[Editor’s note: Selected reviews are posted on the 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 In some cases, they are either unpublished in the Journal itself or published in an abbreviated form in the Journal.]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

International Computer Music Conference 2002

Göteborg University, and Chalmers University of Technology, Göteborg, Sweden, 16–21 September 2002

Reviewed by Bob Sturm
Santa Barbara, California, USA

The 2002 International Computer Music Conference (ICMC2002) was held in Göteborg, Sweden, jointly organized and hosted by the School of Music and Music Education at Göteborg University and the Chalmers University of Technology. Göteborg is the second largest city in Sweden and is known as the manufacturing center of Volvo automobiles and Ericsson cellular phones. ICMC2002 was overall a successful conference run by a very professional and experienced group. Much respect should be accorded the general coordinator, Magnus Eldénius, and his efficient staff for accepting, organizing, and deploying such a large, difficult project as ICMC2002. Furthermore, Göteborg University provided an excellent location for the event, with all the technology required to successfully host this “hyper-technological” event.

The chosen theme for ICMC2002 was “Voices of Nature.” Mr. Eldénius asked in his introduction: “What is the border between nature and art? Nature is present in one way or another in most of today’s computer music activities—explicitly as in physical modeling, psychoacoustics, evolutionary algorithms, or implicitly as a foundation for the physical laws that govern most human activities. And, of course, as an artistic inspiration for many composers.” This theme is exciting, but unfortunately there were only a few papers and pieces that directly dealt with it.

ICMC2002 didn’t have any poster sessions; only papers, demos, and, of course, concerts. Of 193 submitted papers, 121 were accepted, so parallel sessions were necessary to fit everything into five days. (Thus I must make the obligatory statement that I cannot do justice to giving a complete review of the ICMC2002 papers since that would violate fundamental laws of physics!)

Groups and institutions that had three or more papers and demos at ICMC2002 were numerous. These include the Center for Computer Research in Music and Acoustics (CCRMA); Institut de Recherche et Coordination Acoustique/Musique (IRCAM); The Department of Information Engineering (DEI) and the Center of Computational Study (CSC) of the University of Padova, Italy; Massachusetts Institute of Technology (MIT) Media Lab; NTT Communication Science Research Lab; Carnegie Mellon University (CMU); Virginia Center for Computer Music; Sony Computer Science Laboratory in Paris; and the University of California at San Diego (UCSD). These groups cover a broad range of specialties in current computer music research from physical modeling to musical controllers, machine listening, and signal description.

This year’s Swets & Zeitlinger Distinguished Paper Award went to François Pachet (Sony Computer Science Laboratory) for his paper entitled “The Continuator: Music Interaction with Style.” Mr. Pachet demonstrated his program, which aims to create a stylistically consistent music imitation system that is also musically interactive. The title refers to the system’s ability to take a player’s musical input and continue in a stylistically similar way. His demonstration at the conference provided a fulfilling and amusing look at this creative solution to making imitative music systems interactive. Several images, movies, and the software are available online (www.csl.sony.fr/~pachet).

Machine listening was a popular cognitive topic this year. Roger Dannenberg (CMU) demonstrated a program that implements machine listening which produces a high-level analysis and “explanation” of an input piece of music, such as John Coltrane’s Naima or the Christmas Carol We Three Kings. Kenji Suzuki et al. from Waseda University, Japan, presented their first step in creating an autonomous music performance system: an algorithm with the ability to create its own musical sensibility by listening to several raw audio signals. Other papers tackled onset detection using neural networks, quantifying melodic similarity, and improving score following.

Physical modeling of the Tibetan singing bowl was also a popular topic this year. Georg Essl and Perry Cook of Princeton, and Stefania Serafin et al. (CCRMA) presented results that use banded waveguides. Mr. Essl has expanded his model to incorporate the glass harmonica, and Ms. Serafin et al. expanded their model to the musical saw.

One of the most interesting presentations came from a collaboration between physical modeling and ethnomusicology; the paper was “Use of
Physical-Model Synthesis for Developing Experimental Techniques in Ethnomusicology—The Case of the Ouldéme Flute by Patricio de la Cuadra (CCMRA), and Christophe Vergez and René Causse (IRCAM). The Ouldéme is a Northern Cameroon tribe that plays complex rhythms and melodies using bamboo flutes that are closed on one end, similar to single pieces of a pan-pipe. Each player in a group of five plays only two pipes and sings when breathing in. Mr. Cuadra et al. have constructed a physical model in Max/MSP that is controlled by imitation flutes with sensors. A video was shown of five Ouldéme musicians at IRCAM playing the flutes with a precision and feel close to using actual instruments. This exciting study is helping ethnomusicologists understand Ouldéme playing techniques and tuning.

The subject of music controllers made its display at ICMC2002. Controllers based on existing instruments were presented for the violin, saxophone, and a Zydeco washboard. Diana Young from the MIT Media Lab presented her hyperbow controller, which tracks bow velocities, position of the string, and bow strain. Matthew Burtner, of the Virginia Center for Computer Music at the University of Virginia, presented his Metasaxophone, which is a saxophone retrofitted with several sensors and an on-board computer that creates MIDI output. Carr Wilkerson from CCMRA demonstrated a performance interface to Serafin’s Tibetan bowl physical model using his Zydeco washboard called the “Mutha rubberboard.” More information can be found online (www-ccrma.stanford.edu/~carrlane/mutha/muthahome.html).

Other controllers were not based on any real music instruments. Dan Overholt of the Center for Research in Electronic Art Technology [CREATE] at the University of California, Santa Barbara, demonstrated his “Multipurpose Array of Tactile Rods for Interactive eXpression,” or the MATRIX. It looks similar to the “pinpression” toy which makes Reimann sums of hands and faces using pins [there is no easy way to describe this]. More information on the MATRIX can also be found online (xenia.media.mit.edu/~dano/matrix/).

Charles Nichols of CCMRA gave a video presentation of his vBow project: a haptic music controller with four degrees of freedom. When finished, the vBow will be able to be used to realistically control a physical model of a violin. And, from the Interaction Design Centre at the University of Limerick, Ireland, a new controller was presented called the Pressure Sensitive Hybrid (PuSH) Sensor. The goal of this project is to capture and use the unspoken gestures of a musician that are visually significant. One scenario is the use of the sensors to detect the changing weight distribution of a Bodhrán (traditional Irish frame drum) player.

Mark Feldmeier, Joseph A. Paradiso, and Mateusz Malinowski of the MIT Media Lab presented another interesting use of sensors. They have created low-cost wireless motion sensors to distribute among a large crowd of dancing people. The sensors simply detect an impact motion, such as a stomping foot or hammering arm, and transmit an anonymous pulse to a music generator. The music is then sequenced and output live at a tempo which corresponds to the crowd’s overall pulse.

Software—new, old, and updated—is essential to any conference on computer music. From CCMRA, Gary Scavone presented RTAudio, his cross-platform real-time audio I/O application programming interface written in C++, which implements both blocking and callback methods. This project has developed from his and Perry Cook’s Synthesis Toolkit (STK). RTAudio can be downloaded with extensive documentation (www-ccrma.stanford.edu/~gary/rtaudio/).

A highly unique software offering is “Planet CCRMA at Home,” which provides an operating system built on RedHat Linux as well as a variety of useful sound programs. Fernando Lopez-Lezcano, lecturer and system administrator at CCRMA, has created this free, easy-to-install package that uses a low latency kernel for audio applications. Exhaustive information and how-to instructions are available online (www-ccrma.stanford.edu/planetccrma/software).

A creative use of SuperCollider (www.audiosynth.com) was presented by Nick Collins [Middlesex University, UK]. His BBCL, or Break Beat Cut Library, allows a user to easily create interesting and dynamic “breaks,” “glitches,” and intelligent dance music, but it also can be used for many other sample editing and remixing purposes. This library, with several examples and compositions, can also be found online (www.sicklincoln.org).

Miller Puckette (UCSD) presented an amusing talk about extending his program pd to facilitate musical synthesis from graphical scores, as in Karlheinz Stockhausen’s Kontakte, and Iannis Xenakis’s Mycenae alpha. The example presented in the paper...
can be found with current versions of pd in the online documentation. More information can be found at the pd homepage (www.crca.ucsd.edu/~msp/software.html). Roger Dannenberg gave a lecture on his new interactive audio and music language, Serpent, which is an extension of his previous C++ music programming language, Aura. His goal is a compromise between functional programming—useful for signal processing—and object-oriented programming—useful for event-driven music. More information on Serpent and Aura can be obtained from his Web site (www-2.cs.cmu.edu/~rbd/).

Perhaps the only papers that were related to the “voices of nature” theme were Bob L. Sturm’s sonification of ocean buoy spectral data (www.composerscientist.com/), Eduardo Reck Miranda’s “On Making Music with Computer Models of Nature,” and Rajmil Fischman’s presentation of using solutions to Schrödinger’s equation for musical generation. The lack of content related to the theme of the conference was disappointing.

A certain frustration with past ICMC paper submission procedures has been noted on several occasions. This year, instead of reviewing abstracts the organizers decided to review complete papers. This certainly increased the quality of the accepted papers, but there were still too many papers accepted that were irrelevant, redundant, or unoriginal. There are also classes of papers that need no presentation, such as studio reports. If these papers and presentations would be removed, or perhaps placed in a poster category, parallel sessions would be unnecessary. This would make the conference more appealing and much less fatiguing.

