

sual material, the focus has been on using concepts from music, focusing on the structures and language, yet reworking these concepts for a visual production (program booklet, pp. 2–3).

Continuing on, Ms. McDonnell pays considerable attention to the use of motion, in both traditionally composed music and visual music. And indeed, for all the various approaches to visual music seen at the Marathon—whether fully abstracted or hinting at narrativity, whether computer-generated or derived from *objets trouvés*—a similar mindset to that traditionally ascribed to composers seemed to prevail, with emphasis on the structuring of events in time to produce a coherent artistic statement, though not necessarily a “linear” or “narrative” one.

On the other hand, since Richard Wagner—at least as the *Gesamtkunstwerk* philosopher, if not as an opera composer—any composer working in opera has faced the perplexities of the visual art world, and specifically the challenges of presenting a literal spectacle in addition to the usual demands of composing music. Mr. Chasalow has opted to have his singers—all in “concert-blacks” except Ingram’s sneakers, which nicely tempered the dress code—stand in place for the bulk of the opera (although, effective use was made of three musical “asides” with soloists repositioning themselves somewhat onstage, as well as offstage singing by Ingram as a posthumous memory in Delling’s mind). Such a relative lack of staging may be par for the course in post-tonal operas, given the difficulty of the vocal parts. But the visual tradeoff is real: one opera-goer suggested the piece be marketed as an oratorio, rather than an opera, given the lack of traditional staging. Yet the addition of Ms. Marika’s video

projection here allows the composer to write concert-level music without giving up on a compelling visual stage-space. Or, to put it somewhat reductively, the presence of video actively *transforms* Mr. Chasalow’s music from a concert piece to an opera.

Thanks to the Cyberarts Festival and the respective host institutions (Northeastern and Brandeis), these two ambitious events were presented essentially in tandem, allowing for a sort of conversation between visual music and multimedia opera. As in so many instances, the handles used to label these art forms prove slippery at best; but standing side-by-side, a marathon and a one-act opera certainly elucidate one another’s meanings and artistic identity. In fact, these ambiguities in definition seem to nurture the growth of both art forms, allowing each to expand in both musical and visual terms.

This fertile blurring of distinctions is captured in Robert Seidel’s *\_\_grau*. The title of the piece, meaning “gray,” is reflected in a brief dialogic epigram at the beginning of the work (this work can be viewed online at [www.grau1001.de](http://www.grau1001.de)):

**mf** . . . for me, life consists of  
black and white only . . .  
**rs** . . . i think there is just the  
in-between . . .

The piece begins with a brilliant display of colors moving across the screen, right to left, before white flashes overrun the images. Musically, the soundtrack by Heiko Timpelt and Philipp Hirsch combines ambient vocal music with a white-noise pulse that culminates—at least for the moment—along with the white flashes, leaving in its place a mostly black-and-white visual work with tantalizing blocks of color occasionally recurring. The black-and-white sections initially suggest a procession of three-dimensional

Rorschach images, eventually giving way to a whole series of explorations of “in-between” visual worlds. Indeed, black-and-white simply falls short of the task of describing it.

Similarly, the generic delineations of “opera” and “visual music”—not to mention “music” and “film” or “visual art”—hardly do justice to the vibrant works artists are creating and presenting today. Jean Detheux perhaps expressed it best: “I have no doubt whatsoever that Visual Music is a major art form with deeply grounded historical roots . . . and that it will eventually be recognized as such. [The Visual Music Marathon] was a magnificent celebration of the vitality of that art form, and it [the festival] will make babies, mark my words” (electronic correspondence, 22 May 2007). Judging by the abundance of sophisticated, challenging works presented at the recent Cyberarts Festival, it seems that Mr. Detheux’s prediction of fertility and growth among such multimedia presentations is well on its way to realization.

## Publications

### Eduardo R. Miranda and Marcelo M. Wanderley: *New Digital Musical Instruments: Control and Interaction Beyond the Keyboard*

Softcover, 2006, ISBN-10 0-89579-585-X, ISBN-13 978-0-89579-585-4, 295 pages, foreword (Ross Kirk), references, appendix, index, A-R Editions Computer Music and Digital Audio Series DAS 21, CD-ROM, US\$ 49.95; A-R Editions, 8551 Research Way, Suite 180, Middleton, Wisconsin 53562, USA; telephone (+1) 608-836-

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9000; electronic mail info@areditions.com; Web www.areditions.com/.

