noted as close enough to be placed under the subheading "At GS or GS2" (p. 236), with the majority of these many songs included under the subheading "Too far [from GS]." Arriving at the paragraph concerning the symphonies, Mr. Madden criticizes another author—Michael Richard Adkins—in reference to the *Symphony No. 3* by Mendelssohn: "our results were far from his." He proceeds to chart his own figures and concludes with "Not GS." In all fairness, Mr. Madden finally finds GS (or very near it) in two movements of the *Symphony No. 3* and the same in the *Symphony No. 4.* However, he repeatedly classifies all other movements as "Not GS."

Nevertheless, the author provides a résumé of all Mendelssohn symphonies on Table 6.7, apparently with a fewer number of movements found to be GS. It is obvious that the greater number of movements in that classification are "Too far from GS." Mr. Madden asserts that based on the above tables "it seems that Mendelssohn must have known about phi." Hmm . . . not convincing at all.

Furthermore, it is baffling how anyone can dismiss Frédéric Chopin's *Prelude No. 4,* in E minor, in one short sentence, saying "[Michael Richard Rogers] said that the dramatic peak of Pr. #4 occurred at measure 16 of 25. This is correct, for the leap from a#1 to g2 is after beat 62, which is GS. He also correctly stated that the piece was *structurally* not phi, as shown in fig. 6.4."

Mr. Madden misses the opportunity of "re-enforcing" the notion that Chopin may have actually effectively used GS by adding that, (1) this prelude can be "perceived" as being slightly longer: there is the anacrusis on bar zero that should be accounted for, then fermatas on bars 23 and 25; and (2) there is the possibility that GS is actually an "area" and not just a "point"—this GS zone then, could be defined as comprising bars 16 and 17. An analytical mind should consider it important that Chopin had intentionally put into this GS zone (1) the only grupetto and stretto indications of the whole piece; (2) the loudest and only *forte* dynamic indication (bar 17); (3) the highest and lowest sounds in the piece (excepting the Coda); (4) the first octave duplication on the left hand; (5) the first—exceptional and brief—use of four-note chords (making a total of five notes heard simultaneously once the melodic note is included); and I must stop here.

When I listen to this prelude, I sense that the composer has brought all attention to the high drama of this moment (at the GS zone), a dramatic departure from the calm and tender beginning, before returning to a possible reprise with a surprising ending.

Another composer that deserves further research in connection to the topic of this publication is Anton Webern. Feeble references to two of his works appear in this book, and these are less than enlightening. Charts listing possible usage by Webern are contradictory and confusing. On my own I have found Webern's Piano Variations rather intriguing: the first and third movements respond to GS analysis beautifully; the middle one, sadly, is too symmetrical to be part of that family.

The series of questions put forward in the book's Preface, on pages xi and xii, are excellent. Unfortunately, this book has failed to answer those questions, a big disappointment for the reader.

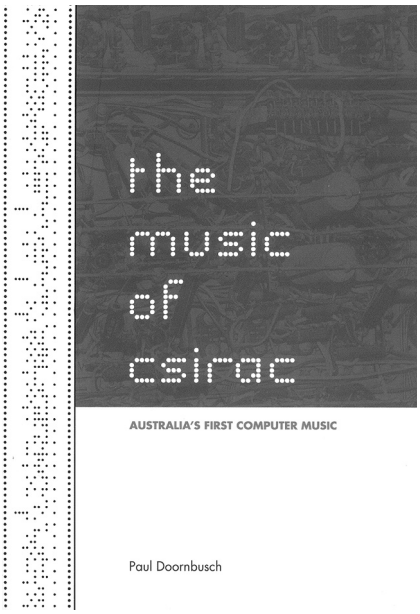
The final section, Conclusions, is too brief and poorly argued. This part of the book should have had many more conclusions and should have been enriched with musical examples, comparisons, suggestions, even denials.

Paul Doornbusch: The Music of CSIRAC: Australia's First Computer Music

Softcover, 2005, ISBN 186335569-3, 101 pages, illustrated, sources, index, AU$ 25; CD-ROM with sound and video examples; Common Ground Publishing, P.O. Box 463, Seaholme, Victoria 3018, Australia; telephone (+61) 3-9398-8000; fax (+61) 3-9398-8088; electronic mail gus@commonground.com.au; Web thehumanities.cgpublisher.com/product/pub.61/prod.10.

