Book Review

Andy Farnell
Designing Sound
MIT Press, 2010 (664 pages, ISBN 978-0-262-01441-0)
Reviewed by Andrew Connor

Andy Farnell has written Designing Sound as "a textbook for anyone who wishes to understand and create sound effects from nothing". As an occasional sound designer for short films I have often found myself frustrated by an inability to produce either the exact sound I need, or, failing that, something I can modify to get close to my requirements¬. I have an abiding memory of trying to create a helicopter sound to match a visual effect, followed by my shamefaced acceptance that I would have to use a commercial recording as I just didn't have the time and skills necessary. So for my money, any textbook on how to create sound effects from scratch has got to be worth a look.

From the start, the book comes across as an approachable and readable basic text on the subject. Farnell introduces exactly what he aims to cover in the book, along with the principles and techniques he will explore. It is quickly established that the later chapters in the book will deal with the practical aspects of creating sound effects, and that the signal processing language Pure Data (Pd) will serve as the main software tool for achieving this.

The book consists of four parts, moving from an introduction to the theory underpinning his approach, through the tools and techniques he recommends for approaching the creation and manipulation of sound, to a substantial final section giving practical examples and illustrating how to use Pd for each sound effect.

The introductory chapters root sound design in three pillars of knowledge: the physical, mathematical and psychological properties of sound. These three pillars support technique, which in turn is the basis for design. He takes a few chapters to investigate the physical and mathematical properties of sound, starting from the basics of acoustics - a handy reminder of my physics school lessons. He covers the physical properties of sound; the creation and propagation of sound waves and the effects of boundaries; how oscillators work and the principles of simple and complex harmonies; and other basic principles. Each chapter is well structured and covers the topics succinctly, but with enough detail to convey the concepts. In addition, each chapter ends with a useful reference section pointing the interested reader towards further study of any of the topics raised. This makes the book even more useful as a classroom text, since each chapter can be used as a launch point to encourage students to explore their own interests further.

The psychological aspects of sound are covered in one much longer chapter, again touching on each topic quite briefly, but also giving enough of a taste to encourage the reader further. The basic mechanisms by which the ear and brain hears and interprets sound are covered, as well as how sound is identified and recognised. Bregman's ideas on auditory scene analysis are also summarised in a section that will be of particular interest to sound designers interested in crafting sonic landscapes to capture an audience's attention.

The final chapter in this section introduces the basic principles of converting the analogue sound we hear to the digital signals that can be recorded and processed using digital technology. The idea of sampling and its limitations are covered, as well as the basics of coding and how computer languages tend to look. Pd is introduced as a visual coding language for digital signal processing. Its main advantages are highlighted, chief amongst them being the notion that 'the diagram is the program' (each patch contains its complete state visually), and its economy of design when compared to other data flow languages. Another advantage of Pd is of course that it is open source and freely available for Windows, Mac, and Linux platforms.

The second part of the book concentrates on the tools available to the sound designer, in particular, the tools available within Pd. The chapters move from the basic starting steps in acquiring, installing and getting to grips with Pd through to the more specific elements that allow direct manipulation of sound. The terminology of canvases, patches, objects and connectors is covered, and the method in which repetitive or frequent functions can be abstracted into subroutines or sub-patches. Common practices and techniques are outlined, and the use of specifically useful objects available in Pd, which allow easy fading, panning, chorus and reverb effects.

As I have a passing familiarity with Pd's sister language, the commercial program Max, I initially leafed through this section quite quickly, as I imagined it would be very similar. However, my familiarity has faded over time, and there are enough small but vital differences between the two languages that I quickly realised I needed to pay more attention to these basics. As with the first part, Farnell has covered the basic concepts succinctly and has provided further references for more in depth detail. I occasionally found his explanations a bit

too brief, but playing around in Pd soon made the use of the objects clear. In the third section, Farnell moves on to technique. Making use of a software engineering approach as a parallel to the strategic production of sound design, he encourages a methodical approach to synthesising sound, allowing the designer to maintain their perspective and avoid getting too tied up in any one single approach to achieve their goal. He provides a basic introduction to five techniques for creating sound effects – summation, tables, nonlinear functions, modulation, and manipulating grains. His descriptions are again brief but informative, and frequently quite pithy –consider his description of granular synthesis as "painting in sound with a pointillistic style".

This section concludes with an examination of game audio, and the fundamentals of sound production for this market. The advantages and disadvantages of samples and procedural audio are examined, and the traditional audio engine model for games outlined. He also briefly touches on the new challenges and likely developments in game audio. As this is an area I have little experience in, I found this a good introduction to the topic. However, given the speed with which the games industry is developing, I suspect this to be the chapter will date quickest.

The final part of the book makes up at least half of the page count. This covers practical aspects of using Pd to create specific sound effects from scratch. For each one, Farnell investigates how to analyse and model the fundamental sounds involved. He then creates an implementation of the model using Pd, explaining the objects and dataflow in the patch and sub-patches shown. The patches and resulting sounds are also available on line, so the reader can compare their own patch to the 'correct' version. Farnell then provides further conclusions, limitations and practical considerations on how the Pd model matches up to the original sound, and if there are any deviations from the original specification. He also provides further challenges to the reader – having created the sound of a pedestrian crossing, we are invited to create the sound of a microwave, or to consider in further detail how the sound of crossing signals assist in road safety.