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The area of performance and interaction in computer music has been recently of great interest for both musicians and researchers. In that light, this book on new digital musical instruments by Eduardo Miranda and Marcelo Wanderley is a welcome addition to the literature. This is a thoroughly researched and documented work, following on from the authors' highly rated research in the field, previously mainly available to the academic audience. The book provides a good and plain introduction to the area, which will be invaluable to readers not too familiar with the subject. In addition, it includes pointers to more specialized background literature, a very important consideration for anyone wanting to explore the technologies described in it.

The book can be roughly divided into two sections. Chapters 1–3 discuss the more established gestural acquisition and sensor technologies, whereas the remainder of the book concentrates on the cutting edge areas of biosignal interfaces and the application of Artificial Intelligence (AI) to acquired signals. The two sections are tied together by the common theme of instrument control techniques, taken in the broadest possible sense. This is actually one of the notable aspects of the book, as its content is not restricted to a narrow interpretation of performance and interaction.

In the first chapter, the reader is guided through the definition of what the authors call a Digital Musical Instrument (DMI). This chapter serves as a background to the discussion of

the different technologies of performance and interaction. It introduces the concepts of gesture and mapping, followed by an evaluation of their significance in music performance. The authors' approach to DMI is based on the conceptual separation of gestural/control and sound generation aspects of an instrument, which can then be re-combined in different configurations. The authors maintain that this methodology leads to great flexibility in instrument design, as well as allowing for an extrapolation of the conventional concept of an instrument. It is important to note, however, that the book is dedicated to the study of the gestural side of DMI. The sound generation aspect is only touched on lightly, mostly in pointers to specialized literature. For that reason, this chapter sometimes lacks detail in important topics such as parameter mapping. Perhaps there is a case for a follow-up to this book, where sound synthesis can be explored in the light of the ideas introduced here. This would allow for the treatment of the crucial question of mapping in more detail.

Chapter 2 is a rather long discussion of existing work on gestural controllers, which, in places, reads almost as a catalogue summary of New Instruments for Musical Expression (NIME) conference papers. The different types of gestural controllers and the projects from which many of them have originated are listed and described. As an illustration of what the current status of research in the area is, this chapter tries to capture the most interesting projects, but it suffers from the fact that it will probably become dated very quickly. This is perhaps the downside of writing about a technology that is in a constant state of flux. In any case, this chapter certainly does not seem to be as interesting as the others in the book.

The following chapter can, on the

other hand, be a very useful resource for students and teachers of interactive systems. Chapter 3 provides a good description of gestural and sensor interface technologies available today, with useful detail. In addition, it considers how these can be used for musical applications. Although most of the discussion is directed to the design of interfaces for control signals, there is also a small section on how to convey control information through audio signals. In general, the chapter is very informative and a good read. However, it is disappointing that a key element in many of the modern interactive systems, Open Sound Control (OSC), is only discussed briefly and with little detail.

In general, the second part of the book is perhaps the most interesting, where the user is guided through the exciting new field of biosignal interfaces and their applications in music. This area, although in its infancy, has demonstrated great potential for interesting and novel uses in many areas of music. Here, the book's subtitle, "Beyond the Keyboard," is taken to its ultimate consequences. Chapter 4 guides the reader through the different types of biosignals that can be sensed and how they can be conditioned for use as DMI controls. Such signals include eye movement, skin conductivity, heart pulse, muscular activity (including the microvibrations measured by a mechanomyogram), and brain activity. Many of these signals are quite complex and require a good deal of conditioning; in addition, it is clear that some might be generated by involuntary activity, which would make them less useful. The book describes the processing of biosignals as an evolving field. It discusses the different stages of conditioning: pre-processing, feature analysis, machine learning, and mapping. It is clear from the book that intelligent inter-

pretation of these signals is generally a key component of the process, something that is well explained in the text. Particularly, the application of machine learning to biosignals seems to be an area of research with great potential for development.

