and practical textbook for students and a practical reference for veterans as well.

Ken Greenebaum and Ronen Barzel (Editors): Audio Anecdotes: Tools, Tips, and Techniques for Digital Audio

Hardcover, 2004, ISBN 1-56881-104-7, 512 pages, glossary, contributor biographies, US$89; CD-ROM with sound and video files, executable demos; available from A.K. Peters, Ltd., 888 Worcester Street, Suite 230, Wellesley, Massachusetts 02482, USA; telephone (+1) 781-416-2888; fax (+1) 781-416-2889; Web www.akpeters.com/.
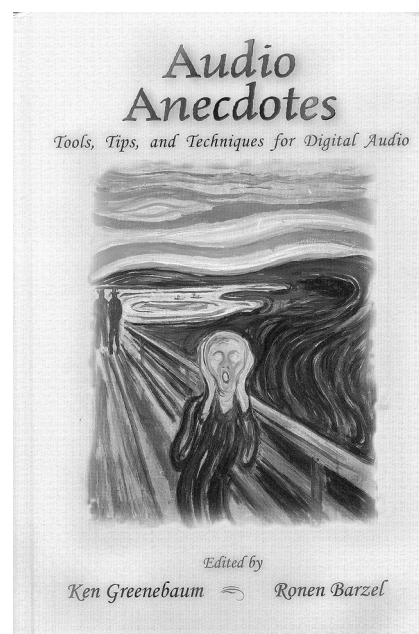
Reviewed by Ian Whalley
Hamilton, New Zealand

Audio Anecdotes is the first in a series of three books covering creating, recording, processing, and analyzing sound and music, also touching on the opportunities presented by digital media and computing. This first book divides into eight chapters and twenty-five essays addressing measurement, perception, recording, synthesis, signal processing, computer techniques, computer tools, and human experience. Co-editor Ken Greenebaum notes that after being frustrated and disappointed with the lack of resources available to understand digital (and previously analog) media, his intention was "to create the book I wished for then and that I still want today" (p. xi). The editors note that "articles take a variety of forms: introductions, essays, in-depth technical explorations, presentations of tools and techniques, and post-mortem analysis" (p. xiv). With the variety of authors that have contributed, particularly those coming from beyond the academy and those drawing on personal experience, read-

ers are encouraged to learn about the contributors' backgrounds before reading each section.

The book's structure, intended as an "arc" (p. xv), assumes that to understand the area one has to first have an understanding of the basic physics and human perception of it. Of course, this is only the first volume in the series, so it would be difficult to include everything from the range of possibilities within this sole offering.

Chapter one focuses on "Measurement." In "Sound Pressure Levels; Mine Goes to 11!," Ken Greenebaum opens the book with a well written introduction to measuring sound pressure levels. Like the remainder of the essays, this is followed by an annotated reference list. This is an excellent way to navigate through further readings, what the readings cover, and something about the quality of each. Hesham Fouad then offers "Understanding the Decibel," a largely mathematical outline of measuring a sound's level, and why we use the algorithmic scale for this. Mr. Greenebaum concludes the chapter with the third essay titled "Sound Propagation," a brief introduction to the physics of sound: what it is, what causes it, sound propagation, travel, and attenuation. Again this is a low-key introduction to the area, with a good balance of technical and accessible information. As the departure point for the "arc," the chapter sets up the anticipation of where reception, and art in a general sense, might fit in with the approach taken.

The second chapter is titled "Perception," to address the contention that "one must explore the human perception of sound to understand the trade-offs and implications inherent in any media" (p. xvi). The terrain covered explores the "perceptual organization of sound, latency in the perception of sound, and the

psychophysics of hearing" (p. xvi). Albert Bregman and WieslawWoszczyk begin with "Controlling the Perceptual Organization of Sound: Guidelines Derived from Principles of Auditory Scene Analysis (ASA)." This is an extensive introduction to the area, with solid examples on the CD-ROM and an extended annotated bibliography. Mr. Greenebaum returns with Derek DiFilippo in "Perceivable Audio Latencies," looking at perceptual detectible levels of latency for a range of interactions, again linked to good examples on the CD-ROM. The final essay is by the same authors titled "Introduction to the Theory of Signal Detection: Measuring Human Response." The approach, grounded in personal experience, is refreshing in context. The chapter is a gentle introduction to the topic, pulling together a significant body of work. The first two chapters then provide a firm foundation to launch from, covering technical details in an engaging manner that will appeal to a wide variety of readers.

