
Book reviews

Eduardo Reck Miranda, *Computer Sound Design*, 2nd edition. Music Technology Series, Focal Press, Oxford, 2002. 263 pp. With CD-ROM, ISBN 0-240-51693-1

This volume complements the other titles in Focal Press's Music Technology Series, and especially Miranda's companion contribution, *Composing Music with Computers*, in that it focuses on sound synthesis and associated programming techniques. It is to a degree more targeted on the creation of sound in the computer rather than creating compositions with sounds. An integral part of the package on offer here is the CD-ROM, an invaluable addition to the book's written contents, since this offers the reader the opportunity to try out many powerful programs on his or her own computer, whether PC or Macintosh. Unix users are generally given Internet sources to acquire programs for their own operating system.

The various chapters of the book give an essential grounding to the topic of computer sound synthesis. Chapter 1 is a clear and well-written summary of 'Computer sound synthesis fundamentals', introducing the concepts of digital representation of sound, its storage in computer files, and commonly used techniques, such as sub-routines and unit generators, for generating these representations. Chapter 2 groups a number of 'loose modelling approaches' – a slightly awkward term for a group of programming techniques mostly derived from their beginnings in analogue synthesis. Here we find amplitude and frequency modulation (AM and FM), waveshaping, wavetable and Walsh synthesis. The trade-offs of programming ease against computational demands in each of these methods is well indicated, and a series of appropriate diagrams makes the technical explanations clearer for the reader. This suggests that the book will prove a valuable resource for students on music technology courses, who have a need to acquire the technical understanding quickly in order to pay attention to the creative fascinations of practical computer sound synthesis.

Chapter 3 discusses approaches to the formation and manipulation of sound spectra. Beginning with additive synthesis – the construction of a timbre by adding constituent sine tones – the author then goes on to outline the principles of synthesis through analysis, beginning with a discussion of various forms of Fourier analysis and especially the fast Fourier transform (FFT). From the analysis files, resynthesis can occur through a number of methods from Fourier synthesis reversion, to additive and subtractive resynthesis. The chapter concludes with a look at

some methods of formant synthesis, in the FOF and Vosim techniques.

The next chapter, entitled 'Source modelling approach: from subtractive and waveguides to physical and modal', discusses more recent developments in sound synthesis applications. Waveguide filtering, Karplus–Strong synthesis and the employment of cellular automata for synthesis purposes are introduced here. There is an important section on physical modelling systems, such as mass–spring networks and bond graphs. Examples of dedicated modelling given include Cordis and Genesis. Praat's vocal tract model is outlined, and there is a brief discussion of the modal synthesis employed in the Mosaic system developed at the University of Paris.

Time-domain techniques are considered in the following chapter, and these include granular synthesis, a group of techniques which seems to hold greater fascination for composers than many others, perhaps because of their less abstract features. For many practitioners it is easier to envisage massing varied fragments of sound than it is to master the often abstruse mathematics and complex formulae of waveguide synthesis. In this chapter there are interesting discussions of Xenakis' Gendy system and the sequential waveform composition techniques of Arun Chandra.

Chapter 6 examines a number of 'case studies' in a slightly more relaxed tone. Much of the chapter is devoted to the means of synthesising human-like vocal sounds with worked examples employing F. Richard Moore's *pcmusic* (a PC version of *cmusic*) and Praat's software vocal synthesizer. The author also discusses work developed from his own program *Chaosynth* – employing granular synthesis through cellular automata methods – which makes possible the construction of various types of sound texture. Audio examples of a variety of results are given on the CD-ROM.

Chapter 7, headed 'Towards the cutting edge', looks to the latest research in sound synthesis. We find here the introduction of artificial intelligence, and the attempt to create meaningful classifications of sound which would aid the principles of synthesis. There follows attention to the implications of different parallel computing architectures for sound synthesis – essentially permitting being able to do more processing in real time – and the possibilities of 'evolutionary sound synthesis' through post-Darwinian models like genetic algorithms.

The final chapter serves as an introduction to the software on the accompanying CD-ROM. Programs are supplied for both PC and Macintosh. This reviewer has investigated only

those for the PC. In any case, many of the programs have versions for both systems. A small number only are exclusive to one or another operating system.

The software

A word of caution. Many of the programs here require a considerable investment of time and effort in order to understand and apply them for a musical purpose. That said, the CD-ROM contains a treasure-trove of very powerful programs for computer sound synthesis, and will continue to reward the intrepid investigator.

For those who perhaps already know programs in the *music-N* category, for example Csound, the principles of two programs given here will be familiar. **PCMusic** is an implementation and extension of Richard Moore's original **Cmusic** program, designed explicitly for the PC. It is a full program – the complete functionality of the system is given here. Nothing is disabled, everything works and can produce sound of great beauty – if the composer is prepared to put in the work to understand it. As well as incorporating a huge variety of sound-producing algorithms, the system includes score-list features which make it entirely possible to realise complete compositions with the language. A difference from at least the earlier versions of Csound is that the 'score' (or note-list) functions are not separated from each other. The instrument definitions and note-lists are included in the same file.