Chapter 6 provides an interesting segue to the topic of intelligent systems, discussing some current trends in AI that could be harnessed in the context of an interactive DMI. It begins with an evaluation of the position of performance in electroacoustic music, pointing out that some early trends in 20th-century music were actually directed to the elimination of the performer role. Nevertheless, the live performance element has emerged as an important aspect of many different types of electroacoustic music, as in for instance, live diffusion of fixed-media works and the so-called "live electronics" works. The book highlights the key role that computers have had in enabling interactive electronic music performance, discussing what it calls "computer musicianship." In particular, it is nice to see a section on dynamic programming, which is quite informative and will probably be very useful for readers interested in that technique.

In summary, readers should find this a very engaging book, copiously filled out with references and further reading suggestions. It should be an useful addition to the booklists for the evolving area of Music Technology and the many university courses dedicated to it on both sides of the Atlantic.

### **Gareth Loy: *Musimathics: The Mathematical Foundations of Music, Volume One***

Hardcover, 2006, ISBN-10 0-262-12282-0, ISBN-13 978-0-262-12282-5, 608 pages, 263 illustrations, foreword

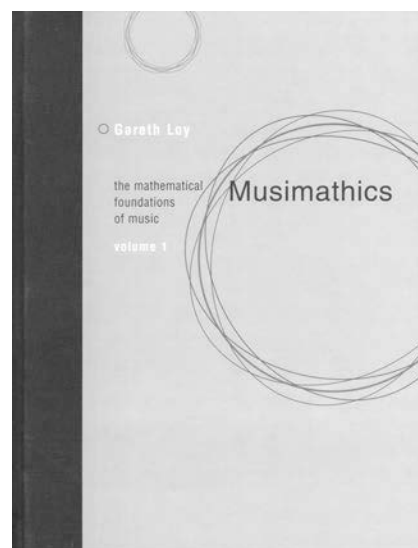
(by Max Mathews), two appendices, glossary, notes, references, equation index, subject index, US\$ 50.00/UK£ 32.95; The MIT Press, 55 Hayward Street, Cambridge, Massachusetts 02142-1493, USA; telephone (+1) 617-253-5646; fax (+1) 617-258-6779; Web [www.musimathics.com/](http://www.musimathics.com/).

*Reviewed by Mark Ballora  
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With *Musimathics*, Gareth Loy solves a problem I have faced for a number of years now. As an instructor of a university Science of Music course, I have never found any single text that explains all necessary topics with equal depth and clarity, and thus have had to rely on course packs of photocopied compilations. In the future, this chore will be unnecessary, thanks to this book. *Musimathics* doesn't have absolutely everything, but it comes so very close, and then provides a wealth of bonuses. The book is singularly precise, thorough, and often very funny.

The first chapters are preliminary, providing basic vocabulary for concepts that are treated in greater depth later. Chapter 1, "Music and Sound," introduces air pressure, waves, and simple harmonic motion. Not a word is wasted anywhere. Students will likely be comforted by the low page count.

Chapter 2, "Representing Music," gives an overview of how music is translated into pictorial symbols, with explanations of what is being represented at each step. Pitch is explained as both a matter of frequency and of interval ratios, and is supported by time-domain graphs of air pressure changes, the amplitude envelope, staff notation, and how pitch subsets form various scales. Duration and loudness are covered in terms of time, tempo, musical dynamic notation, and time signature. Timbre is



discussed in terms of spectral changes and time. Graphs illustrate a string's vibrational modes, plots of complex waves composed of harmonic partials, dynamic spectra, and sonograms.

Things take off with Chapter 3, "Musical Scales, Tuning, and Intonation." Here is where everything gets treated down to the fine details. The nature of scales and ratios is discussed as they pertain to equal temperament, just intonation, Pythagorean intonation (and the problems introduced by the syntonic comma), meantone temperament, well temperament, various ethnic and microtonal scales (Hindustani and Partch, to name just two), and fret calculations used by guitar makers. Anything left out of a reader's tuning background is likely to be covered here.

Chapter 4, "Physical Basis of Sound," is approximately two-thirds "physical basis" and one-third "sound." The majority of the chapter provides background in general physics, leading to musical considerations after covering underlying topics such as dimension, mass, density, velocity, Newton's laws of motion,