Chapter 3 provides a logical next step with a focus on "Recording." The path tread here is likely to be similar to many through their first experiences with music and technology. John Klepko begins with "Understanding Microphones," a brief, balanced, and wide-ranging approach that is a must-read for many musicians and students. Dex Manley next deals with "How to Make Great Voice Recordings," a very useful chapter based on wide professional experience. Daniel Levitin discusses "Instrumental (and Vocal) Recording Tips and Tricks," and although largely dealing with the recording of popular music, the approach might be applied generically. It is the balance of academic and practical expert knowledge in this chapter that gives it a sense of pragmatic punch, and makes it a section that will have regular visitors.

In the fourth chapter, one would expect something on sound generation, and it dutifully arrives in the form of "Synthesis." One could reasonably expect something on the past, present, and future of the field, or at least on the range of possibilities that are available. David Theil begins with "Retro Game Sound: What We Can Learn from the 1980s Era Synthesis," linked to full C-based implementation of synthesizers on the CD-ROM. This is a quirky beginning to the topic in context, but sustains interest well, and the sense of personal experience is again refreshing. It is then something of a jump to go from this to Perry Cook's "Introduction to Physical Modeling Synthesis" without dealing with the range of possible digital methods of sound generation in between. Mr. Cook's chapter is detailed and well referenced, but without a broader proceeding chapter, the context for this development may be lost on many readers. Finally, James Hahn concludes with "Timbre

Trees: Integrating Sounds and Images." This looks at a system where mathematical models produce both sound and images in an animation allowing synchronization and close correlation between audio and visuals, providing an interesting tangent. The main problem with the chapter is what is negated as an overview of synthesis, given that this book is intended as a broad introduction.

"Signal Processing" is the title of chapter 5. At this point, those with an artistic bent might begin to wonder when the "what's it all for" question might begin to be addressed, as further technical explanations are rolled out. Henrique Malvar begins with "Audio Masking in Audio Compression," a technically focused offering that explains an area that is vital to understanding the psychoacoustic effect that current popular audio compression schemes exploit, and includes MATLAB scripts as examples. Tor Ramstad then discusses "Rate Conversion," again a technically focused offering. Ben Luna contributes "A Framework for Software Modem Experimentation." Although interesting, in context, the last essay seems tangential here, and readers may soon yearn to return to more mainstream topics on digital music tools and techniques.

The sixth chapter looks at "Computer Techniques," beginning with Mr. Greenebaum's "Simple Interfaces: Small (Hello) World," grounded in personal technical experience making sensible software programming interfaces for digital media. The same author and the book's other editor continue with a technical offering in "RampTest: Quantifying Audio Performance," outlining a method for automatically quantifying the performance of digital media systems. Concluding is the multi-authored essay (Ken Greenebaum, Christian Hresko, Alexandros Eleftheriadis,

and Danny Hong) titled "Audio File Formats: A Formal Description-Based Approach." This is a technically focused and readable look at file formats and what shaped these, and discusses problems in supporting binary formats across platforms. FLAVOR, a bitstream description language, is also demonstrated.

"Computer Tools" is the title of the seventh chapter, although also listed as "Software Tools" in the introduction (p. xviii), which may ultimately have been a better title. The topic seems vast to deal with in one chapter, particularly given that this will be an area that digital music users will have some experience of. Phil Rutschman's "Octave and Gnuplot: An Audio Detective's Best Friend" opens, a largely personal narrative about how the author used particular tools to track down a noise problem in an MP3 decoder. Mr. Greenebaum, Phil Burk, and Ross Bencina follow with "PABLIO: A simple Audio I/O Library," a cross-platform audio I/O library used for implementing the *Audio Anecdotes* example programs. Working through the CD-ROM extends one's appreciation of the work here. Following is Ross Bencina and Phil Burk with "PortAudio: An API for Portable Real-Time Audio," describing the implementation of a portability layer for the PABLIO library. Finally, Alexandros Eleftheriadis and Danny Hong present "Using FLAVOR for (Media) Bitstream Representation," a more detailed look at the language introduced in the last essay of the previous chapter. At this point, many digital audio practitioners, given commonly shared knowledge of a wide range of software, may wonder about the technical range undertaken here.

