Chapter 1

Compositions

This chapter aims to briefly describe the portfolio of submitted work. However, this chapter focuses exclusively on technical and musical descriptions of the musical output and does not have as its purpose to be a commentary on the background, motivation or theoretical framework of the creative process (the previous chapters already serve as a meta-commentary of the submitted work). I will therefore concentrate on . . . .

1.1 E-tudes

E-tudes[1] is a set of electronic *études* for six stage pianos, live electronics and mechanical piano.[2] These compositions were written for the ensemble **piano***circus*[3] for a project that became a two-year collaboration and lead to two performances.[4] What initially attracted me to this ensemble was its very particular instrumentation consisting of six electronic stage pianos. I thought this would be a suitable platform to experiment with the notions of *real-time plunderphonics* and *live musica derivata*,[5] considering that these instruments are electronic and therefore produce no considerable audible acoustic sound.[6] Like a book of *études* from the repertoire, *E-tudes* consists of a set of pieces that can be performed together at the same event or individually as separate short pieces. At present time, I have completed four 'e-tudes', and as an ongoing project, I will continue adding new pieces

[1] See Contents of Portfolio: CD I (*Compositions*), tracks 1–4 and DVD I (*E-tudes*).

[2] In case a mechanical piano is not available, it is possible to use a sampler with piano sounds.

[3] See http://www.pianocircus.com/

[4] Enterprise 08 Festival, The Space, London, May, 2008, and The Sound Source, Kings Place, London, July, 2009.

[5] See pp. 91–92.

[6] The only acoustic sounds that can be heard are the keyclicks produced by the physical contact with the stage pianos while playing. This noise is slightly audible mostly when there are no sounds playing through the speakers (or they are very quiet).

to the collection. *E-tudes* is modular in the way in which it can be presented: depending on the set of circumstances for a given event, they can be presented separately or as a whole, either as a concert performance or as an installation with perforative elements. In the installation version, the audience walks into, out of, and around the area surrounding the musicians and has creative control over how they want to experience the performance. By choosing between listening to the speakers in the room or to various headphones that are distributed through the performance space and generate different outputs, each member of the audience fabricates their own version of the piece. Therefore, in the installation version their are various possible outputs generated by the computer from the performance, which the audience can choose from. It is also possible to have a performance were the members of the audience are wearing wireless headphones that can receive multiple channels that are transmitted in the performance space, therefore allowing them to choose which channel they want to listen to.[7]

I use the same configuration for all of the pieces that comprise *E-tudes*: the ensemble of six stage pianos is placed in hexagonal formation and divided into two subgroups. The first subgroup consisting of three pianists are asked to select *études* from the western piano repertoire at will—they can select the *études* they prefer to perform (for example, *études* by Chopin, Debussy or Ligeti, to mention just a few)—and are to play them in their chosen order during the duration of the performance. The second subgroup consisting of the remaining three pianists perform together from *The Sixth Book of Madrigals* by Don Carlo Gesualdo da Venosa (1566-1613).

The pianists playing the madrigals send Midi information to a computer that transforms the audio signal from the *études* and schedules the digital signal processing events. The audience is not be able to hear in the room what the pianists are playing as the stage pianos do not produce an acoustic sound. The seventh performer (performing the live-electronic part)[8] performs different tasks: at some points s/he speaks the Madrigals' text into a microphone and the spectral information from this signal is be used to process the final audio output and to trigger other sound events, at the same time playing Midi controllers. The live electronic part is not fixed, leaving space for improvisational elements within the human/computer interaction. Finally, through the analysis of all the inputs the computer sends Midi messages to the mechanical piano, adding yet another element to the performance. In the room the final result of the creative process of combining the simultaneous performances in diverse arrangements is diffused through the speakers. In the installation version, the headphones that are spread through the performance space portray the inner life of the performance sounding in the room

[7] This was the case in the performance at Kings Place.

[8] In the performances of *E-tudes* I performed this part myself.

and reveal the inner layers of computer processing and the appropriated compositions.

Computer programmes play a vital role in all the elements of *E-tudes* and were written in SuperCollider—some of these prgrammes are discussed in Chapter 5 but some were exclusively written for *E-tudes*.[9] These programmes are used to analyze incoming Midi data to schedule events[10] and for digital signal processing (DSP). The incoming Midi events from the pianists playing Gesualdo is analyzed and divided by each voice of the original madrigals. The computer analysis using score following techniques tracks each voice and according to its position in the score, schedules specific DSP events. The Midi *note* and *velocity* information in some occasions is used to determine certain parameters in the DSP algorithms. The DSP algorithms of the live electronics use as input two mayor audio sources: the input of the combined live audio of the sound generated by the three pianists playing *études* and *micro* elements[11] derived from various recordings of existing music which I choose to appropriate. The individual live audio signals coming from each pianist playing *études* are interpolated with one another (by altering the pitch and volume of the signals).[12] The live electronics performer can change the duration of the interpolation between *études* with a Midi controller. At the same time, the resulting signal is then pitch-shifted again through several pitch ratios (the original signal results in five different signals with varying pitch) generating multiple signals that are then mixed together to create yet another signal. The sounding result of this last signal is a very noisy signal which could be described as 'piano noise' (it still retains a piano-like quality). I then utilize this 'piano noise' as input in synthesis algorithms which filter it using several techniques. The 'piano noise' however is very different to *white noise*, *pink noise* or any other types of noise used in classic synthesis techniques in that its spectral flux is constantly changing and its rate and amount of change is fairly irregular. Additionally, the live electronics performer can change the sonic qualities of the 'piano noise'—and therefore also change its spectral flux—by altering the interpolation time of the live signals coming from the pianists playing *études*. The the first two 'e-tudes' in their final result (the final output diffused through the speakers) are composed exclusively using synthesis algorithms which use this 'piano noise' as input. At the same time, in the installation version, the audience can listen through headphones to the different outputs at different degrees of processing—for instance, the output of one of the headphone outputs is made out of material generated from the interpolation

[9] The code for these computer programmes can be found at http://github.com/freuben/Etudes.

