and the order of the plug-ins can swapped by dragging them within the chain. Whether the effects are applied Pre-or Post-fader is also selectable.

**Audio I/O and MIDI**

Live 1.5 works with any ASIO-compatible device or DirectX on a Windows-based computer and ASIO or Sound Manager on a Macintosh. I have tried Live with good results on a Macintosh with a Digidesign Digi001 soundcard using ASIO drivers, a Korg OASYS soundcard, as well as Sound Manager.

Live 1.5 will also host any ReWire-compliant device, allowing you to record audio directly into Live from a program such as Reason.

Aside from receiving MIDI keyboard and controller information, Live will send and receive sync data via MIDI Time Code or MIDI Beat Clock. SMPTE offsets and frame rates are also selectable. A MIDI setup on the Macintosh requires OMS 2.3.8. There is also a MIDI Time Code in-and-out offset to overcome latency issues.

**System Requirements**

System requirements are not overly demanding but I found Live was a little slow to respond on a G3 300 MHz iBook once there were a number of plug-ins being used. Performance was greatly improved on a G4 400 MHz processor. Minimum requirements for Macintosh are: G3 Macintosh or faster; 128 MB RAM or more; CD-ROM drive; MacOS 8.6 or later; Monitor resolution at least 800 x 600, 256 colors. For a PC, the requirements are: 300 MHz or faster; 64 MB RAM (128 MB recommended); CD-ROM drive; Windows 95/98/NT 4.0/2000/XP; Monitor resolution at least 800 x 600, 256 colors; Windows-compatible sound card, preferably with DirectX or ASIO driver.

Copy protection is a challenge-response system based on serial number and the computer number. The response key can be obtained on the Ableton Web site or by electronic mail, telephone, fax, or post. When Live is installed, it will run for 10 days without the response key. There is no transfer saving in-and-out feature such as Sibelius has implemented, so you will be unable to transfer your work between computers.

Overall, Live 1.5 is a powerful program and a worthy investment. It invites users to explore new ways of playing and interacting with audio in a real time or “live” setting.