"Human Experience" is the ambitious title of the final chapter, beginning from Randy Thom's "Designing a Movie for Sound," a wonderfully

practical guide to a real-world problem. Gordon Hepton offers "Listening to Nature: Hearing is More Than Meets the Eye," an engaging essay based on long experience for being an environmental "sound tracker." Finally, Adrienne Ross presents "Understanding Hearing Losses and Hearing Gains: Fine Tuning the Experience of Sound," another engaging personal account, this time of being made aware of a hearing defect, how the author has compensated for it through other senses, and the link between sound and other sensual experiences.

A glossary of audio terms matches the issues raised in the book well, and the section of contributed bibliographies is indeed useful to read before delving into each essay, outlining the perspectives and experiences the authors bring. The CD-ROM offers examples from many of the essays in each chapter, and should run on Macintosh, Linux, and Windows platforms. In addition, provided one has some technical fluency, there is much to intrigue and satisfy here as one explores further possibilities through the good range of software tools and techniques provided.

The appeal of this book is its practical usefulness, the variety of approaches taken within some chapters, its accessibility, and the breadth of experience brought to bear, particularly from a technical perspective. In these terms, it is likely to be a handy reference book on many shelves in educational, artistic, and engineering settings, and it certainly fills a gap in some of the current tutorial offerings. As such, it is likely to find a good audience. With the inclusion of more mainstream topics and a more careful balance between technical and practice-based issues, the book might also have found a wider mainstream readership.

Recordings

Various: Music from SEAMUS, Volume 17

Compact disc, EAM-2008, 2008; available from SEAMUS, 2550 Beverly Boulevard, Los Angeles, California 90057, USA; Web seamusonline.org/.

Reviewed by Ross Feller
Oberlin, Ohio, USA

The Society for Electro-Acoustic Music in the United States (SEAMUS) is a non-profit organization of composers, performers, and teachers of electroacoustic music founded in 1984. Music from SEAMUS, Volume 17, continues the tradition of placing the most popular compositions from the annual SEAMUS national conference onto a CD distributed free to all its members. Scott Wyatt, Professor of Composition at the University of Illinois at Urbana-Champaign and a past president of SEAMUS (1989–1996), directs the project, and also does the fine remastering. Almost all of the compositions on this disc are scored for live instruments (from one to four) with electroacoustic accompaniment. The combination of acoustic and electroacoustic sounds runs the gamut from blended to confrontational assemblages, representing well the current diversity of styles and approaches.

Daniel Weymouth's *Unexpected Things* for violin, piano, and electroacoustic accompaniment employs a variety of unpredictable and aggressive materials to good effect. The instrumental and electroacoustic parts are equally engaging, idiomatic, and virtuosic. The piece begins with the violin and piano attacking a unison pitch using a variety of articulations and rhythms. A violent piano cluster enters, processed to forcefully reshape the piano's resonant decay. This ush-

ers in a short section devoted to a sequence of asymmetrical repetitive patterns reminiscent of those found in Franco Donatoni's work. Chromatic pitch collections are briefly interrupted with cleverly constructed unison alliances. The first two minutes of this twelve-minute piece serve as a kind of introduction in which the basic compositional ideas are brought into play. The remainder of the piece develops the ideas from the introduction within a lengthy, sectionalized formal structure that is positively kaleidoscopic. At times the textural density builds to include multiple, simultaneously unfolding layers of material. Around the two-thirds mark we hear the climax of the piece, a dense, labyrinth of squealing and wailing above a slowly rising glissando. Following this is a 2.25-minute decay that features the minor third in the first harmonically stable section of the piece. The integration of the electroacoustic part is mostly seamless in *Unexpected Things.* Worth noting is the use of amplitude envelopes that seem to open or close too quickly, especially when used in reverse. This effect palpably and effectively foregrounds the artificial nature of the electroacoustic part.

According to the liner notes, David Taddie's *Tracer* for piano with electroacoustic accompaniment "makes extensive use of digitally processed samples as well as purely synthesized sounds to provide expanded resonance of the harmonic fields implied by the piano's lines and to expand the piano's apparent acoustical sound space. At times, the roles are reversed as the piano supplies harmonic and/or gestural intensification of the electronics." Mr. Taddie successfully integrates his acoustic and electroacoustic materials with a high degree of rhythmic and timbral precision. The piano part employs an intriguing atonal pitch collection, fluidly performed and subtly