Reviewed by James Harley
Guelph, Ontario, Canada

Readers of *Computer Music Journal* will likely be aware of Paul Doornbusch's work on early computer music in Australia (see his Spring 2004 article, "Computer Sound Synthesis in 1951: The Music of CSIRAC," 28(1): 10–25). For many, it was a revelation to realize that music was being produced "down under" as early as 1951, several years before Max Mathews and his colleagues were producing digital sounds at Bell Labs in New Jersey (but at just about the same time that the Ferranti Mark I computer in the UK was also producing simple musical examples). *The Music of CSIRAC: Australia's First Computer Music* presents a fuller account of Mr. Doornbusch's research into the music-making capabilities of the CSIRAC computer in Sydney and Melbourne and his efforts to reconstruct the sounds that had been produced there more than 50 years ago. Although a few of the recorded sound examples were included on the *CMJ* DVD Vol. 28, this publication comes



with a CD-ROM containing a larger collection of the music produced on the CSIRAC.

As Paul Berg points out in his introduction to the book, "the path that led to [computer music] is the result of many very small steps. Steps that were neither coordinated nor goal-oriented. Steps that were not labeled merely scientific, consumer-oriented, or artistic" (p. ix). At Bell Labs they were researching the transmission of speech signals for telecommunications systems; Lejaren Hiller was a researcher in chemistry with access to the ILLIAC computer at the University of Illinois, Urbana-Champaign; Iannis Xenakis was trained as a civil engineer. There was no research agenda for developing the field of computer music, and little direct communication between the people carrying out pioneering work in different places (between Illinois and New Jersey, let alone between Australia and the USA). In Australia, the innovative work on creating programs to produce music was done by mathematicians, physicists, and engineers.

The Council for Scientific and Industrial Research (CSIR) developed one of the world's first stored-program electronic digital computers. The CSIR Mk1 ran its first program in November 1949. In 1955, the computer was moved to the University of Melbourne, renamed the CSIRAC, and held in service until 1964. The computer has been preserved relatively intact (although not operational) at the Museum Victoria, where Mr. Doornbusch was able to access it (along with much related materials, such as program tapes, documentation, etc.) in order to reconstruct the historical procedures and technology developed by the early Australian researchers for producing sound. One of his aims was to reproduce the instructions for the music programs through the same process as would have been carried out originally, output through the same loudspeaker driver that was installed as part of the computer. This work involved much effort trying to decode the sometimes ad hoc instructions, and trying to understand how the programs were run and how the sounds were created.

The CSIRAC did not contain a digital-to-analog converter; such technology was nonexistent when the computer was built in 1948–1949. Instead, program instructions could be routed to the loudspeaker on the data bus as a series of pulses, channeled through an amplifier. Initially, the loudspeaker was intended to provide an audible signal that the computer was functioning correctly (or incorrectly). But, it quickly became apparent that by sending multiple pulse instructions or by looping them a continuous tone could be produced. From there, the engineers worked to develop methods for generating different frequencies, and by extension, melodies. The computer was never able to produce more than one pitch at a time, and the waveform was fixed, as a by-product of the pulse-signal process. But, durations, frequencies, and overall amplitudes were controllable.

Mr. Doornbusch's dedication to this project and the thoroughness with which he pursued the explication of this historic computer music technology, along with his determination to reproduce the sounds of the CSIRAC, are admirable. The history of computer music is one to be constructed from a great variety of sources, and this hitherto little-known Australian contribution from the very early days represents a valuable addition to our knowledge of the field.

A few words about the book itself. The main part of the text is organized in 11 short sections. We are given an introduction to the CSIRAC and to the computer (and music) technology current at that time, including discussion of the Ferranti Mark I computer in Manchester, which apparently produced musical tones in a similar fashion. We then learn about the "hooter" speaker and how it could be driven by pulse signals. Mr. Doornbusch documents the evidence surrounding the chronology of music produced on the CSIRAC over the period of its operation, and includes many references to interviews with a number of the principle people involved. He goes on to describe the process of reconstructing the music (none of it had been recorded to any audio storage format). Some of the tapes of the computer programs used to produce music do still exist, so a tape reader was fashioned in order to capture the data, and logic circuitry was built to recreate the pulse signals that were sent to the hooter. A valve amplifier and original speaker driver were used to create the actual sounds.