The practical sound effects section covers a range, from the sound of a pedestrian crossing through to the 'red alert' sound from Star Trek, and going by way of telephones, running water, jet engines, birds, explosions, and many others. I have only tried a few of these so far, and have not made it as far as the more complicated combinations of patches and sub-patches, but have found each exercise to be clear and easy to follow. In general, the book provides a clear and basic introduction to the principles behind designing sound effects. It does not set out to give an in depth description of everything, but covers the basics concisely and provides further references to allow the interested reader to explore concepts in further detail. The sections on tools and techniques establish how the sound designer can start to examine, analyse and model implementations of original sounds to synthesise their own versions, and by extension create entirely new sounds based on solid fundamental sound physics. The final section covering practical application of these basics, with specific examples in Pd, is ideal in both giving very useful, immediately accessible examples for the reader to try, but also encourages experimentation, modifications and the development of new Pd patches to create many other original sound effects.

I suspect I will be returning to this book frequently when I need to create that specific sound effect that I just can't record or fake in any other way. And the crowning glory is, of course, the patch that allows me to create my very own helicopter sound.

CD Review

Erdem Helvacioğlu and Şirin Pancaroğlu: Resonating Universes Sargasso (SCD28064)
Reviewed by Alistair Zaldua

Sargasso's latest publication is a set of eight pieces presented by composer Erdem Helvacioğlu and harpist Şirin Pancaroğlu. Helvacioğlu is a very successful young Turkish composer whose (now somewhat outdated) website reveals his having composed for film, theatre, dance, as well as for video and sound art, and that his work has been performed at many international festivals for computer and electronic music. The equally successful Şirin Pancaroğlu is described on her own website as "Turkey's most renowned harpist", and that for her "discovering a variety of musical identities for the harp is one of her constant endeavors." On the evidence of this disk, these interests are clearly borne out. From the information given it appears that Pancaroğlu not only performs on the harp, but also on the çeng (an ancient Turkish open harp), and the electric harp, whilst Helvacioğlu commands the electronics.

Most of the music presented is reliant on reverberant sound reminiscent, whether conscious or not, of middle-period Cocteau Twins, or even the instrumental and percussive textures of James Dillon's L'œuvre au Noir, and the ever-present drones even suggest Indian Classical music; the echo chambers here are as much cultural as they are stylistic. The CD consists of eight parts of unequal duration, each with their own distinctive character, but all serving to describe the ever-changing resonant universes referred to in the title. There are many things to observe here that a single listening would do little justice to. Lasting merely an hour, the impressions are of expansive, lavish, and sensitively sculpted sound landscapes. The sonic environment is often inventive and idyllic, and the gentle layering and combination of the sounds are at times playfully non-directional.

Throughout, Pancaroğlu displays a tour de force of listening and of the delicate choice and uses of playing techniques at her disposal. It is not always clear if the sounds are all derived from the harp itself; amongst the harp sounds can be heard what sound like distant distorted guitars as well as percussively metallic and wooden pulses, although the former could be Pancaroğlu's electric harp and the latter a percussive beater being stroked against the tuning pegs. In amongst the rather chaotic-sounding soundscapes appear sudden moments of clarity, which often come as a relief to the ear. Regarding Pancaroğlu's extended playing techniques, the resonant universes displayed here attest to a considerable amount of experiment and excavation in the possibilities offered by the harp, and in how both performers interact. The sounds Pancaroğlu produces go well beyond those found in Helmut Lachenmann's scores. The close micing of much of Pancaroğlu's sound intensifies the experience and it often feels like the listener's ear is adjacent to her harp. Acoustically, the notes at the lower end of the harp tend to take a short while to project, but the performers demonstrate that they are aware of this and the danger of creating dull and aimlessly muddy textures is keenly avoided; the reverberant techniques used create distance and add dimension to the whole.

The pieces range from three to eight minutes in length. The shortest piece, part 4, in its use of crashing metallic sounds serves to creatively break the main flow of the music until then. The work achieved in these shorter forms is to my ears more successful, especially the extended acoustic harp solo, the stopped harmonics in part 3, and the concrete sections of part 5. The pair do seem to have a little difficulty while working on the longer form. The seven pieces accumulate in energy to provide a well sculpted pedestal for the final work, running over 15 minutes. This final essay, part 8, provides a somewhat drawn out cadence to the whole, and seems a little labored. Despite my misgivings about this final track, here it is as if the origin of the enormous palette of sounds is finally revealed. There seems to be a scale running between the extended sounds of the distorted electric harp, through the plucked harp resonances towards the noisy, granular, and metallic tuning-peg sounds. The final aspect of the recording to address is the role played by the electronics. These tend to occupy several different functions at once, providing a drone-filled backdrop; a constantly shifting reverberant cloud of sound; at times deliberately understated sympathetic resonances; and then suddenly taking centre stage as the main 'instrument'. A source of the seduction of this CD is that the roles both harp and electronics have are never static.

In view of these achievements, Sargasso chose to print their own label name on the front of the CD, inviting us to 'take a plunge in the Sea of Sound', but without mentioning the musicians themselves. It's only on the back and sides of the CD where both the title of the disc and the names of musicians are revealed. Neither do the sleeve notes disclose anything: all that is presented is the total catalogue of other CDs one could order from Sargasso. On the plus side, this choice of minimal information might be sending the healthy

message of ‘think for yourself’ rather than allowing the overload of biographical and extra-musical information commonly seen on many recordings, which can detrimentally influence a listeners opinion. Despite this I feel it does these musicians a disservice as the music offered on this CD is both as rich in content and craftsmanship as the listening experience to be gained from it. For example, I was curious to learn about how these musicians may have worked together. The music on the disc sounds more improvised than composed; how much of this was the result of some outstanding collaborative work? The musicians were obviously concerned to let the electronics reveal the deeply sensuous nature of the different harps played. But whether the result of a collaboration or of a worked through composition, both Helvacioğlu and Pancaroğlu have produced a recording that contains many hidden subtleties to discover and admire. For the discerning listener not put off by the ever present reverb, but curious to hear an introductory portrait of two outstanding Turkish musicians, this compact suite of eight pieces is highly recommended.