Roger Dannenberg's **Nyquist** program is similar to the extent that it also provides note-list features, here within the LISP programming environment. It helps considerably to know the LISP language. LISP (a name derived from LIST – Processing) provides very powerful general programming facilities which in Nyquist are extended to sound synthesis and score generation, and those familiar with the language will be at an advantage in using the system.

Som-A is a Brazilian computer music language for additive synthesis. It employs files here called spectral charts, and the note-list features of PCMusic and Nyquist. In the program given on the CD-ROM, many aspects of the presentation seem to be still in the process of development and are thus incomplete.

Both PCMusic and Nyquist employ a command-line interface, which some users may perceive as unfriendly. There are, needless to say, many other programs on the CD-ROM which provide graphical and therefore 'friendly' interfaces. A very good example of this is the program **Virtual Waves**. This is a well-designed graphical package by Nicolas Fournier, which permits the user to drag graphical 'modules' on to a work-space, edit their input parameters (frequency, amplitude, etc., etc. . . .) by a simple process of clicking the icon. This opens up the expanded module, showing the current or default parameter values, which can be modified by the user. On accepting the modified values, lines may be drawn with the mouse from the module outputs to other module inputs, until a complete sonic instrument is graphically defined (the last in line is an output module). Clicking on another icon initiates the synthesis process, causing a – usually short – delay before the sound is heard. There are many types of graphical module, in the general categories of generators, processors and analysis modules, and almost limitless possibilities for combining them.

Among the analysis modules are the phase vocoder and sonogram, allowing sophisticated spectral synthesis and display. Now this program is a commercial product, and so has save facilities disabled. At the time of writing, it does not actually seem possible to buy the product, because the website (www.synoptic.com) declared as the source for any purchase is itself up for sale!

A similar approach to Virtual Waves is taken by **Audio Architect**. Again, modules can be connected together on a workspace, the sound compiled and auditioned. I found it more influenced by the pop industry in the given (repetitive) examples, which were rather over-influenced by the rhythmic note-sequencer module, and therefore less conducive to experimentation.

SMS-Tools originates in Spain, from the Music Technology Group of Xavier Serra and his associates at the Audiovisual Institute of the Pompeu Fabra University of Barcelona. SMS stands for 'spectral modelling synthesis', which essentially applies the analysis and re-synthesis model. The version on the CD-ROM is numbered 0.80, and since the program has evolved further since the first release, users are recommended to obtain the latest version from Barcelona at the SMS Homepage: <http://www.iaa.upf.es/~sms/>.

The commercial demonstrations from Native Instruments, **Reaktor** and **Spektral Delay**, are startlingly direct in their response to the user's mouse movements. These are very impressive programs commanding both intuitive control features and novel applications. A sufficient number of example applications are provided to assess the quality of the programs. Again, as is usual with commercial products, the save facilities are disabled.

The Seer Music **Reality** demonstration limits the user to five twenty-minute sessions, which is barely enough to convince the user that here is a software synthesizer utilising a number of powerful synthesis applications incorporating sampling, four-operator FM synthesis and other standard methods.

CrusherX-Live! is a shareware program – a 'multichannel vapour synthesizer' – which enables the user to load up to four samples (typically wave files) and create real-time performances of granulated versions with a variety of control parameters. I would recommend a look at this.

Wigout and **TrikTraks** are a pair of programs for creating waveforms to given specifications by the user, written by Arun Chandra at the University of Illinois. They employ a command-line interface, and require writing text files in an appropriate format. There is extensive documentation for both programs, and a somewhat didactic tone in the written manuals. These programs are useful for teaching the basics of waveform synthesis, but compared with some of the other offerings here, appear rather dated and limited.

Praat was written as a serious research tool for the investigation and synthesis of speech, though it may be employed also for general sound synthesis using the speech model. It provides facilities for displaying analysis data as well as writing sound files, but requires the user to write a text specification file which is then interpreted by the program. Praat is available for many different platforms.

The development of Eduardo Miranda's own program, **Chaosynth**, is intriguing in its use of cellular automata to

generate the patterns of granular synthesis. The emerging patterns may be viewed as they are created; usually the chaotic system settles down to regular patterns within a relatively short space of time. The user may intervene to create changes during the course of the performance. However, unlike CrusherX, the sounds from which the patterns are made are derived from oscillator waveforms and the results may pall rather quickly.

The powerful CDP (Composer's Desktop Project) system is given some representation not only in the form of the original command-line programs, but also in the very user-friendly graphic environment written by Robert Fraser called *Sound Shaper*, and is well designed and intuitive. (This is one of a pair of such 'front-ends' available from CDP for the system, the other being Trevor Wishart's *Sound Loom*.) The CDP programs excel in their wealth of spectral facilities through filtering, vocoding and morphing. It is a pity that, especially in this second edition of the book, the CDP coordinator's name is given wrongly – for 'Acher Hendirch' read 'Archer Endrich' (p. 217)!