ICMC is an academic hydra with heads concerned with synthesis methods, perception and cognition, physical modeling, composition, sound programming, haptics and interactivity, and music content and classification. It is associated with so many different parts of the computer music community that it can’t represent any one adequately enough. It would perhaps be in everyone’s best interest to limit the ICMC to a single-track conference, with papers and pieces that reflect original and refreshing work in all these fields. The ICMC could serve as an archive of this research; the event and the proceedings should create a rich resource for sharing, distributing, and documenting the status of the field. Each proceedings can provide a platform from which we can proceed, and each volume can be a guidebook for students looking for where interesting research is occurring.

Kudos are due to Mr. Eldénius and his capable and resourceful staff for hosting a quite successful ICMC. Many wishes for a speedy recovery!

First International Conference on Musical Application Using XML

Laboratory for Musical Informatics (LIM), Milan, Italy, 19–20 September 2002

Reviewed by Denis Baggi Berganzona, Switzerland

MAX2002, the First International Conference on Musical Application using XML, took place in Milan, Italy, at the seat of the Laboratory for Musical Informatics (LIM) on September 19 and 20, 2002. Although open to the public, it was not a typical conference in the sense that it was dedicated to a very specific topic and it sought to attract contributions that should materialize in actual work for the definition of a new standard for using XML.

After the introduction by host Goffredo Haus (see Figure 1), director of LIM and Professor of Computer Science in the Department of Information Sciences (DSI) at the State University of Milan, Denis Baggi explained the two main aspects of this project. First, there is the procedure of the Standards Activity Board (SAB) of the Institute of Electrical and Electronics Engineers (IEEE), the largest professional society of people active in the field (www.ieee.org). A subset dedicated to Computer Science is the Computer Society (CS), comprising about 100,000 members (www.computer.org). In September 2001, the SAB accepted a Project Authorization Request (PAR1599) for the establishment of a standard for the encoding, delivery, and reproduction of music, symbolic and sub-symbolic, via Web, DVD, and CD-ROM, to obviate the inherent deficiencies of existing de facto standards. These are either incomplete...
Music Representation” was the contribution of France Champagne and Guy Tremblais of the Université du Québec à Montréal, Canada. It was about the XML encoding of a melody and of what a music student notes of it during a musical dictation. The original score is then compared against what written by the student, while an algorithm identifies the differences and computes a grade. The results of the program are fine-tuned by examining those of the dictation instructor.

Jacques Steyn, an independent researcher and consultant from Hatfield, South Africa, contributed “Framework for a Music Markup Language.” Some existing XML-based languages were mentioned: 4ML, FlowML, MusicML, MusiXML, MusicXML, which all focus on a subset of Common Western Notation (CWN), and ChordML. After listing some requirements for a proposed language, such as conformity with XML, simplicity, modularity, universality (beyond CWN), the author examined existing proposals: Hy Time, SMDL, and SMIL. He then distinguished among several features of music, intrinsic (core: e.g., notes, periphery: e.g., rendition of a note) and extrinsic (performance, recording in graphic form, or sound), pointing out the complexities and their importance in a mark-up language. Modules of such a language were defined, including frequency, time, organization, texture, effects, performance, control, notation, lyrics, MIDI, synthesis, and more, each one explained in its constituencies.

“A Proposal For a Regular Grammar To Parse Jazz Chord Notation” was delivered by Mr. Baggi of the Centro CIM della Svizzera Italiana (CIMSI) of the University for Applied Science of Southern Switzerland (SUPSI). The author showed a simple program capable of parsing, identifying, printing, and playing the notes of the symbolic notation for extended chords used in jazz. Such symbols are gathered in a harmonic grid, of fundamental importance in jazz, even though they identifies pieces that may have a totally different sound and style, as the author demonstrated with his saxophone. The proposal is to build an extensible, flexible algorithm for parsing such symbols [note: Figures 1 and 2 of this article in the Proceedings contain errors]. The relevance to the standard was apparently not clear.

The last contribution of the day was by Maurizio Longari of LIM, “A Case Study: Prepared-Piano Notation in XML.” A prepared piano is a standard instrument with the addition of various kinds of tools: nails, sticky tape, thin layers of plastic, copper, aluminum, etc. Prepared-piano master Pino Devita gave a demonstration and played a number of works [see Figure 2]: Wednesday, a “static” piece (meaning that the piano is prepared in advance and then played normally); Industrial Piano, “dynamic” in the sense that the piano is played directly on the strings, with some performance tools; and Muz’ Breath, another static piece. Note that there exist “mixed” pieces. This demonstration concluded the day with a well-applaused performance.

The session of the second day opened with a lecture by Markus Lepper of the Technische Universität Berlin, Germany, “Modeling Music using XML—Some Basic Considerations.” This was a rather deep paper which, based on a body of pre-existing work, showed that there exists a whole body of algebraic modeling underneath coding languages. The author strongly suggested basing the discussion, and the later standardization, on a semantic model, and using a language with some degree of abstractness to yield
easier comparability between competing solutions than the mere syntax of a set of Document Type Definition (DTD). An architecture was then presented, based on the identification of aspects of an object with multiple values from different domains. Lastly, he suggested incorporating a specially restricted kind of lambda-expression into the coding, so that definitions of default behavior could be contained in the standard, together with the configuration of multiple-track views, data transformations, and other aspect values.

Maurizio Longari of LIM presented “Towards a Symbolic/Time-Based Music Language Based on XML,” co-authored with Mr. Haus. The paper first went through an analysis of existing mark-up languages for Symbolic Music Information (SMI), namely: SMDL/Hy Time, MusicXML, MusiXML, MusiCat & MDL, WED-ELMUSIC Format, MNML, MML, MuTaTeD, MusicML, and ChordML. It considered layered SMI at the structural, notational, performance, and audio levels, and their possible representation in XML. It then described the proposed Spine, a structure for an [at least] two-dimensional representation of music that allows the definition of relationships among layers, such as notational, performance, and audio. The paper concluded with mention of related topics and open problems.

Gustavo Frederico, from the University of Ottawa, Canada, authored “Actos: A Peer-to-Peer Application for the Retrieval of Encoded Music.” Actos is an application written in Java that uses XML-based ChordML, written by the author, to perform queries on chord sequences. After a brief introduction, the presentation emphasized examples, on-the-spot, of the software demonstrating its performance in retrieving and identifying chord sequences in a given piece of music, both as annotated chords and as a sequences of degrees with cipher notation.

Michael Good, of Recordare LLC in Los Altos, California, is the guru of his existing XML system for music, which he presented in “MusicXML in Practice: Issues in Translation and Analysis.” MusicXML was briefly introduced by the author together with its design techniques and applications supports, showing how it has become the lingua franca for a number of existing music software programs, including Finale, XEMO, SharpEye, KGuitar, and other related ones, as shown in Figure 1 of his paper in the Proceedings. Then, the issue of converters was dealt with, namely, programs that convert from one music format to another, including NIFF [in spite of its errors], MIDI files, and Finale. It was shown that MusicXML can be used for musical analysis, and this was compared with two other approaches, DOM and Xquery, both with their source. In conclusion, MusicXML was shown to cover such needs. Mr. Good, attentive to the commercial importance of these kinds of standards for music publishers, expressed his preference for starting with a concrete application, instead of from definitions in the abstract, to avoid the pitfalls of SMDL.

Lastly, Perry Roland, of the University of Virginia in Charlottesville, highlighted another facet of the problem with his paper, “The Music Encoding Initiative [MEI],” arguing, in a scholarly opposition to Mr. Good, for an encompassing approach unrelated to a concrete piece of software. The Text Encoding Initiative [TEI] is a parallel to the proposed MEI, which refers to Common Music Notation (CMN). The constraints were listed as: comprehensive, declarative, explicit, interpreted, hierarchical, for-
Third International Conference on Music Information Retrieval

Institut de Recherche et Coordination Acoustique/Musique (IRCAM), Paris, France, 13–17 October 2002

Reviewed by Maxwell Wells
Seattle, Washington, USA

Last Supper, or Supper at Last?

French cuisine has a well-deserved reputation for excellence. It requires selecting the very best ingredients, meticulous attention to detail, and exquisite timing. The 2002 International Conference on Music Information Retrieval (ISMIR) organizing committee, under “Maitre d’” Michael Fingerhut, served up an intellectual feast with typical Parisian éclat. Close to 200 participants attended a total of 58 short and long papers, five invited papers, three tutorials, three panel discussions, and a half-day professional visit, all over five days. The opening address by Pulitzer Prize–winning author and academic Douglas Hofstadter on the topic of “Gist-finding, Analogy-making, Variation-spinning” set the tone for the quality and exuberance of intellectual enquiry.

The conference papers were organized into seven subsections: 1) Preprocessing, 2) Indexing, Classification, and Analysis, 3) Summarization, 4) Query by Example, 5) Similarity and Recognition, 6) Systems, and 7) Usability. This review will not focus on the specifics of the papers, but on some of the strong undercurrents that tugged at the conference. This reflects my personal bias and experience as the Chief Technology Officer and co-founder of Canto-metrix, a music technology company acquired by Gracenote. Suffice to say that all of the papers, posters, tutorials, and panels were of a consistently high quality. Readers are advised to visit the ISMIR2002 Web site for specifics (ismir2002.ircam.fr/papers.html). The professional visit to the BnF (equivalent to the US Library of Congress) was an education in the strength and quality of both Gallic architecture and pride. The conference supper aboard the vessel Bel Ami was an appropriate finale to the event. The cruise along the Seine provided spectacular cuisine, scenery, and camaraderie, as well as some of the motifs for this review.