All of this is illustrated with numerous photographs of the technology, both original and as re-constructed. From there, the author devotes considerable attention to analysis of the sounds, and explication of the limitations of the particular technology that created problems for achieving consistent tuning and tone quality (relating to the serial architecture and cycle speed of the computer). The appendices provide examples of newspaper reports on the CSIRAC, further details of the pulse curves and circuitry used to produce them, and a listing of the contents on the CD-ROM (in addition to recorded examples, there is a slideshow of photographs, diagrams, etc., and a video of an interview with one of the main CSIRAC programmers). The Sources section includes a bibliography (print resources as well as relevant Web sites) as well as details of all the interviews conducted by the author for his research.

The Music of CSIRAC presents good solid work on an aspect of computer music history that deserves to be better known. Paul Doornbusch is to be lauded for his dedication to this project. His book is an important, crucial addition to the body of references documenting our field.

Recordings

Paul Doornbusch: Corrosion: Music for Instruments, Computers and Electronics

Compact disc, EMF CD 043, 2002; available from CDeMUSIC/Electronic Music Foundation, 116 North Lake Avenue, Albany, New York 12206, USA; telephone (+1) 888-749-9998 or (+1) 518-434-4110; fax (+1) 518-434-0308; electronic mail cde@emf.org; Web www.cdemusic.org/.

Reviewed by Richard Barrett
Berlin, Germany

Paul Doornbusch, born in Melbourne, Australia, in 1959, produced the pieces on this CD in The Netherlands, where he was resident during the 1990s and where he had the opportunity to engage in extended and fruitful collaborations with all of the gifted musicians featured there. The five works of this collection are representative of Mr. Doornbusch's output in combining acoustic instrumental parts of challenging intricacy with either live electronic processing or prerecorded materials.

Continuity 3 (2002) for percussion and computer uses transformations both of performing technique and of the sound itself to explore relationships between continuous and discontinuous textures and structures. The use of only three metallic soundsources does indeed create a sense of continuity and coherence, whose converse is to be found in the constantly changing electronic refractions to which the sounds are subjected. The overall effect is of an extension of the idea of resonance, so that as the metallic bodies are struck and resonate, they in turn serve to "excite" the virtual resonating body in the computer, one which is no longer tied to rigid physical objects and natural decays. Both in its adherence to a carefully selected vocabulary of sounds produced by bodies in motion and in its sense of dramatic timing, *Continuity 3* seems to continue the *musique concrète* tradition exemplified most memorably in the work of composers like Pierre Henry, Bernard Parmegiani, and François Bayle. The fact that it is performed in real time by a percussionist and a computer running Max/MSP is a measure of how profoundly the practice of electronic music has changed as a result of the accelerating development of digital technology. At the same time, the lessons it draws from *musique concrète,* a music composed with magnetic tape and razor blades, is witness to the fact that the best of that music was in no way restricted by what we can now view as rudimentary and fearsomely time-consuming methods, but has, and will no doubt continue to have, many subtle and sophisticated things to tell us about the art of sound-composition. The percussionist Timothy Phillips plays with and against the distorted images of his own sounds as if engaged in the almost subliminal interactions of chamber music.