In summary

Miranda's book, and the accompanying CD-ROM, represent excellent value for any composer, sound artist, designer or engineer who wishes to evaluate the field of sound synthesis on modern computers. Highly recommended.

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Petri Kuljuntausta, *On/Off – Eetteriäänistä Sähkömusiikkiin* (trans. 'On/Off – from ether sounds to electronic music'). Like & Kiasma, Helsinki, 2002. 793 pp. ISBN 951-578-934-6 (PBK). Available from <http://www.likekustannus.fi>

Petri Kuljuntausta has belonged for more than a decade to a new generation of composers in Finland interested in experimental and electronic music, music incorporating environmental and concrete elements, and work in musical multimedia. In addition to his work as a composer, he has been a catalytic figure in the promotion of these forms of music in his journalistic writing and work for Finnish national radio (YLE), and he was the driving force behind the founding of the experimental music and arts organisation Charm of Sound, which has proved to be an effective vehicle for the propagation and support of boundary-crossing musical projects in Finland. *On/Off* began its life as a radio series compiled and presented by Kuljuntausta and broadcast by YLE. His original intention was to publish a CD charting the genesis of electronic music in Finland and focusing specifically on the mid-1950s to 1960s. This remains the main stated aim of the project, although Kuljuntausta's CD liner notes eventually metamorphosed into a 793-page book that to some extent diverts attention from the CD packaged with it. Unfortunately for those without the requisite linguistic skills, the book is written entirely in Finnish, although some related material translated into English can be found online. The CD/book package is worth ordering for the CD alone, however, which

does much, even without the accompanying book, to supplement knowledge on early electronic music in Scandinavia. The author hopes to secure funding for the translation of some sections of the book into English in the near future.

Stylistically, as well as in terms of the musical territory covered, Kuljuntausta's book has much in common with David Toop's *Ocean of Sound: Aether Talk, Ambient Sound and Imaginary Worlds* (London: Serpent's Tail, 1995) and Mark Prendergast's *The Ambient Century: from Mahler to Trance – the Evolution of Sound in the Electronic Age* (London: Bloomsbury, 2000). Like these books, the sweep of the writing is broad and discursive indulgences are frequent. Those looking for an authoritative academic text in which non-sequiturs and speculative forays are avoided at all cost are likely to be disappointed. *On/Off* is more than simply an entertaining read, however, and it is certainly not written exclusively in journalese; the painstaking documentation and probing investigative work that infuses the main text of the book and its appendices are valuable resources to scholars interested in the genesis of electronic music in Finland and elsewhere. Indeed, the combination of academic, journalistic, and more writerly approaches seems particularly apposite in this and the other books mentioned given the irreverence of much of the music that is their subject matter towards conventional stylistic boundaries.

In *On/Off*, Kuljuntausta provides a kind of micro-history of the genesis of electronic music in Finland, acting frequently as a guide to, or curator of, the material (re)presented more than a historian seeking to encompass his subject matter within an overarching narrative design. In this respect, his work is in tune with recent historiographical work, particularly with Foucault's notion of 'archaeology', which allows unearthed material (the documents and recordings Kuljuntausta has gathered from YLE's radio archives, personal correspondence with composers and performers, and a wealth of journalistic and historical data) to speak for itself rather than have the historian impose on it his or her own explicit agenda. Ploughing through this mammoth opus in a short period of time, as I have done prior to writing this review, is probably not desirable or possible to most readers, but it is paradoxically the detailed nature of the material provided that makes some sections of the book so compelling. It is as if one can hear the voices of the protagonists as events unfold, sometime warts and all, rather hearing mere snippets of voices as they are relayed to the reader in the author's prose and then extrapolating what the actors must have thought or felt. In fairness, Kuljuntausta has stated that it was never his intention that the book be read cover-to-cover in a focused, linear way; rather that sections of interest be dipped into as the reader's curiosity dictates.

What distinguishes Kuljuntausta's book from other literature on the subject, aside from its language, is its focus on Finland as an unlikely meeting point for a wealth innovative and eccentric musical talent, which does not imply that *On/Off* is exclusively concerned with Finnish composers. The book begins with a roaming survey of electronic music, which starts not in the twentieth century as one might expect, but traces a genealogical line that extends back to the use of mechanical instruments in earlier historical periods and culminates in a thoughtful consideration of the impact of recent technologies pertaining to the production of