As digitization and electronic music distribution (EMD) make music more available, the need for tools and technologies to manage music, and information about music, is becoming increasingly evident. The experience of music listening, like fine dining, is enhanced by the artful combination of textures, colors, and flavors. A hard drive with 10,000 tracks is an indigestible collection of bits until the music can be organized and presented in appetizing bites. The presentations were about the tools and recipes required to transform the raw ingredients into a sumptuous repast. The conference addressed very real problems being faced by music fans today. This was not a solution in search of a problem.

Yet, despite the appealing location, the comprehensive menu, and the very reasonable price (subsidized by the Cen- tre National de la Recherche Scientifique, Indiana University, the Mairie de Paris, IRCAM, and the National Science Foundation), there was very little consumption by music service providers, retailers, radio/internet radio companies, and of course, record companies (the “labels”). Was it because this section of the industry has already eaten its fill and has no appetite for the courses on offer?

Over the past three years a number of companies with an assortment
of content-management tools have attempted to cater to the music industry. These include eTantrum, GigaBeat, HiFind, Music Buddha, Sonic Print, and Uplister (all now defunct), Cantametrix (acquired by Gracenote), Mongo Music (acquired by Microsoft), AgentArts, Audible Magic, BayTSP, Friskit, Media Unbound, MoodLogic, Relatable, Savage Beast, Sonicprint, and Tune Print.

For the most part, these companies have created products to help introduce people to more music, with the expectation of increasing music sales. Some of the research presented at the conference replicated the work done by these companies. This is neither surprising nor a waste of effort, because few of the companies have published their research, making it difficult to know what they have done or how they did it. For example, Gigabeat crawled the Web for cultural information related to artists and CDs. Uplister harvested and shared playlists created by individuals. Human-generated playlists are an efficient means to incorporate both intrinsic attributes and extrinsic (cultural) attributes of the music, and to take people from music they know to music they don’t while maintaining some coherent theme.

Music identification by means of intrinsic features (fingerprinting) has been tackled by Audible Magic, BayTSP, Cantametrix, eTantrum, Mood Logic, Relatable, Sonicprint, and Tuneprint. Accurate music identification provides the foundation for a range of value-added services. Agent Arts, Friskit, HiFind, Mood Logic, Mongo Music, Music Buddha, and Savage Beast have all used humans to classify and describe music, and have created relational databases with that information. Both Cantametrix and Mongo Music use machine-extracted attributes to classify music. The Cantametrix technology was inspired by the work of Patrik Juslin (“Emotional Communication in Music Performance: A Functionalist Perspective and Some Data,” *Music Perception* 14/4 1997:383–418) and David Smith (“The Place of Musical Novices in Music Science,” *Music Perception* 14/3, 1997:227–262). Similarity and query-by-example are means to access this type of classification, and most of the companies developed some kind of offering. Many of the companies, and their offerings, no longer exist. Working with similarity is non-trivial, and several authors at the conference described approaches and prospective solutions. The difficulties have been reviewed by Amos Tversky (“Features of Similarity,” *Psychological Review* 84/4 1977:327–352), and include context-dependence, judgment by both common and distinctive features, the presence of asymmetric similarities, and the non-complementarity of similarity and dissimilarity. The problem of generating recommendations that individuals will like, in a scalable and flexible manner, is far from being solved.

Research around collaborative filtering, as practiced by Amazon, Media Unbound, and others, was not addressed at the conference. This is an area that generates huge quantities of mineable data that are ripe for research, on the role of music as a psychographic metric, for example. This is another interesting and difficult problem.

Problems that have not been tackled by any of the companies, and for which research was presented at the conference, include melody segmentation, voice separation (including instrument voice), summarization, transcription, query-by-humming, and singer identification. It is likely that many of the companies have performed some rudimentary usability studies, but it is also likely that most have had some bias or preconceptions inspired by their own product offering. None of the commercial companies have created an accessible corpus of music data for subsequent research, nor created extensible evaluation frameworks. Each represents a difficult problem for one or more of the following reasons: they are technically challenging, it is not clear how they would generate revenue, and there are difficult rights issues. However, they are all worth tackling because the fruits of the research are likely to result in technologies with a variety of applications.

Conferences satiate our need to “show and tell” even if we have seen it and heard it before. Therefore, the absence of particular industry participants is not adequately explained by the “been there, done that” hypothesis. A more powerful explanation is that there isn’t enough money being made to generate a feeding frenzy. This begs the question: if consumers want it, why is there so little revenue? The cynical answer is that the labels are delaying the start of supper by refusing to give their blessing, in the hopes that some guests will starve to death and leave them a bigger share. The truth is more complex and very relevant to the future role of ISMIR.

Any change within the record companies requires an economic incentive. This could take the form of a drastic and sustained reduction in CD sales, or a clear opportunity to make more money. Despite claims that person-to-person [P2P] file-sharing is eating the labels’ lunch, the jury is still out as to whether this is the cause of the approximately 10% decrease in CD sales. The majority of consumers will pay for ease of use and quality of service. Illegal P2P file-sharing can offer neither be-
cause of a combination of legal challenges, blocking, and interference tactics orchestrated by the likes of the Recording Industry Association of America (RIAA) and the International Federation of the Phonographic Industry (IFPI). In contrast, CDs are easy to use, CD players are ubiquitous, and CDs provide reassuring physicality in the face of hard-disk crashes and computer viruses.

The other economic incentive is the promise of making more money. This means finding more buyers, or persuading existing buyers to spend more. Despite industry recognition that EMD could do both, and grow what is currently a 40 billion dollar per year industry to 100 billion dollars per year, change has been slow.

The lethargic response of the labels to adopting EMD belie some fundamental impediments which, like congealed fat in a drain, have blocked the flow of commerce. The essence of the blockage is that until someone makes money with EMD there is no incentive to adopt it, and no one will make money until it is adopted. These impediments include the following:

Agreement on rights. Many sound recordings have more than one rights owner. There are always problems in getting multiple people to agree on anything. This is even more difficult when it is not clear how money is to be made.

Antiquated infrastructure. To the embarrassment of the record industry, the fight with Napster highlighted the fact that for many sound recordings no one knows who owns the rights. The information is either missing or the rights have changed hands so many times no one knows who has the correct information. (This situation is better in Europe, which has a more centralized rights management process.) Improving the infrastructure will take money.

Leadership. The people at the top are empowered to minimize risk and maximize reward. It is easy for them to see the risk in EMD, in the form of P2P file sharing, but the reward is less clear.

Revenue models. It is not clear what people will pay for. Finding out requires some attempts and some failures. We are only beginning to see the attempts, and it will take some time to dig through the wreckage of the inevitable failures to understand how to go forward.

The challenges inherent in navigating around these impediments are huge. It will require bold leadership in an industry noted more for formulaic repetition of whatever worked last. In addition to the impediments, there are some cultural shifts that need to occur, including the following realizations:

Copy protection is both unworkable and unpopular. If music can be played it can be copied. In the competition for disposable income, music has many hungry competitors. Any sales gained by coercing people to purchase will be offset by the sales lost because copy protection creates barriers to use.

The record labels must find new ways to monetize legacy music. This is hard to swallow for an industry that makes a handsome profit from reissuing old music as “best of” CDs, and “Christmas compilations.” However, some farsighted executives will realize that the record labels can still make money by windowing the release of content, as has been done for movies, by selling legacy music “by the pound” for use in MP3 players, by offering services to manage content, and by continuing to manage the artist “brand” and the commercial activities that occur around that brand.

The objective is to increase your own profits, not to defeat the other guy. Again, this is hard to swallow in an industry where the exercise of power is an end in itself. Some of this style of interaction has leaked into the public arena, where music fans (i.e., customers) are feeling persecuted by the labels and their watchdogs (i.e., purveyors). It is difficult to see how this is good for business. The size of the pie can be increased by strategic alliances and partnerships so that there is more for everyone.

The ISMIR conference exposed two problems: the impediments to EMD, and the need for tools once EMD becomes mainstream. The impediments to EMD will be removed; the benefits are too great, the technology too agile, and the consumer demand too incessant. The labels are beginning to smell the cooking, but before they can go out to eat they need to put their own houses in order. The bad news is that this will not happen immediately. The good news is that this will give ISMIR participants time to create the science behind the products that will benefit music fans and the industry that serves them. ISMIR’s selection of ingredients and attention to detail were evident at this conference. We will see if their timing is perfect.
A monograph about a specific piece of music can take many forms: it can deal with the unique features of the composer’s thought-processes, worldview, and career; it can concentrate upon the work as analytical text, and upon technical details of its composition and interpretation; it can explore the perception and reception of the music. John Palmer’s recent publication explores Jonathan Harvey’s 1982 epic electroacoustic journey into the inner life of sound, Bhakti, in all the above ways, and then some, in just over 150 pages—an all-encompassing, if high-risk, strategy.

The music of Bhakti, for 15 instruments and tape, is rich, complex, profound, and many-layered—indeed, the last three adjectives could apply to the composer himself—and consists of 12 movements (with a total of 36 sections) exploring in sound the nature of devotion, adoration, and the merging of the soul with the godhead. As with many works by Mr. Harvey, the impulse for the composition is as much literary as it is philosophical, with texts from the Hindu Rig Veda providing a meditative framework for the compositional superstructure, and all bar one of the movements suffixed à la Claude Debussy with quotations as challengingly rebarbative in interpretation as they are simple in syntax. Again in common with much of Mr. Harvey’s output since his first contact with the Institut de Recherche et Coordination Acoustique/Musique (IRCAM) in 1980, the technical vehicle for this mysticism is at once simple and complex. It consists of the exploration of the partials of a single pitch (a quarter-tone above the G below A440), and a series formed by symmetrical intervals above and below the axis frequency, subsegments and tropes of which are distributed irregularly across each of the 36 sections. Amid the rigorous interplay of serial elements there is space in the movements for what Mr. Harvey calls “glossing,” the bringing of an improvisational spirit to the development of the serial pitch-cells.