Unfortunately, the Malle Symen recorder quartet has now disbanded. This Amsterdam-based ensemble was unique in its commitment to expanding the musical and technical potential of the recorder, including explorations of microtonality, theatrical modes of presentation, combining recorders with electronics, and commissioning new works from a wide variety of composers. Mr. Doornbusch's *Continuity 2* (1999) shows them at their most virtuosic, containing as it does virtually no "traditional" means of sound-

production, instead disengaging from one another the various physical components of playing and using a multilayered system of notation to encode the resulting complex textures. These notational devices are derived, as the composer acknowledges, from the recorder notation developed by Luciano Berio for his solo piece *Gesti.* This "discontinuity" between the actions of lungs, embouchure, and fingers is complemented by a "continuity" between the instruments, in so far as the individual players (who all play bass recorders) are very rarely perceptible as such, fusing instead into a single "sound-object" which sounds as if actuated by four mouths. This "instrument" is confronted by an electronic part that combines sampled and processed concrete sounds (principally but not exclusively bass recorder sounds) with synthetic materials generated by an implementation of Iannis Xenakis's dynamic stochastic synthesis technique. The combination of the recorder ensemble's dense twitterings and keenings with this often even denser "wall of sound" is for this listener the least successful aspect of *Continuity 2,* which sounds sometimes as if two self-sufficient pieces are running simultaneously and canceling rather than complementing one another's musical impact. (The electronic part does in fact have a separate existence as *Continuity 1.*) This is not, however, to detract from Mr. Doornbusch's achievement in eliciting a raw kind of musical energy from these seemingly innocuous instruments, to parallel Xenakis's definitive denial of the harpsichord's baroque quaintness in *Khoai* and *Naama.*

The theatrical component of *Act 5* (1998) for bassoon and electronics always threatens to overshadow everything else in the audience's perception: three large objects (a cluster of pots and pans, a xylophone and a kettledrum), hanging precariously over a large darkened stage, are released in turn by the soloist to fall noisily to the floor. The performer therefore has not only to execute an increasingly "athletic" bassoon part but also repeatedly to sprint back and forth to where these objects are suspended. The palpably heroic efforts of Hamish McKeich, not only a talented and imaginative bassoonist but also New Zealand's leading conductor of contemporary music, cannot altogether dispel the idea that the music appears sometimes to be there more to fill out the overall musical process of the composition (whose pitch range, beginning in a restricted low register, gradually opens outwards and upwards) than to breathe life into that process. After a striking start, a little too much time is spent meandering around modal pitch-collections which themselves seem dangerously close to being arbitrary. The music wears its algorithms on its sleeve, so to speak, in distinction to the other works on the disc which embody a much more distinctive sense of imaginative freedom. This may seem an odd thing to say about a piece which involves dropping heavy items onto the stage from a height of several meters, but of course the comparative neutrality of much of the bassoon's material is not necessarily a miscalculation or a disadvantage when placed in the context of a staged performance.

The electronic composition *g4* (1997) was composed exclusively using dynamic stochastic synthesis, and its form also is reminiscent of the abrupt, unpredictable, and aggressive beginnings and endings of layers of sound materials in Xenakis's *Gendy3.* There, however, the resemblance ends, although there are obvious family resemblances between some of the sounds in that piece and those heard in *g4.* In comparison with Xenakis's use of these techniques, the layers in *g4* are less static and more complex in themselves, and are also assembled into denser conglomerate textures. The result is a remarkably individual and absorbing composition, which forms a worthy tribute to the work of Xenakis while simultaneously striking out in a direction of its own, giving the impression that there is indeed a future in developing and personalizing this method of synthesis, even though it is hardly as "general" as its name would imply.

The final work on the disc, *Strepidus Somnus* (1996), for vocal quartet and electronic sounds, is, at 27 minutes, considerably longer than any of the others. The four vocalists perform with earpieces, upon which each hears and reproduces a track of precomposed vocal material, ranging from coital gasps to whispering in an algorithmically fractured English, reminiscent (as such things always are) of the teasing impenetrability of James Joyce's *Finnegans Wake.* This kind of "audible score" has been used by several composers previously, notably in the stage works of Robert Ashley, but seldom with such chaotic abandon as in Mr. Doornbusch's piece. Indeed, the composer's intention here is to give the impression of parallel streams of quasi-improvisatory consciousness, whose occasional synchronized or coordinated moments engender a floridly surrealistic sense of dislocation. The use of shortwave-radio-derived electronic sounds, together with vocal acrobatics which occasionally congeal into operatic parody or "realistic" weeping or laughing, is often reminiscent of Michael Vetter's *tour de force* recording of Karlheinz Stockhausen's *Spiral,* and the combinations of vocal hysteria with "pure" electronic sounds bring us close to