instruments and the recording and reproduction of musical sound. There is plenty of interest as well to readers interested in composers from outside Finland who visited the country during the period investigated as well as to the cross-fertilisation brought about by the involvement of key figures in the Finnish scene in international events. Several significant insights are offered in both of these regards. Composer Jouko Tolonen's (also Head of the Music Department of Finnish Radio) encounter with Edgar Varese in New York in the late 1940s is seen as a turning point of sorts, as is composer Martti Vuorenjuuri's 1955 visit to Darmstadt, which led to an extended sojourn in Finland by Stockhausen in 1958, during which his influential *Gesang der Jünlinge* was performed amidst much critical furore. To his credit, Kuljuntausta seldom settles for tidy historical and stylistic overviews concerning the genesis of electronic music. It is noteworthy, for example, that he challenges the view espoused in some circles according to which Pierre Schaeffer working in the late 1940s is seen as the sole progenitor of electronic composition, and points instead to the pioneering work done in Futurism in the teens and to a variety of significant 1920s and 1930s precursors. Kuljuntausta's ability to see the big picture as well as to revel in the minutiae of his archaeological discoveries sets this book apart refreshingly from much of the literature, too much of which has difficulty seeing beyond national boundary lines and broad stylistic categories. Other pivotal events brought to light include visits to Finland by Terry Riley and John Cage. Convincing evidence is provided that Riley took a significant step towards his seminal *In C* (1964) and *Keyboard Studies* (1964–) in performances and semi-improvisatory recordings in Finland and Sweden during this period. Riley's influence spread and undoubtedly infused a burgeoning experimental sensibility through his collaborative work with Finnish composers and participation in happenings, as was the case with Cage. Together with the influence of the Darmstadt school, these visits are shown to have had a significant impact on Finnish experimentalists such as Erkki Salmenhaara, Usko Merilainen and Otto Donner.

But Finnish composers did not slavishly follow the example of their foreign influences. A maverick tendency is identified within Finnish musical life that is willing to take influences from a broad range of sources – not only legitimate and respected ones – and to explore the possibilities of cross-artistic fertilisation without prejudice. The result is a musical terrain that invokes Paris or Darmstadt but which always has a distinctive local flavour and benefits greatly from an obsession with technology which adumbrates the current Nokia generation's interest in electronica in numerous examples of invention and adaptation.

Two figures emerge from the book as exemplifying this maverick approach: Martti Vuorenjuuri, who first brought avant-garde and electronic music to Finland and established contacts with the Darmstadt school, and Erkki Kurenniemi, who is responsible for designing a recording studio in which much of the Finnish electronic music has been composed and who concentrated from the early 1960s on the invention of digital instruments which he continued to develop during the 1970s. A significant early composition of the former of these men, included in re-mastered and re-edited form (work done by Kuljuntausta himself) on the CD accompanying the book, is the soundtrack to a radio adaptation of Aldous

Huxley's *Brave New World*, which was composed as early as 1958. This composition, whose duration is almost two hours, comprises text extracts from the book read without any overt vocal expression. These extracts comprise the concrete material for the composition, which involves the electronic manipulation of vocally produced source sounds. The musical end product belies its early date of composition, highlighting Vuorenjuuri as an early, if largely unacknowledged, representative of electronic and concrete composition whose impact on musical life in Finland in from the late 1950s is shown to have been significant.

Kuljuntausta's book takes its name from a little-known work by the composer Erkki Kurenniemi, who is identified as a key protagonist in the Finnish electronic scene. Kurenniemi can be thanked for establishing the first major studio dedicated to the production of electronic music at the University of Helsinki in 1961. Known for his collaborations with composers such as Otto Donner, Kari Hakala and Erkki Salmenhaara as well as numerous distinguished foreign visitors, from early in his career he combined his abilities as a technician with an enthusiasm for electronic music that resulted in a prolific compositional career. As a technician, his invention of the DIMI series of synthesizers is particularly impressive, most notably the optical DIMI-O synthesiser, which transforms video images of performers' hand movements or the movements of dancers into electronic music in real time. Kurenniemi is still active as a performer, inventor and theorist, and was invited to perform at the book launch of *On/Off* in Helsinki. The more eccentric side of Kurenniemi is manifested in his belief that our generation will be the last to 'die young'. In earnest, he has set about a 'life project' of recording his memories as they happen in digital form with the help of copious video and audio recordings. He hopes that this material might be used one day to restore the memory of a cloned or somehow 'regenerated' Kurenniemi. While the composer is aware that such behaviour might be regarded as eccentric, it does not seem to bother him unduly.

On the evidence of book reviews and sales in Finland to date, *On/Off* has struck a chord with young musicians, who recognise the music introduced in the book as a significant precursor of the current interest in various forms of electronic and concrete music. Clearly the material gathered by Kuljuntausta in his archaeological research resonates with the tastes of a new generation; following the publication of the book, CD recordings, television documentaries and written material pertaining to composers discussed in the book has begun to surface. Kurenniemi's project of resurrecting personal memories through strategic technological intervention may be speculative at best; Kuljuntausta's related although considerably more down-to-earth project of restoring collective memory in Finland concerning the early days of electronic music is, however, turning out to be an unmitigated success.

Details on the CD/book package *On/Off* can be found at <http://www.kiasma.fi/on-off/>; information on ordering at <http://www.likekustannus.fi>; and biographical information on Petri Kuljuntausta at <http://www.nic.fi/~petriear/>.