Perhaps with a similar, transcendentally universalist ethos to the music it describes, Mr. Palmer’s monograph endeavors to marry clearly delineated chapters on the biographical and style-historical “background” to the work (pp. 1–17) with others on the full, rich complexity of “the form” (pp. 19–33), “pitch strategies, melodic and harmonic Gestalt” (pp. 35–67), and “the organization of timbre” (pp. 69–91), with more generalized ones entitled “overview and interpretation” (pp. 93–141), and “retrospection and forum” (pp. 143–167).

Starting with the first group of chapters, Mr. Palmer goes into useful detail about the nature of the prime form of the row, with its symmetrical divergence away from the axis pitch, its mirroring of intervals on either side of the axis, and its more complex (and less symmetrical) distribution and groupings of these through the row, and throughout Bhakti (from p. 36). Similarly, the classification of the 36 sections into three types of motion—“dance,” “recitative,” and “change(able)” (from p. 22)—and the uneven distribution of these types, patterns of instrumental density, and other such structuring parameters throughout the 12 movements, is clear and thorough. The reader, however, is reminded somewhat of the tone of György Ligeti’s famous exposition of the compositional processes of Pierre Boulez’s Structures 1a (“Pierre Boulez: Decision and Automatism in Structures 1a,” Die Reihe 4 1960:55–57) in two ways: firstly, in the technical complexity of the language used to describe the musical structures under discussion; and secondly, in the sometimes unclear distinction between the facts about process available to Mr. Palmer by dint of his privileged (and evidently friendly and communicative) relationship with the composer, and those analytical conclusions made by Mr. Palmer himself.

One quotation exemplifying each tendency will suffice. Firstly, when discussing “the development of cells” (pp. 41–48), Mr. Palmer states that:
out of the twelve cells displayed in Fig. 3.4, the following eight cells are selected: the complete row (cell 12), now renamed cell A—and cell B—(former cell 2 in retrograde form); two triads—cells C & [sic] D—(former cells 3 & 10); two tetrachords—cells E & F—(former cells 4 & 6); one pentachord—cell G — (former cell 7), and one hexachord—cell H and former cell 9 (Fig. 3.5). The seven cells are systematically elaborated into 15 new prime 12-tone rows constructed through interval permutation or mirroring . . . cell 11 provides the same array as cell 2, and cells 5 and 9 are complementary and use the basic array. (p. 41)

Secondly, earlier in that chapter, Mr. Palmer claims that: ‘crucial to Harvey’s aesthetic and compositional predilections since 1972, axial symmetry is one of the composer’s most frequently adopted techniques of pitch distribution because it reflects the idea of expansion, both in musical and spiritual terms’ (p. 39).

As a result, in a way similar to the historic Ligeti article, much of the technical information comes across as descriptive rather than analytical, as a completist Toveyan Baedeker for those who have yet to listen to the work, rather than an analytical enrichment for those who are already familiar with the work. In addition, much of the rest reads like a conflation of expanded sleeve-note and condensed composer interview. Indeed, Mr. Palmer’s foreword confirms this: “the book is essentially intended as a guide to the work, equally usable by the professional musician and the advanced music student” (p. xi).

This is not necessarily a problem, of course, and there is a long history of such scholarship adding tremendous enrichment to repeated listenings to such an inspiring chewy polyvalence; however, the second, more generalized group of chapters seem to steer the monograph in an opposite direction, away from the factual-descriptive and toward the mystical-speculative.

The “overview and interpretation” chapter (pp. 93–141) contains several assertions based on Mr. Palmer’s insider knowledge of the work, which, while unlikely to be absolutely incorrect, are certainly difficult to prove. The less mystically gifted among us will find it hard to be sure that “in [the first] movement a single pitch, the note G, is presented in slow motion and from continuously changing perspectives, as if the listener was asked to place the ear about a rotating planet, the G itself” (p. 94), for example. Similarly, there is insufficient cognitive evidence for this reviewer’s mundane ears to agree that, in the same movement, “the ambiguity in the Vedic text ‘neither non-existence nor existence’ [Mr. Palmer’s emphasis] finds here a perfect musical environment where the dissimilar timbral perspectives, the mutating tone colors of the same sonic reality—the single note—seem to question the very ‘existence’ of sound itself” (pp. 96–97).

In an endeavor to prove that a single note might indeed “question the very existence of sound itself” for listeners other than him, Mr. Palmer shifts the emphasis to the cognitive, arguing, in a section entitled “the symbolism of listening” (pp. 126–141), that:

as [Leonard] Meyer suggests, the relationship between sounds and the indicated reality ‘is not located in the mind of the perceiver’ and ‘the relationships existing between the tones themselves or those existing between the tones and the things they designate or connote, through a product of cultural experience, are real connections existing objectively in culture’ [again, Mr. Palmer’s emphasis—why?]. Such considerations . . . indicate sonic images residing in the music itself with constantly evolving textural settings where the instruments of the ensemble are actors (musical personae) conducting a dialogue, independently and in unison, with their own transfigured natures and displaced images: 15 ‘characters’ whose temporal, timbral and spiritual dislocations take place in a sonic odyssey evolving from and around the physical nature of sound. (p. 127)

The clumsiness of the language notwithstanding, it is hard to be sure what Mr. Palmer means by this, other than (possibly) the advocacy of the aesthetic position that sounds have the same monolithic, inherent, and literal semantic meanings for all listeners—namely, the mystical narrative one that Mr. Palmer expounds in some detail; in any case, it is certainly not what Mr. Meyer meant in Music, The Arts, and Ideas (Chicago: Chicago University Press, 1967).

The need for further corroborative evidence for this reading is the only possible explanation for the existence of the final chapter, “retrospection and forum” (pp. 143–167), in which the views of eight performing musicians, composers, and musicologists—including Joel Chadabe and Arnold Whittall—with some knowledge of Bhakti are canvassed in an 11-point questionnaire. Questions include the following: “What do you think Bhakti means to us as an artistic-cultural statement?” (p. 154), “How do you perceive the association of the Rig Veda texts with the music, and, if any, a dialectic of the two? [sic]” (p. 156), and, of course, a variation on that old student favorite: “Do you believe music to be a language? If yes, do you mean it in a structuralist sense or in metaphorical perspectives? Or both? And how
would you define a work like Bhakti in such terms?” (p. 157).

It does not take the talents of the Maharishi to foresee the outcome: at best, there is little consensus among the interviewees, and certainly very little that might directly corroborate Mr. Palmer’s view of the narrative “meaning” of the work. A surprised Mr. Whittall provides the most telling and quietly germane comment from the “forum”: “Music is a language like music, rather than a language like English or Italian; it makes ‘statements’ (sounds reverberating in time) which are as inherently ambiguous as they are profound” (p. 158).

More importantly, any musicologist with more than a passing interest in the psychology and cognition of music would find some serious problems with the quantitative and qualitative research involved in the forum itself, let alone with its rationale. Why eight musicians, exactly? Why these eight? Why these loaded questions? Even had there been unanimity of opinion among these eminent personages, what would that tell us? Why aren’t we asking more questions? How about that mono-cognitive way the text often refers the reader to different figures from different chapters in the same sentence, are more reminiscent of undergraduate work than scholarly research.

Mr. Palmer acknowledges the potential problems of his approach in his foreword:

It is often said that composers writing about other composers is a tricky business and I can certainly assert that being a composer myself did not make such a task easy. Up to which point can the composer/author stick to the rigor of analytical methodologies and remain an objective musicologist? Will the composer/author always remain a composer in the first place? With such questions in mind I have tackled the writing of this book, possibly without finding an ultimate answer, but certainly coming to terms with the nature of my puzzling role whilst trying to utilize such a dichotomy in the most musically meaningful way. In this book I have attempted to maintain a balanced approach where analytical objectivity may happily go hand-in-hand with intuitive interpretation . . . my views derive not from verbal complexes or theoretical concepts, but from my own musical experience of the work and from my awareness of the composer’s aesthetic thought. (p. x)

Perhaps a little more input from the world of “verbal complexes” or “theoretical concepts,” or even more careful research and editing in general, might have enabled Mr. Palmer to complete his profoundly ambitious and ambitiously profound project with more success.

### David Temperley: The Cognition of Basic Music Structures


Reviewed by Ian Whalley

Hamilton, New Zealand

Cover notes for this book state that the author sets out to address a fundamental question about music cognition: “How do we extract basic kinds of musical information from music as we hear it?” David Temperley takes a computational approach and develops models for generating aspects of musical structure based on “preference rules.” These are “criteria for evaluating a possible structural analysis of a piece of music. A preference rule system evaluates many possible interpretations and chooses the one that best satisfies the rules.”

Chapters 2–7 cover the six models applied to metrical structure, melodic phrase structure, contrapuntal structure, pitch spelling and the tonal-pitch-class representation, harmonic structure, and key structure. The second half of the book argues that “preference rule systems are not merely valuable as proposals for how musical structures are inferred, but also shed light on other aspects of music” (p. x). This begins with a discussion of revision, ambiguity, and expectation as aspects of musical experience. Chapters 9 and 10 explore the application of metrical, harmonic, and key models to aspects of rock music and the metrical and phrase structures of African music. Chapter 11 proposes a framework for

### Publications
describing musical styles and looks at how preference rules might apply to composition and performance issues. The final chapter considers issues like motivic structure and musical tension in terms of applying preference rules to higher levels of musical meaning and structure.