some of Luigi Nono's works for similar resources such as *Contrappunto dialettico alla mente.* Here, however, the emphasis is neither on absorbing, incorporating, and transcending the detritus of global communication as in Stockhausen, nor on using radical musical means to articulate radical socialist politics as in Nono, but on the creation of a nightmarish sonic landscape whose inhabitants leer and convulse like Bosch's demons. *Strepidus Somnus* forms a disturbing conclusion to a program which is never less than thought-provoking, and which deserves to bring Mr. Doornbusch's work to the attention of a wider audience. There are not so many composers at work, even in the 21st century, even after the example of Xenakis, whose commitment to the technical possibilities afforded by contemporary technology is so closely matched by a compulsion to exploit to the full the expressive potential unleashed thereby.

Nicholas Collins, Curator: A Call for Silence

Compact disc, 2004; Sonic Arts Network, The Jerwood Space, 171 Union Street, London SE1 0LN, UK; telephone (+44) 20-7928-7337; fax (+44) 20-7928-7338; electronic mail david@sonicartsnetwork.org; Web www.sonicartsnetwork.org/.

Reviewed by James Bohn
New Bedford, Massachusetts, USA

A Call for Silence (released in February of 2004 by the Sonic Arts Network), curated by Nicholas Collins (Chair of the Department of Sound at the Art Institute of Chicago) is a collection containing 34 tracks that range from conceptual pieces to sound documents (unmanipulated sounds meant to document a time and location), to performance-based compositions, to tape-based compositions. As one might expect, much of the inspiration for the collection is John Cage's infamous work, *4′33″* (1952). The project also includes extensive notes, including no less than three essays.

The introductory essay by Mr. Collins speaks to the ever-increasing preciousness of silence. It also speaks to current interest in lo-fidelity music production techniques, which may be seen as somewhat of a backlash to the quasi-fetishistic nature of the world of hi-fidelity. On a more humorous level, Mr. Collins relates the project to an old lecher's quip: "a drink before and a cigarette after are the three best things in life." Several of the works in this collection focus on the drink and the cigarette, editing out what had been the central material.

Daniel Levitin's essay, "The Rose Mary Woods/Nixon Tapes," is compelling in that he makes the case for the eighteen-and-a-half-minute gap in a reel-to-reel tape recorded in the White House during the Nixon administration as the second most famous silence of recent time. He then goes on to attribute the most famous silence to the essential part of a Jack Benny joke. Here Mr. Levitin identifies (intentionally or unintentionally) a functional approach to silence. This approach is a technique which I refer to as "nothing is funny." It is the silences in Benny's delivery which instill hilarity. It is the silence that follows the trombone solo in Aaron Copland's *Rodeo* that renders the melody humorous. It is the "nothing" that Andy Kaufman performs during his infamous "Mighty Mouse" routine (lip-synching to a recording of the "Mighty Mouse Theme," but only on the line "Here I come to save the day").

The closing essay of the liner notes, "The Sounds of Silence: John

Cage and *4′33″*," by Larry Solomon, is somewhat expected. However, the author explores the genesis of Cage's piece. In particular, he focuses on an excerpt from "The Art of Noises" by Luigi Russolo (1913), as well as Cage's mention of this work in a 1948 lecture at Vassar College. Many writings on this landmark piece deal with the impact of the work on society after its premiere. Mr. Solomon's essay is refreshing in the way that it looks back to the ideas that led Cage to frame silence in the manner that he did.

Another trend of the collection is the number of pieces that reference Alvin Lucier's landmark work *I am sitting in a room.* Included are *How Many People Are In This Room?* by Kapital Band 1, and Richard Beard's *I Am Not Sitting In a Room.* Such references serve to trivialize the works, casting them as being derivative, and not being able to stand on their own. Mr. Lucier himself contributes a subtle work entitled *Quiet Coffee,* where ambient sounds are recorded from within Turkish coffee pot.

Credited to Matt Rogalsky and George W. Bush, *Two Minutes Fifty Seconds Silence for the USA* utilizes the President's address of 17 March 2003, where he gave a 48-hour ultimatum to Saddam Hussein.