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Andrew Horner and Lydia Ayers, *Cooking with Csound part 1: Woodwind and Brass Recipes*. A-R Editions, Inc., 2002. ISBN 0-89579-507-8

CSound is, undoubtedly, a highly versatile synthesis and processing environment. However, its flexibility and scope have always come at a price: in order to achieve worthy results the novice must embrace a painful and steep learning curve. Until relatively recent times, this journey had to be undertaken almost barehanded, since the only guide available at the time consisted of a factual, technically oriented manual, which, in spite of being invaluable as a reference to the variety of statements on offer, provided little information regarding their effective application for the creation of interesting sonic results. Perhaps, apart from slow processing times, this is one of the main reasons that deterred potential users, even when CSound made the leap into the personal computer environment over fifteen years ago. The situation began to improve with the appearance of books such as *Virtual Sound: Sound Synthesis and Signal Processing – Theory and Practice with Csound*, by Ricardo Bianchini and Alessandro Ciprianni, which appeared originally in Italian in the mid-1990s, providing a gradual ‘hands on’ path to proficiency, friendly and digestible enough to encourage potential users to ‘take the plunge’. Also, *The Csound Book*, edited by Richard Boulanger, a comprehensive compendium of contributions by individual experts in the field, addresses the needs of users at a variety of levels, from beginners to advanced. The combination of these welcome contributions and greater computer power allowing for fast synthesis times and real-time operation, have greatly increased the popularity of CSound. However, the sheer bulk of possibilities afforded by the latter enables a pluralistic range of aesthetic and technical approaches, making the task of producing an all-encompassing and definitive text highly unrealistic. Therefore, publications which focus on specific approaches, fulfilling the needs of particular communities of users are important and highly valuable: *Cooking with CSound – Part 1* falls precisely within this category, specifically intended for those interested in creating convincing synthesised versions of existing acoustic instruments.

Cooking with CSound – Part 1 is a highly organised book, which takes the reader gradually towards the implementation of woodwind and brass instruments using a single paradigm for a generic wind instrument. Its chapters are well written, containing enough information to understand the inner workings of the instruments presented but concise enough not to divert the user from the main purpose, which is to achieve a flexible and realistic instrumental palette. In addition to an extensive bibliography and terminology index, it includes a glossary, an instrument design index and an insert index. The orchestras and scores presented are fully functional and appear in the accompanying CD-ROM, which also contains the audio files (WAVE format) produced by the former, including a variety of examples from the instrumental repertoire. In addition, the CD-ROM also features a number of files containing Csound code, which may be inserted into simpler orchestras. The references to all files in the CD-ROM are clear, including indications of how to modify these: for instance, which code must be deleted or pasted in.

After an introductory chapter, the reader is briefly initiated in the use of Csound and presented with the naming conventions used for different types of files. This is followed by the description of the generic wind instrument paradigm (chapter 3). The fourth and fifth chapters are respectively devoted to the actual implementation of woodwind and brass instruments. The following chapters add extra value to the implementation of the instrumental palette and fall within three main areas: effects, tuning and more advanced techniques referred to as ‘seasoning touches’. Chapters 6 and 7 provide the implementation of a range of effects, such as chorus, flanging, ring modulation, etc., both as global ‘black boxes’ which affect a whole orchestra, or as effects applied to individual notes of particular instruments. The effects are explained in reasonable detail without becoming too technical. Chapter 8 discusses techniques for pitch representation and how these are used in order to create a variety of tunings. Various tuning possibilities are exemplified through *Paté*, a short work written by Ayers. The last chapter describes a number of refinements, which may be added to instrument designs; most notably, various types of articulation (legato, staccato, trills, etc.), variation of dynamic range and glissando. This chapter also includes the implementation of a virtual audio file mixer. Function tables are used effectively in slurs, legato and ornaments. This brings us to one aspect that could have been improved in the realisation of panning, glissando and evolving dynamics: these are implemented by means of a number of limited breakpoint values (maximum three pairs), resulting in longer and more cumbersome instrument statements in the score. A more versatile alternative could have consisted of the implementation of control signals driven by function tables, with the advantage of shorter instrument statements and virtually no restriction in the number of breakpoints. This technique could also be applied, for instance, to filters with changing bandwidth and centre frequency.

As mentioned above, a great deal of care has been invested in the organisation, content and layout of *Cooking with CSound – Part 1*. Also, the orchestras and scores provided in the CD-ROM are straightforward to compile and do not present any complications: I used The Csound Window Driver, by A. Norman and J. P. Ffitch, a public domain windows version of Csound (the website <http://www.csounds.com/> contains links to a variety of sites where public domain versions of Csound may be downloaded). Nevertheless, the ultimate value of a cookbook is measured according to the resulting culinary delights created when following its recipes; in this case, the aural results. I listened to these using the output of a Tascam DA-30 DAT digital to analogue converter, which was fed into a pair of HHB Circle 5 speakers driven by a Samson amplifier.