The text is clearly written and suitable for general music readers who are literate in Western music notation. Rather than an accompanying CD/CD-ROM, there is a Web site that presents computational examples and implementations given in the book (www.link.cs.cmu.edu/cbms/).

The questions a lay person interested in the topic might ask on reading the publicity notes are: How is this approach different from established methods? How does one test/validate the system against the process people use when hearing music? And how far can the system be generalized to musical styles other than the Western “classical” music on which the tests were based?

Mr. Temperley presents a substantial and detailed real-time computational approach to music knowledge, leaving the impression that a more apt title for the book might have been “Preference Rules and Basic Music Structures.” In contrast, although many significant issues are raised in applying these to music cognition, the experimental design largely results only in raising a number of worthy speculations based on the assumptions made. The problem, in the face of the task set out to be achieved, lies in combining a computational approach to music knowledge within an experimental approach based in music cognition.

The introductory chapter outlines and freely acknowledges the limitations of the experimental design. The psychological feedback for the models proposed is based largely on the author’s intuitions as to the correct analysis of musical pieces and the assumption that most literate people would reach similar conclusions. The psychological validity of the models then only “provides a promising hypothesis about the cognition of basic music structures which warrants further investigation and study” (p. 2). Moreover, the application of the preference rule system is put forward as a representation of aspects of music literate people perceive in real-time, but which at the same time applies the approach to music and musical styles (p. 292) as examples, a “sleight-of-hand” freely acknowledged by Mr. Temperley. The argument is extended to stating that the preference rule system outcomes are reflected in musical styles (p. 297), but the hypothesis is not tested.

Between computation and cognition then, Mr. Temperley attempts to model an experience without a guarantee of how it works in cognitive reality, requiring a leap of faith in agreeing with his intuitions of how music is received. Experience suggests, however, that music cognition is not uniform between people or occasions. “Hearing” might depend on why one is listening, the medium through which music is transmitted, the knowledge and experience brought to the situation, and one’s primary instrument. Besides, music reception is not simply a matter of cognition but also of physiological and emotional response.

Within a computational/formalist/music-knowledge approach, the text impresses with extensive qualitative testing and implementation of preference rules. The system is largely based on, and extends, Fred Lerdahl and Ray Jackendoff’s A Generative Theory of Tonal Music [GTTM] (Cambridge, Massachusetts: MIT Press, 1983). This is implemented using dynamic programming techniques, although there is again no experimental evidence on this technique’s relationship to psychological reality (p. 19). It is put forward as an area worth exploring.

The input mechanism for many of the tests is based on the piano roll approach, dislocating timbre from performance in context. Mr. Temperley admits the problems of encoding timbre, but largely avoids the criticism in his experiment design. The solution presented is clean computationally but not so convincing from a reception perspective, as it removes musical engagement as a by-product of the expressive manipulation of timbre in performance.

The primary contribution of the first section of the book lies in the computational contribution in some areas covering new ground in extending GTTM. There are, however, limitations, as in the melodic phrase model that seems to require more extensive implementation in contrast to other sections. Furthermore, aspects of the output of the preference rule models are not compared with recent research that may have performed tasks as well or better. For example, work on beat tracking, some of which predates Mr. Temperley’s work, would have provided a more valid comparison to the results in the text.

The second section of the book, largely speculative in nature, is refreshing and stimulating, partly because the questions arising have been so clearly outlined, and it is such a brave leap into the unknown. Chapter 8 argues that continuing work on the preference rule framework, with modifications, is worthy of pursuit as a hypothesis about music cognition (p. 205). Examples of expectation, ambiguity, and revision in real-time are provided and applied.
ties for further work.

Chapter 9 is a discussion, rather than a computer implementation, of how aspects of the modified rules could be applied to rock music notation, harmony, and key. Mr. Temperley also speculates that both key and harmony models could be improved in application here by removing the syncopation information in pieces, so that works represent more directly the underlying structure. The chapter is extended to discuss how key could be determined even though different modes are commonly used in rock music.

The author also argues that cognitive principles are found to operate across styles (p. 237) without claiming that the principles are universal or innate. The main problem with this approach is again the difference between cognitive experience and experimental method. Using piano roll representation and removing timbre and syncopation information from rock music removes it from cognitive experience as a primarily aural art: resulting scores being only approximations of aspects of musical knowledge.

A similar problem arises in the next chapter, discussing the application of models to meter and grouping in African music, a limitation that is acknowledged in the text (p. 290). The analysis method used forces a Western music notation approach on the source material, and the evidence is drawn mostly from transcriptions by ethnomusicologists. Any model of the cognitive experience would negate large parts of the semiotic experience in such a cultural context; the similarities between African and Western basic structures may then be in part a product of the experimental design.

Chapter 11 illustrates how preference rule models may reveal elements of composition, style, and performance. The idea is to rate musical works with various models on a continuum of best fit between disorder and perfection, suggesting composers could optimize works between these extremes to produce music within a selected style. The difference between style and idea remains to be explored here.

The text ends with a discussion of functions and infrastructure. This centers on how the author’s models of basic structures affect higher ones such as motivic structure (p. 326). The relationship is dealt with in some detail, covering aspects of the current literature in the field. The discussion ends with a number of hypotheses on the recognition of motivic relationships between segments. My hesitation here is again on the cognitive aspects of the reception and its individualistic nature. Linking patterns and relationships in music can differ greatly between individuals, and particularly between composers and performers.

Make no mistake: this is a detailed, solid, lively, and thought-provoking book that is at times epic in scale. For those interested in a computational approach to musical knowledge, it extends past work, outlines various problems that need to be solved, and provides a benchmark for others to better. For those interested in music cognition, it outlines many of the current problems in the field in a challenging and frank way. The application of the models proposed to other aspects of music and style covers new ground that will provide the basis for continuing discussion. The limitations are in connecting the computational approach to experimental cognitive evidence and the assumptions in doing this inherent in the research design. However, the speculative framework presented here provides an extensive map for future work.

### Multimedia

**Uli Aumüller: My Cinema for the Ears: The Musique Concrète of Francis Dhomont and Paul Lansky**

DVD Video, 2001, US$ 18.99, Bridge 9117; Bridge Records, Inc., 200 Clinton Avenue, New Rochelle, New York 10801, USA; electronic mail bridgerec@bridgerecords.com; Web www.bridgerecords.com/

Reviewed by Kristine H. Burns and Colby Leider

Miami, Florida, USA

*Mein Kino für Die Ohren* [My Cinema for the Ears], a 59-min film by Uli Aumüller, is not only a fascinating “under the hood” peek into aspects of the creative processes of two important contemporary composers, but also an impressive experimental work for video and tape in its own right. The DVD is presented primarily in French with some English, along with optional German, French, and English subtitles. It also includes four audio tracks in stereo format.

The film depicting the lives and creative processes of Francis Dhomont and Paul Lansky is difficult to describe. It skirts idiomatic elements common to art film, documentary, and video while presenting a nonlinear examination of its subjects. Although this may be considered a strength in many aspects, it also may lead to some confusion as to where the documentary ends and the experimental film begins. With footage of Mr. Dhomont recording samples in the field and in the studio, and footage of Mr. Lansky tweaking samples on the computer, viewers are treated to a brief glimpse of both composers working in their respective environments. Mr. Aumüller punctuates the
film with footage of conversations between both composers, with Mr. Lansky speaking in English and Mr. Dhomont speaking in French (and a little bit of the other way around, to be fair!). Some of these interchanges seem scripted, although they contribute to a kind of subtle dry wit that underlies the whole film. However, although it is interesting to see the impetus for Mr. Lansky’s Table’s Clear, the viewer is somewhat less interested in seeing Mr. Dhomont skipping stones on a lake. The “action” elements are a bit contrived in spots.

One of the most interesting aspects of the film is the cohesiveness between dramatic and artistic elements. A discussion between Mr. Dhomont and composer (and former student) Christian Calon about music made for the ear, rather than for paper, flows into a series of stunning water transformations accompanied by Mr. Dhomont’s Un Autre Printemps. During such scenes, though, one wonders whether the accompanying water sounds in the foreground are part of Mr. Dhomont’s composition or part of the film. However, on rare occasions the video trivializes the audio. The direct synchronicity of elements during Mr. Lansky’s Night Traffic seems a bit too comical at times. During this part of the film, the video resorts to a clichéd montage of the industrial city, rather than balancing the audio and visual elements in a more experimental for-

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The DVD is well worth the US$ 18.99 purchase price. Video artist Robert Darroll is integral to the success of the DVD, and both he and Mr. Aumüller should be commended on the wonderful visual elements for this project. A combination of education and art, this would make an excellent film to show composition students, although it may not be what most of them would stay home on a Saturday night to watch!

Recordings

Paul Lansky: Conversation Pieces

Compact disc, Bridge 9083, 1998; available from Bridge Records, Inc., 200 Clinton Avenue, New Rochelle, New York 10801, USA; electronic mail bridgerec@bridgerecords.com; Web www.BridgeRecords.com.

Reviewed by Elaine Lillios
Bowling Green, Ohio, USA

Conversation in various forms has typified much of Paul Lansky’s compositional creation. Spoken word has influenced his work on many levels, from processing and content to structure and timbre. Long-time listeners expecting to hear another series of “idle chatter” works will be surprised at the direction and focus of this 1998 release by Mr. Lansky. Containing compositions “specifically composed, designed and conceived for recording,” Conversation Pieces presents a new, abstracted approach for this composer in the use of speech and text. Three of the six pieces are based on recordings with his wife, Hannah MacKay, who has played a central role in Mr. Lansky’s previous work, but gone are direct references to speech and/or text. The listener is instead encouraged to “imagine music talking.”

And the music itself does speak to the listener. It shares many moods: joyful, reflective, meditative, contemplative. Some works, such as For the Moment and Andaluzia, make use of highly contrapuntal and melismatic structures, imitating the flow of speech or conversation. Other works, such as Chords, exhibit the contemplational stasis of solitude in their use of slowly evolving chords.

Conversation Pieces, however, speaks to the listener in ways beyond those emotional or compositional. It speaks of the ever-increasing blur between electroacoustic art music and new age music. It speaks of the possibility that somehow electroacoustic music has lost sight of the simplicity and beauty inherent in instrumental timbres, or in the use of straightforward harmonic vocabulary. It speaks of the breadth of possibilities available to a composer, and to a listener, through seemingly simple means.

Mr. Lansky’s deliberate selection of finite timbres [string, orchestral, piano, and vocal sounds] allows the careful listener to choose various modes of listening: one can either “listen in” to the music, following the minute detail and filigree of contrapuntal gestures, or simply allow the pieces to wash over them as a soundscape. A cursory listening might find the disc disappointing in its seeming timbral, harmonic, and structural simplicity. After repeated listenings, however, the disc comes alive, the details take on a three-dimensional scene, and whether for relaxation or study, the works are appreciable.
Thomas DeLio, Agostino Di Scipio, Linda Dusman, Wesley Fuller, Michael Hamman: MUSIC/TEXT II

Compact disc, Capstone CPS-8693, 2001; available from Capstone Records, 252 DeKalb Avenue, Brooklyn, New York 11205, USA; Web www.capstonerecords.org /

Reviewed by Thomas Licata
Oneonta, New York, USA

MUSIC/TEXT II, Capstone Records’ second release of text-based pieces, presents a rich and diverse compilation of works that, like the first (MUSIC/TEXT, Capstone CPS-8669), continues to address and explore the setting of text in a contemporary musical idiom. Comprised of works composed exclusively for the electro-acoustic medium (the first release consists of a superb collection of electronic and mixed ensemble pieces), MUSIC/TEXT II features the music of five very different composers, each approaching the setting of text of five very different poets/writers, each approaching the setting of text nearly unintelligible. A particularly striking moment is found near the end of the third song. Alternating and overlapping with Mr. Inman’s reading of the text, the voices of both poet and composer are heard discus-

processed manipulations of the recorded voice. Remarkably, this quality of “bareness,” in combination with the rather disjunctive nature of the text and the overall sonic materials, heightens and intensifies the many intricately composed details that rest on this work’s surface structure. This draws the listener’s attention to the smaller, more local forms, creating a fresh and engagingly discursive quality to the overall structural framework.

Linda Dusman’s Becoming Becoming Gertrude (2000) impressively displays this composer’s handling of only two, unaltered recorded voices [male and female] as the work’s sole source material; there are no “electronic” sounds, per se. Based on a reading of a single paragraph from Gertrude Stein’s novel, The Making of Americans, the work begins with each voice articulating different word fragments. As the piece unfolds, more complete fragments and sentences gradually emerge, culminating in a full reading of the text at the end of the work. Overall, the piece projects a whirlwind of isolated words and sentence fragments in various repetitive patterns, colorfully shifting textures, and riveting juxtapositions of the male and female voice. What’s more, these voices are imaginatively projected in different positions in space, adding to the many rich sonic manifestations the recorded materials undergo throughout.

An especially evocative and sensitive work, Vers (2001) by Wesley Fuller, is based on a selection of three complete poems and two poem fragments from Swarm, a volume of poetry by the American poet Jorie Graham. Recorded by a female voice and left unaltered throughout, the complete poems are bordered by the two fragmented poems, which begin and end the piece. The readings themselves are set against a rich amalgam of electronically processed sounds [generated with Csound] that merge, offset, and complement the text in a variety of truly exquisite ways.

Fragments for Tiresias (2000), by Agostino Di Scipio, is part of a larger-scale work entitled Tiresias, a work whose text, as a whole, centers on the transportation of this mythical figure’s transformative powers to contemporary society. A captivating work, Fragments for Tiresias is based on two poems by the Italian poet Giuliano Mesa, who is also the reader. The poems, read in Italian and left untouched throughout, are stated in their entirety and set against an overriding sound-world rich in detail and brimming with dynamism. Largely composed of continually changing gestures and shifting rhythmic patterns of a rather grainy texture, this sound-world blends and offsets with the voice in beautifully subtle and at the same time highly dramatic ways.

The last work on the CD, think on parch (1997) by Thomas DeLio, is a stunning and highly original work. Based on a setting of four poems by the American poet Peter Inman, the work’s sound materials are nearly entirely derived from Mr. Inman’s recorded voice. Mr. DeLio writes: “rather than set words to music in the traditional sense, I’ve used electronic means to present and often transform the poet’s own reading of his work.” The four songs articulate a wide-ranging treatment of the text, from rather straightforward, unaltered readings, to complete transformations that at times leave the text nearly unintelligible. A particularly striking moment is found near the end of the third song. Alternating and overlapping with Mr. Inman’s reading of the text, the voices of both poet and composer are heard discuss-

Recordings

117
ing issues raised during the recording session. This effect adds an utterly striking dimension to the work, not only further elaborating and transforming the setting itself, but its process as well. Indeed, it is this unique treatment of sonic materials together with the rather bold exploration of formal structures that make Mr. DeLio’s music so fresh and exciting.

Comprising highly original text-based electroacoustic pieces, MUSIC/TEXT II offers yet another compilation of exciting works exhibiting a wide array of innovative approaches to text setting in the contemporary domain. Hopefully, this series of stimulating and challenging music will continue to be released.

Barry Truax: Islands: Soundscape Compositions

Barry Truax: Twin Souls: Text-Based Electroacoustic Music

Compact discs, CSR-CD 0101/0102, 2001; available from Cambridge Street Records, 4346 Cambridge Street, Burnaby, British Columbia V5C 1H4, Canada; Web www.sfu.ca/~truax/csr.html.

Reviewed by alcides lanza
Montreal, Quebec, Canada

Islands

Islands is a 2001 collection of soundscape compositions by Barry Truax. Pacific Fanfare [1996] is a sonic overture and a catchy sampler of sounds to come—brief, vivid, and evocative, with choral sound-blasts from foghorns. Many of the sounds come from the rich catalog of the World Soundscape Project, the celebrated sonic research project done at Simon Fraser University in the early 1970s.

Pendlerdrom [1997], a “commuter dream around Copenhagen,” includes announcers and people’s voices freely mixed with fragments of conversation and train station noises. This environmental documentary has an international flavor (or perhaps aural memories of a traveler . . . ).

La Sera di Benevento [1999], “the afternoon at Benevento,” brings city noises into a Latinized and musically coherent format. This is helped by the upper pedal “whistle,” which adds consistency to the musical phrase before dissolving into hissing steam. Granular synthesis was applied to the realization of audio strata—low pedal points and quasi-grumbling noises well juxtaposed to the high grinding sounds. Occasional children’s or women’s voices give a touch of humanity to the otherwise noise-filled soundscape. La Sera di Benevento is my favorite on this album.

Dominion [1991] is quite different from the other pieces as it was written for chamber ensemble and tape. Again, foghorns and bells are among the opening sounds. This looped, gentle continuum swells up and down. Taped and instrumental sounds are all blended together quite well into a unified sound field.

Island [2000] uses octophonic watery sounds. One wonders how much of the octophony effect we are bound to lose when hearing this stereo version. A drone quality is prevalent, with repetitive sounds of metallic quality—quite percussive at certain times, and an intriguing contrast to the beautiful liquid sonorities of other patterns. Occasionally we can even imagine seagulls crying and frogs croaking, excited by the onset of a storm. Island creates a tranquil atmosphere, ideal for easy listening.

This compact disc is representative of the various compositional styles of Mr. Truax. The solo tape pieces are superior to those which include instruments. In all these works, the composer shows his mastery of studio techniques, as well as his inventive use of his specialized research on granular synthesis. A highly recommended CD as an introduction to the art of Barry Truax.

Twin Souls

There is a compelling logic in the choices of Mr. Truax’s music offered in Twin Souls, also from 2001. The unifying factor is best illustrated by two things: texts that deal with different approaches to personal relationships, and the writing for soloists accompanied by tape.
Wings of Fire [1996] is performed with dexterity and imagination by renowned cellist Frances Marie Uitti, for whom the piece was written. The performance is warm and sensitive, a perfect match for the subtle, varied spoken texts, delivered by Ellie Epp and written by British Columbia poet Joy Kristin. We are told the “lover” is the cello, in a dialogue with its idealized electronic partner—very insinuating and a pleasure to listen to.

Androgyne, mon Amour [1997] uses a similar approach [a double bass interacts with the voice and electronics], but it results in a very different musical composition. The piece is clearly shaped by seven poems of Tennessee Williams and incorporates an elaborate and highly technical part for double bass. Robert Black, an American virtuoso of the contrabass, is the featured soloist. He delivers his part with conviction, presenting well defined rhythms and colorful shaping of textures, harmonics, and double stops. The poems are read by Douglas Huffman in a straightforward manner. The implicit eroticism bounces back and forth between the two partners. While the instrumental interludes bring the piece forward as a performance work, the “theatrical” aspects of the piece are obviously not registered in this CD. Repetition of thematic content in the text, and the improvisatory nature of many moments on the double bass result in a certain formal naiveté, and is written in a very conventional style. We hear it in a delicate and precise rendition by the Vancouver Chamber Choir, under the expert direction of Jon Washburn.