In general, the realism of the aural results varies from instrument to instrument, from the excellent French horn and tuba to a much less convincing oboe. Also, there are a few general issues which affect realism, most notably, the implementation of vibrato, which sounds artificial when applied to long notes, as well as abrupt changes in register occurring in certain instruments, such as the clarinet and trumpet. It is also worth pointing out that in general, examples in which the virtual instruments perform known repertoire (e.g. excerpts of Stravinsky’s *Rite of Spring*) may suggest a tighter association with their real counterpart than

when these same instruments perform a 'neutral' chromatic scale. This may be due to what Smalley (1984) has called the *cumulative level* of timbre, which includes our previous experience of similar sources articulating the same music.

Regarding specific instances of the implemented instruments: the piccolo, flute and bassoon are very successful. The oboe sounds rather artificial. The English horn (cor anglais) works well except for the high register. The clarinet is convincing in the low and high register but is less successful in the middle register. The bass clarinet is realistic but the audio example provided contains some undesirable clicks. The contrabassoon is reasonable and the saxophone has sudden timbral changes when crossing registers, with additional problems in the low register. Aside from the problem of vibrato on long notes, the woodwind example including the opening to Stravinsky's *Rite of Spring* (cited on pp. 44–5) is impressive.

As mentioned above, the brass instruments include excellent implementations of the French horn and tuba (the stopped horn is successful in the middle register). The trumpet is good in the high register (e.g. example of Bach's second Brandenburg Concerto cited in page 49) but more dubious in the middle register (listen, for instance to *Paté*, cited in page 67). The trombones are less successful, sounding too metallic and bodiless. Also on offer are examples of the application of a variety of mutes. *Brassoufflé*, a brass Chorale by Ayers is an appealing piece in itself. Some of the sections are 'brassy'; others are simply interesting for their sonic content. Obviously, effects such as flanging produce sonic results which are different from the original instruments, but these are effective from the musical point of view and worth including as examples of timbral extension beyond the scope of real instruments. In general, the examples of multi-effects are clean and their combination is successful.

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Roger Dean, *Hyperimprovisation: Computer-Interactive Sound Improvisation*. Computer Music and Digital Audio Series, Vol. 19. A-R Editions, Inc., Middleton, WI, 2003. xxvi+ 206 pp. ISBN 0-89579-508-6 \$49.95. With CD-ROM

This book can be welcomed as an overview of computer improvisation at the end of the twentieth century, but is not the authoritative text that might be hoped. As well as a certain sparseness of material, one's perception of which is not helped by the over-generous margins (8 cm out of 19 cm per page), critically, it does not cover the last three years due to the timescale of publishing. Dean admits this on p. 135: 'the time of writing the bulk of this book (mid-2000)'. The only 2001 reference is to one of Dean's own CD releases.

This means that, unfortunately, important references (Rowe 2001) and contemporary trends (laptop music as a popular phenomenon, the very research into algorithmic drum and bass that Dean claims is missing on pp. 70–7) are left out.

There are certainly redeeming features in the book, and some rewarding encounters for the reader with the work of The Hub, George Lewis, Christopher Yavelow and Paul Hodgson, to mention but four of a host of characters. The described work is mainly academic or arts based, with some references to commercial software. Band in a Box, Abelton Live and Reaktor all escape mention, but SuperCollider, PD and Csound manage to get a look in, though the bulk of the analysis and enthusiasm is directed towards MAX/MSP. Again, with the book's slightly backwards position, we miss any reference to the new SC Server, designed from the outset for network music. Dean also avoids the technical insights that Rowe provides, approaching more from an arts theory perspective. He does take up a few subjects, like emergent behaviour, but without any technical exposition. For non-standard interfaces and interactive systems, I'd still consider Roads' great tome (Roads 1996, chapters 14 and 15) a better starting point, particularly considering its many photos of instruments and systems in the flesh that Dean's book lacks.

I would like to say that the writing is attractive – I'm afraid that one of my chief grudges against the book is the stiffness of the prose and a certain lack of cohesion of argument. Unfortunately, I found myself enjoying many of the quotes (Perkis on p. 93 makes exactly the sort of exciting observations that energise the reader) rather more than some of Dean's own arts theoretic waffle: 'relating to the version of analysis of the postmodern that emphasises its defiance of meta-narrative' (p. 179). As for form, not only could one permute the chapters, one could permute entries within the chapters without destroying whatever argument is intended. It shows up the book to be mostly a list, without any really new directions or profound arguments to add but for the summarising of a curator, touching on some trendy aspects like emergent behaviour. The book is strongest as a review: there are extensive quotes, and no-one could claim Dean has not invited the contributions of practitioners – Appendix Two details his questionnaire sent out to many computer improvisers. On page 179, Jeff Pressing outlines a position antithetical to Dean's own, a healthy diversity of opinion showing the broadness of approaches to electronic improvisation covered.

The accompanying CD-Rom is a small-scale affair, and is not used to its potential. Dean's bias towards MAX/MSP is evident, and unfortunate for PC users (though hopefully the ways of publishing will mean the PC MAX/MSP is out by the time you read this). I had a lot of trouble with the data, trying it both on Mac and PC, having to download the latest version of the Quicktime Player, finding misnamed, wrongly filed and missing MAX/MSP files, discovering the Virtual Bird movie lacking video and with the audio data spread between long silent passages. It's almost as if the CD-Rom has not been tested on anything but Roger Dean's own machine. Some movies and web projects enclosed are worth a look, like Rod Berry's *Listening Sky*, and some are weaker conceptions. The actual MAX/MSP patches included are rarely interesting, mostly very basic transformations and algorithmic composers of the type that get generative music labelled as random MIDI triggering. Where they do become

exciting, as in the fast swapping flange, reverb, phasing and filtering of Eric Lyon's Twittering Drum Machine, the DSP functions are hidden from access. The Rowe book must remain a preferred source for didactic and inspirational purposes.

The three audio tracks seem over long for what is demonstrated, and I would have preferred to see a greater collection of work from the many artists mentioned in the text. The Dr.MetaGroove work is particularly risible, sounding random and without grounding in true drum and bass or contemporary electronica: but then, Dean muddles the definition of break and breakbeat on p. 71 (implying them to be the same thing!), so dance music isn't his forte. The second track involves constant high-frequency distortion and is very uncomfortable listening, having few ideas over a long time span – quite like Merzbow, really, not that Masami Akita gets a mention in the book. To be fair, the third track (from Curtis Bahn) is far more interesting as a demonstration of interactive improvisation, with some very creative exploration.

In conclusion, the book is well meant, and does contain interesting passages, and at least provides a repository of much work in computer improvisation pre-2001. Reading it felt like dissecting a long review paper, which proved at the conclusion to be not exhaustive in its own right. I'd recommend this book if you are an artist wanting details on the history of computer improvisation, or to find the work of other practitioners that you might be overlooking, but not if you primarily desire technical implementation details for computer improvisation systems.

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Roger Dean, *Hyperimprovisation: Computer-Interactive Sound Improvisation*, softcover and CD-ROM. A-R Editions, Middleton, WI, USA, 2003. 156 pp., appendices, references, index. ISBN 0-89579-508-6

Hyperimprovisation is, argues Roger Dean, a new category of performance practice, one that has emerged from a few decades of improvisational performance with computers and involves real-time alteration of active algorithms. Dean's recent book, *Hyperimprovisation: Computer-Interactive Sound Improvisation*, outlines this emerging area of musical practice against a wide-ranging coverage of computer-assisted performance issues and history.

Dean is a composer, performer, researcher, academic and founder of the intermedia ensemble *austraLYSIS*. He is well qualified to write in the area of computer-assisted improvisation and has published two previous books on musical improvisation and co-authored a third.

Research for the book included a questionnaire of forty-six musicians active in the field. This data has clearly informed the details of the book and references to the work

of the respondents are regularly made. This process has helped increase the breadth and validity of the claims made, while the diversity of examples and quotes enriches and makes concrete the issues and practices discussed. In attempting to accommodate the diversity of activities amongst improvising computer musicians, the book at times lacks some crispness in making its points, and, as a result, clear statements of opinion are sometimes obfuscated by qualifications, exceptions and a keen awareness of the provisional nature of trends in digital media.

The book consists of eleven chapters divided into six sections. The first two sections provide an overview of the cultural and technical context from which hyperimprovisation emerged. Sections three to five describe the practice and technologies of hyperimprovisation, including case studies across a range of styles and approaches. The book concludes with Dean, in section six, outlining his views of the future directions of hyperimprovisation techniques and practice. There are appendices containing the interview responses and a table of CD-ROM contents. The book has a good reference list and complete index.

Dean begins by situating the computer in a social context, describing society's historical reluctance to understand that the computer, a tool used for utilitarian tasks in the office, might also be an expressive musical instrument. He points to the continued male dominance in computer music activities as evidence that the computer still has a 'geek' aura. Increasingly, the computer is being used as a social tool (e-mail and Internet, for example) and Dean sees this as positively reflecting on its communicative potential as part of an improvisational ensemble. However, he maintains that 'computer interaction must be distinguished from improvisation' (p. 6) and cites the generative capacity of the computer as enabling a shift from usage to partnership in music-making.

Following this exploration of the social and personal context, Dean outlines the historical practices and technical heritage of hyperimprovisation. Citing works and performances from the 1960s, Dean provides a good overview of the history of real-time electronic/computer music performances, compositional practices, and instruments. The logic of selecting examples for this section appears somewhat expedient rather than systematic. The coverage is generally quite extensive, but some significant figures are omitted. For example, not mentioned here are John Bile's *GenJam* jazz improvisation system, David Shea's sample-based performances, Gerrard Errante's interactive clarinet and computer performances, Stuart Favilla's *Light Harp* performances and contemporary electronic improvisers such as Scanner. Many of these people are mentioned later in the book, so it appears that their contributions were simply considered more appropriate under other headings; however, other performers are mentioned several times throughout the book.

Dean outlines the use of interactive computer and synthesizer controller interfaces. These include purely electronic devices, both standard (mouse, keyboard) and specialised. Controllers for improvisation also include acoustic/electric hybrids or Hyperinstruments, which use 'sensors ... to detect aspects of the playing process ... in addition to, or instead of the normal acoustic sound of the instrument' (pp. 31–2). Differences between the use of audio signal or symbolic data in communicating with the computer are

highlighted as having 'radically different implications and possibilities' (p. 36) for the hyperimproviser.