In this CD there are a variety of works for instruments, or voices, and tape. It is a bit homogeneous and somewhat repetitive in approach. The works that stand out are Wings of Fire with cellist Frances Marie Uitti, and She, a Solo, the oldest work in this compilation, with mezzo-soprano Phyllis Mailing.

Alternating Currents: Electronic Music from The University of Michigan

Compact disc, CRC 2492, 2000; available from Centaur Records, Inc., 136 St. Joseph Street, Baton Rouge, Louisiana 70802, USA; telephone (+1) 225-336-4877; fax: (+1) 225-336-9678; electronic mail info@centaurrecords.com, Web www.centaurrecords.com/.

Reviewed by Nico Schüler
San Marcos, Texas, USA


The initial composition on the disc, Doxology [1998] by Mary Simoni, refers to the tradition of the English-speaking Roman Catholic Mass. Ms. Simoni, who is Chair of the Department of Performing Arts and Technology at UM and current President of the International Computer Music Association, writes in the liner notes: “Doxology is an unfolding of the history and the future of the doxology. Initially chanted by males in Greek and Latin, the voice of a woman foreshadows changes yet to come in the Roman Catholic tradition.” Indeed, Ms. Simoni’s composition represents two opposing performance practices: traditional Gregorian chant, performed excellently by Dennis Keller [St. Mary’s Parish in Pickney, Michigan] and electronically modified, is juxtaposed...
finding, I wanted to awaken the possibility for all participants to build a bridge between their dreams and reality and nourish each other with their own individual revelations.

The music, “world music” in the best sense of the term, does indeed convey the composer’s intentions. Although all vocal parts were performed by Mr. Santos himself, the instruments, such as piano, ney flute, claves, taiko drum, Arabian flute, and others, were sampled and modified to support the Neruda poem on butterflies. Based on these vocal and instrumental parts, the composer has created “magic” sound colors that seem perfectly coordinated and formally well organized.

Via Negativa: Cloud of Forgetting (1995), by UM graduate Benjamin Broening, now assistant professor of composition at the University of Richmond in Virginia, is based on the 14th-century Christian mystical book, The Cloud of Unknowing. It is about approaching the unapproachable and knowing the unknowable. The composer “was struck by current secular versions of this idea, in which Truth and Happiness are attained through a renunciation of the external world. While the present piece is not a call to reanimate early Christian values, it does represent a personal endeavor to combat comfort’s seductions and to preserve contemplation as a value in [his] own life.” Whereas the beginning of Mr. Broening’s piece is abstract in its synthesized sounds, its dramaturgy is well prepared and leads to a bagpipe melody toward the end. Although one may only identify the composer’s literary references and thoughts after reading his explanations, it is a very pleasing piece of music.

Gregory D. Laman’s One Divided (1996) is a composition for an acoustic instrument (B♭ trumpet) with live electronics, without using any synthesized sounds. The software for the real-time modifications of the trumpet sounds includes five different processing configurations. These configurations create different sound effects, such as pitch shifting for glissandi, harmonizations of the instrument with itself, short delay loops for ostinati, long phrase delays to create canons, and simultaneous combinations of these processes. Mr. Laman, a composer systems consultant at UM, indeed captures the music not only through the sound as a result of these configurations but also by short pauses between the “movements.” The unity and coherence of this wonderful 8.5-minute piece, however, is maintained by the live performance of the trumpet part (played by Paul Bhasin).

The highlight of this CD, Evan Chambers’s Lament (1996), is a composition for Zeta violin, sampler, and tape. The title refers to the traditional Irish form of lament and “aims to capture the overwhelming sense of sadness and loss that seeps slowly out of the abandoned places in the West of Ireland. Although beautifully desolate, these areas were once densely populated, and even now are marked with reminders of a catastrophe and an overwhelming human loss.” Not only does Mr. Chambers, director of the electronic music studios at UM, indeed capture these feelings with sampled, processed, and sequenced instrumental and vocal sounds (creating the tape part) that he had gathered on a trip to Ireland, an Irish fiddler himself, he also makes the feelings and [historical] circumstances understandable to the listener without them having to read the liner notes. All sampled, modified, and live sounds melt together perfectly and are dramaturgically well-organized.
James Aikman, assistant professor of composition at UM, is represented by two compositions on this disc: *Burton Tower Prelude* (1997) and *The 7th Trumpet Toccata* (1997). The first one is based on noises in the bell tower on his campus (in which his office is located), from noises of a recent remodeling to pianos practicing, from bell sounds inside to siren noises outside the tower. The second piece is based on Revelations 8:6: “And the seven angels which had the seven trumpets prepared themselves to sound.” Both compositions are rhythmically creative and complex, emphasizing the contrast between steady beats and asymmetric meters (and partially polyrhythmic structures). The polyidiomatic percussion part in the latter piece, however, does not seem to fit well either the trumpet-derived sounds or the musical style in general.

The final piece of the CD, Stephen Rush’s *RANDALOG* (1999), is composed by use of aleatoric procedures: “Decisions about random parameters, tempo, and sample content were the primary function of the composer, determining variable frequency shifting, random panning, and algorithmic silence or repetition.” Mr. Rush, a dance and performing arts professor at UM, based the piece entirely on synthesized sounds. Despite some interesting room effects and high-quality production of the synthesized sounds, *RANDALOG* is of little musical value because its (random) organization and sound structure hardly functions by itself aesthetically (nor does it refer to a program).

All in all, *Alternating Currents* presents a relatively broad spectrum of aesthetics, compositional techniques, and sound structures, but unfortunately also a broad spectrum of musical quality. However, the Evan Chambers piece alone is worth the price of this disc.

**Products**

**Propellerheads ReCycle!, ReBirth, and Reason Audio Software**

US$ 179 (ReCycle! 2.0.1), US$ 179 (ReBirth 2.0), US$ 399 (Reason 2.0), available from Propellerhead Software, Rosenlundsgatan 29c, S-118 63 Stockholm, Sweden; telephone (+46) 8-556-08-400; fax (+46) 8-556-08-401; Web www.propellerheads.se/

Reviewed by Michael Theodore

Boulder, Colorado, USA

Not many companies can claim to have changed the manner in which music is made, but Propellerhead Software has done just that with the release of its great product, Reason. Reason is a stunningly compelling application than one might initially guess—that is, it’s not just useful for dance music. Anyone experimenting with digital sound will find much of interest in Reason. And for people working in dance music, it’s nothing short of the Holy Grail itself (if this is you, don’t even bother reading this review; just get up right now and get yourself a copy).

However, Reason isn’t the only exceptional product offered by Propellerheads; the company has also released two other software applications, ReCycle! and ReBirth, both of which are reviewed here as well. All three are currently supported at 2.x versions, and all three were tested here on the Macintosh platform, although Windows versions of the programs exist. (The lighter-weight of the two test computers was a G4 400 MHz machine, with 256 MB RAM.)

Propellerheads’ first release was ReCycle!, followed by ReBirth, and most recently, Reason. We’ll consider each of these programs in the order in which they were created.

ReCycle! (see Figure 1) is mainly a tool for a special type of slicing of loops that permits flexible tempo transformations, as well as the editing and shuffling of resultant slices. Users launch sessions by dragging a soundfile onto the program icon, which causes a window to appear displaying the soundfile. A “sensitivity” slider controls the program’s response to transients. When the sensitivity level hits a certain threshold, the file is automatically divided into a series of smaller segments (visually indicated with dashed vertical lines). One can continue to adjust the sensitivity until the slices are in the desired locations, and one can also manually remove or move the slice locations. Finally, when adjustments are complete, one can export the sliced file as a REX file, along with an associated MIDI file.

As would be expected, REX files preserve the slice information. A growing number of programs are able to read and take advantage of the possibilities that the REX format offers. As stated above, one major utility is the ability to apply time expansion or compression algorithms. For example, it is possible to dramatically alter the tempo of “REX-ified” drum loops without drastically altering the pitch or quality of the sound. (Of course, the greater the deviation from the original the greater the chance of pronounced artifacts.) One can also use MIDI to reorder the slices, or trigger them separately. The MIDI files created by ReCycle! may also be remapped to trigger other sounds, in effect preserving the onset information of one perfor-
ReCycle! also includes some excellent onboard effects, most of which apply some kind of amplitude-dependent processing to the file, slice by slice. A dramatic (and useful) range of shaping is available with these tools, from the subtle to the extreme.

Finally, ReCycle! is set up not only to export REX, MIDI, and sound files, but also to communicate with outboard hardware samplers [all major devices are supported]. Overall, ReCycle! is an indispensable tool for anyone who works with loops on a regular basis. The slicing feature is also useful for anyone looking to reconfigure audio in a “transient aware” fashion [I’ve used it in many highly experimental, non-beat-oriented situations].

ReCycle! is essentially a utility, whereas the next two programs to be considered, ReBirth and Reason, are conceptually different in that they emulate hardware devices.

ReBirth (see Figure 2) sets out to reconstruct, in software, both the sound and the experience of working with three legendary [and long discontinued] pieces of hardware made by Roland: the TB-303 bassline synth (ReBirth includes two of these), and the TR-808 and TR-909 drum machines. In addition, several effects are supplied, including a delay, a distortion unit, a compressor, and an analog-type filter. Although ReBirth is an excellent program, it is the least general of the three being considered, and is of particular interest to fetishists of the original gear [and those intrigued by these particular
Propellerheads decided to emulate the devices that comprise ReBirth not by sampling the audio from the actual devices, but by prying them apart and attempting to model the analog signal flow in software. By all accounts, A/B comparisons with the original devices show that they’ve done an amazing job. Although there are some differences [the pitch of some of the drums, for example], for the most part ReBirth demonstrates uncanny fidelity to the original sounds. The programming interface is also nearly identical, although using a MIDI fader box (such as the Peavey 1600) with ReBirth enhances the programming experience considerably, and brings it closer to the feel of working with analog gear.

The program ships with some fancy demo songs that demonstrate just how much is possible. It also ships with a set of Mods, which are modifications of both the interface and the drum sounds. Users can create their own Mods using the Mod Packer Utility. ReBirth is an extremely popular program, and it’s quite easy to find devotee sites on the internet, which include troves of

*Figure 2. ReBirth screenshot.*
ReBirth-created songs and user-built Mods.

As previously stated, ReBirth is of greatest interest for those users looking for a particular set of sounds and methods of working. Those looking for a more generalized tool can skip directly to the mothership—Reason. I can’t emphasize enough how impressed I am with this software, and how seismic the impact of its arrival has been on legions of computer musicians around the world.

The “hardware emulation in software” model reaches a pinnacle with Reason; it truly is a “complete studio on a CD-ROM” [but make that three CD-ROMs]. The first thing a user sees on launching the program is a scrollable rack full of gear (see Figure 3). The devices include a 14-channel mixer, a drum machine, two different kinds of samplers, an analog-style synthesizer, a REX file loop player, a “graintable” synthesizer (constructed using an interesting hybrid of granular and wavetable synthesis), a “pattern” sequencer, and a master sequencer for all devices (these sequencers are the only things in the program that don’t attempt to emulate “real world” devices, although the pattern sequencer is similar to an analog step sequencer).

The number of instances of each device in the rack is limited only by the host computer’s processing power. Connections between the devices are made by flipping the rack around and connecting patch cables. A remarkable amount of care has been taken with the interface—all of the virtual knobs and cables look real, down to phony serial numbers and electrical warnings on the back. One funny detail is the fact that the nest of cables jiggles when the rack is turned around. One is able to get to work right away because the interface matches the familiar operations of typical gear with such fidelity.

As mentioned above, the mixer has 14 (stereo) input channels (one can simply add another mixer or mixers in a chain should more inputs be necessary). Auxiliary sends, muting/soloing, panning, and gain sliders are all present in their familiar locations. One wishes the equalizers were a bit more robust, as the current implementation only has knobs for treble and bass. One can always use the Parametric EQ device included with Reason, but given all of the trouble that they’ve taken with everything else, it’s a bit puzzling to find that there are no knobs for midrange adjustments.

The Redrum drum machine is based on the pattern programming metaphor (similar to the 808 and 909). However, it is considerably more flexible. Each of the 10 drum channels is loaded with an audio file. Sets of audio files can be saved as “kits,” and any file on any channel can be changed at any time, making it quite easy to mix and match. Also, because the audio files can of course be any sound, it’s easy to use Redrum to program rhythmic arrangements of non-drum sounds. Users aren’t limited to programming in step mode, either, as one can program the drum machine by sending MIDI data from the master sequencer. Patterns that are created through step-mode programming can also be copied to the sequencer, where they can be varied and transformed in a host of familiar ways.

Subtractor, the analog-style synthesizer included with Reason, is described in the manual as being based on subtractive synthesis. This is only part of the truth, however, as it also combines elements of additive and modulation-based synthesis. The unit boasts 99-note polyphony, and is outfitted with two filters (which...
can be cascaded in interesting combinations, two oscillators (each containing a set of 32 preset waveforms), two low frequency oscillators (LFOs), envelope generators, and a host of modulation operators. Like all devices in Reason, Subtractor may be flipped around, allowing access to the many Control Voltage/Gate inputs (and outputs) on the back, for further modulation possibilities. Modulation parameters, filter center frequency, and amplitude can each be controlled by a series of envelope sliders, which control attack, decay, sustain, and release. Here is one place where I wish the program would offer more flexibility. Although it’s certainly true that this is the [limited] degree of control one might expect from a real-world device, it would be wonderful to take advantage of the fact that Reason is in fact operating on a computer, and have a pop-up window in which one could make much more elaborate envelopes by using a breakpoint graph, or something similar. This would depart from the absolute fidelity to real world emulation, but so what? This is a quibble, however, as it is possible to make endless amounts of interesting sounds with Subtractor in its current configuration.

Reason also ships with another synthesizer, the Malström “graintable” synthesizer. The Malström offers an idiosyncratic hybrid of granular, wavetable, modulation, and waveshaping synthesis. The manual doesn’t spell out the process in detail, but the basic idea is that the oscillators read sampled sounds, which are then subjected to various granular processes, the results of which are a series of periodic waveforms that can be recombined to form the original sound. The output of this process, a “graintable,” can then be treated like a wavetable—it can be scanned at different speeds, in different directions, etc. The rate at which the table is scanned affects the overall evolution of the sound, and the rate at which individual grains are read allows for transformation of the spectral quality. The signal produced by the two oscillators is then sent through up to two modulators, two filters, and a waveshaper (with envelope shaping and modulation possibilities for all parameters). The Malström is in some ways the least predictable of all of the modules, but after a little while one starts to get a good feel for what kinds of knob pushing will create what kind of transformation. It doesn’t really allow for the creation of “classic” granular synthesis sounds (though this wasn’t what it was intended to do either), but instead creates a fairly unique set of new and rich sounds. Like so many components of Reason, one could spend a long time tinkering with just this module.

There are two samplers (more properly, sample players) included with Reason, the NN-19 and the NN-XT. The NN-19 is for quick and dirty sampling tasks, while the NN-XT allows for complex, layered mappings of samples. The NN-19 has the ability to load samples into key zones and maps, and can also do some processing of the samples, including tuning, amplitude shaping, and filtering. The NN-XT has all of these basic features, but also comes with eight stereo output pairs, which makes it possible to route different samples to separate processing paths. Most importantly, it allows the user to layer several samples on a single “key,” and to control which sample is played with various strategies (incoming MIDI velocities can be mapped to particular samples, samples can be mixed or cross-faded across a specified range, one of the layered sounds on a key can be chosen randomly, etc.). The NN-XT offers similar (if somewhat expanded) processing opportunities to the NN-19. Both read various file formats, including REX files, and the NN-XT also reads SXT files, which allows one to read in samples from the massive Orkester sound bank that comes with Reason. Orkester is a set of high quality orchestral instrument samples, and its inclusion greatly increases the value and utility of Reason.

Loyal users of the other Propellerheads products mentioned here will find ample support for them in Reason. The Dr. Rex Loop Player is a straightforward REX file player, with some processing ability (tuning, filtering, and amplitude shaping) thrown in. As is the case with ReDrum, the pattern of events contained in a Dr. Rex Player can be exported to the sequencer, allowing for the easy creation of variations. ReBirth users will be happy to find the ReBirth Input Machine, which streams audio directly from ReBirth into Reason (using Rewire technology, which will be described shortly).

Finally, there are two conceptually different sequencers. The Matrix Pattern Sequencer is similar in style to an analog step sequencer. It lives in the rack, and can send control and gate information to other devices. [Matrix is an excellent device for programming bass lines.] The Sequencer is not a part of the rack, and is modeled on the familiar software sequencer concept (i.e., the interface window looks similar to Cubase or Logic). Given the astonishing amount of things this program already does, the Sequencer is surprisingly robust, and contains some nice features. That said, it isn’t developed to the level of sophistication that one finds in a dedicated sequencer. This isn’t all a problem, however, owing to the wonderful Rewire!
Rewire allows a user to stream audio directly from Reason into a Rewire-aware host. One can therefore work in a professional sequencing environment, but have all of the glory of Reason piped in as input. Rewire syncs the tempos, loop points, transport controls, etc., assuring smooth interaction between the two programs. The only hitch is that not all Rewire hosts have done a good job of implementing the technology. For instance, Digital Performer consistently crashed when I tried to use it with Reason [on both computers]. By contrast, I’ve been having criminal amounts of fun using Ableton Live as a host application for Reason [with some Pluggo thrown in for fun], with almost no problems. Using such an application as a host solves another problem, which is that there is no way to record audio directly into Reason. In my mind this is a bit of a puzzling omission—why not have a pretend multi-track machine? One assumes that in time all major sequencers will have a healthy Rewire implementation.

Why would someone who already has a room full of gear want Reason? One simple answer is that Reason devices can be integrated with each other in ways that are usually impossible in the real world. Any Reason device can be connected to any other device and used as a modulation source. The signal routing possibilities are literally endless (although it’s a shame that there isn’t a Y-cord in the Reason universe). If you need 15 samplers, just put that many in your rack. Need each one to modulate some other signal in several different ways? Not a problem. You really can get rid of that room full of gear! (Many people already have. Of course, there will always be special pieces of hardware that have an irreplaceable sound. Hang on to those.)

Space doesn’t allow discussion of many other important features, such as the quality of the massive number of presets and included samples, the ready availability of REX file CDs for sampling work, the ease with which one can share completed work, and the large user community. Indeed, the user community can be quite helpful when one runs into technical problems. American citizens who don’t buy Reason from Propellerheads directly must get technical support through Midiman, which offers the worst support I’ve ever experienced.) You needn’t be interested in creating dance music to find yourself hopelessly drawn into the Reason orbit. Granted, it doesn’t have the “behind the hood” level of ultimate flexibility that Max/MSP or SuperCollider offer, but the tradeoff is that the interface offers a set of very well made and fascinating tools, all beckoning for your immediate exploration.