At the heart of Dean's definition of hyperimprovisation is the algorithmic processing of music, a topic dealt with directly in chapter five. The ability to improvise by adjusting algorithmic parameters, he claims, 'is one of the most fascinating possibilities of computer-interactive improvisation' (p. xxiii). Algorithmic processing is described in three stages; analysis, manipulation and generation. These are akin to Robert Rowe's categorisation of machine listening and machine composing, but procedures are not covered in as much detail as Rowe's books (Rowe 1993, 2001). Dean provides examples of algorithmic processes used in his own work, complete with Max patch examples, and references to other relevant examples and tools.

The Max/MSP environment is the main software for Dean's own practice, and this environment is outlined in chapter six, along with a brief overview of some compositional techniques in that environment. Also covered are references to other prominent software systems used for computer-assisted improvisation, with comments about their strengths and weaknesses for hyperimprovisation, including the quality of pitch and rhythm tracking of audio sources, and the sophistication of various generative approaches.

The distinction between solo and networked improvisational systems are discussed in chapter seven. Solo systems are defined as those with one computer and performer (if the computer is a true partner perhaps these should be duets) while 'networked' improvisational systems (after Bischoff, Gold and Horton 1985) are defined as systems where computers communicate with each other as well as with human participants. It is noted that, at times, the computer networking simply facilitates human-human communication, while at other times it can involve human-computer collaboration. Dean describes how these networked arrangements can relate to ideas of 'meta-composition' (p. 84) and two meta-compositional architectures are described. One in which a 'primary composition is subjected to one or more secondary compositional modifications' and another where 'an algorithm permits access to several separate compositional modules' (p. 84). He goes on to provide examples, some in detail, others in brief, of networked hyperimprovisational systems.

The use of mixed media in 'music' performances is a long-standing interest of Dean's. He describes how this has increased with the ability of the one instrument, the computer, to deal with multiple media in digital form. Interoperability of media through digital translation is argued to be a great opportunity for algorithmic improvisation because 'the power of the semiotic undercutting between sound and image is remarkably strong' (p. 111). Issues and examples of mixing sound with text and image in improvised performance are discussed in chapter eight. The discussion is quite brief, in keeping with the focus of the book on improvised music and in light of Dean's exploration of these issues in previous publications.

Chapters nine and ten provide descriptions of a number of interactive works. While the works and discussion are interesting and relevant, the reason for their inclusion at this point in the book is unclear, beyond further reinforcement of issues already discussed. They may have more appropriately been utilised as additional exemplars in early sections.

The insights in chapter eleven about the future of computer-assisted improvisation may have been informed by Dean's background as a biochemist, but they are also consistent with predictions by other commentators. He predicts that generative systems will rely more heavily on emergent processes such as evolutionary algorithms, rather than using knowledge-based or stochastic methods. Acknowledging that computer systems are now capable of reasonable real-time signal processing, Dean notes that current perceived limits of network bandwidth and processing bottlenecks will vanish over the next few years. This should allow greater use of real-time audio feature detection, making computers more attentive and responsive as improvisational partners. He indicates that there has been an increase in the number of generative systems in recent years and backs and provides some examples and a list of recent US patents in the area.

The CD-ROM that accompanies the book contains three audio tracks of interactive software performances, two audio data files of interactive pieces, a collection of interactive Max/MSP patches, and three web-based interactive works by Dean and various collaborators.

This book brings together a vast array of material relating to computer-based improvisation. It makes a convincing case that improvisation with generative functions is emerging as a new area of musical performance. Dean's coining of new terms, amongst them hyperimprovisation, computer-interactive, and comp improvisation (a hybrid of composing and improvisation), may grate on some ears but as new forms of activity are identified, an argument for new terms has a certain validity.

This work is firmly grounded in practical experience, and makes extensive use of practical examples to support the claims made. In fact, at times the amount of support data may be excessive, resulting in a somewhat awkward narrative flow in parts. In these sections the reader can be left with a sense that example data were included wherever a place could be found, rather than being purposefully selected. However, the richness of data makes it clear that Dean has a thorough knowledge and first-hand experience with his own and others' activities in the field and provides many opportunities for readers to follow up practices in areas that interest them.

The historical coverage of the field is outstanding but, at times, some viewpoints lack up-to-date referents. For example, discussion of synthesis methods seems to stop after the introduction of frequency modulation, the latest books by two of the most-cited authors are not included (Rowe 2001 and Cope 2001), and the discussion of real-time video processing does not mention the *Jitter* extension to the often cited Max/MSP software. These are not serious oversights and, in a field as fast moving as digital media, difficult to avoid.

Dean's insights into the importance of generative digital systems in improvised musical performances are far reaching and this book brings together the threads that have informed this emerging practice and provides some clear pointers to its future.

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