[10] See p. 113.

[11] See pp. 89–90.

[12] Each signal is interpolated with the other by gradually pitch-shifting one signal down four octaves and fading out its volume gradually, while at the same time introducing the next signal which would be pitch-shifted four octaves down and gradually transposing it up until its normal pitch, and by gradually fading it in.

of *études*, while another one reveals the 'piano noise'. The original appropriated sources (the *études* and the madrigals by Gesualdo) are also displayed closer to their original form through certain headphone outputs. The algorithms that control the overall process have also generative elements—each time they are performed, they generate slightly different results. The generative characteristics of the algorithms, the varying incoming data from the live performances (the *études* chosen by the pianists change for each performance of *E-tudes*[13] and the incoming Midi data from the madrigals varies each time they are performed) as well as the improvisatory elements in the live electronic performer's part, makes *E-tudes* an electronic composition that changes (both in content and performance) each time that it is performed, however maintaining certain elements that identify it as the same composition.

E-tude I is based on the first madrigal of Gesualdo's *Sixth Book of Madrigals* called *Se la mia morte brami*. In *E-tude I*, 'piano noise' is filtered in different ways using various subtractive synthesis algorithms. For the first half of *E-tude I*, several algorithms take the live electronics performer's voice reading the words of the madrigal as input to filter the 'piano noise' using different filtering techniques or for onset detection. The most prominent filtering techniques using the voice as input are vocoding (using a variation of the 'classic' vocoder algorithm) and the FFTFilter described in the previous chapter.[14] The microphone signal is also used for onset detection, and the live electronics performer triggers voice different percussive sounds (generated by filtering bursts of 'piano noise' at different frequency ranges) with his/her voice. Spectral gating (FFT technique which ignores the frequency bins which have magnitudes bellow a certain threshold) of a limited frequency range of the 'piano noise' is another technique that is used to isolate the strongest frequencies in a specified range—the resulting frequencies are used as pitched material that is presented either in its natural sinusoidal quality (prominently in the high frequencies) or these frequencies might also be mapped into Midi notes that are triggered by the mechanical piano (prominently in its lower range). At the same time, all pitched material (including the center frequency of some filtered sounds) is altered or defined by the Midi note information received from the pianists performing the madrigal (tuned in *just intonation*). The dynamics for these sounds are also shaped by the Midi velocity from the performance of the Gesualdo. At the same time, different layers of sound such that there are similar pauses follow the madrigals phrase structure—the layers start and end at the same point in time were the madrigal's phrases do.[15] The Midi note information (mostly *note-on* messages, but not exclusively) at times

[13] Like Cage's *Imaginary Landscape No.4*, this type of musical appropriation is current, generative and indeterminate. See p. 81., for a further discussion of Cage's appropriation strategy.

[14] See pp. 98–99.

[15] I use this technique in many of my compositions: I plunder the phrase structure of an existing composition to generate a blueprint for a new composition. See pp. 89–90. I also wrote a computer application that automizes this

also trigger different sounds generated through a combination of filtered 'piano noise' and data derived from analysis of instrumental and vocal recordings. A common technique I use in *E-tudes* to make synthetic sounds sound more imperfect or 'humanized' is to modulate the synthesized sound according to the plundered fundamental of an appropriated recorded sound—by modulating the synthetic sound in frequency and amplitude according the fundamental of the recorded sound, the synthetic sound becomes more irregular and therefore sounds more 'natural' due to the imperfection it inherits from the plundered sound. Another technique I use to make synthesis algorithms sound more 'instrumental' is by deriving harmonic structures from FFT analysis of appropriated recordings of the instruments I want to approximate. In *E-tude I*, I generate sounds using these techniques to approximate sounds with similar characteristics to a celesta, several percussion instruments, to a vocal melody, high bowed string harmonics, etc., however always using the 'piano noise' as the main noise source to be filtered.

1.2 On Violence

This composition attempts to explore the aesthetics of violence and reflect on different manifestations of violence. It is also inspired by slovenian philosopher Slavoj Zizek's ideas about violence. Zizek categorizes violence into two main types: subjective and objective violence. Subjective violence is clearly identifiable by an agent, for example acts of terror or crime, and it is perceived as a clear interruption of the normal state of things. On the other hand, objective violence is violence that is inherent in the social fabric and it is hard to see and experience for the advantaged classes or countries. What Zizek argues is that objective violence is inherent within the social "balance" and it is objective violence which triggers acts of subjective violence. Furthermore, Zizek identifies two types of objective violence: symbolic and systematic violence. Systematic violence is manifested through our economic and political systems that in order to give the idea of a normal smooth running of things, exert systematic violence on large groups of people. Symbolic violence is related to and included within systematic violence but it is specific to violence expressed through language and other symbolic systems (like music). Zizek goes further to argue that the forms of symbolic violence are actually based on and manifested by the symbolic systems as such.

process and generates a visual representation of phrase structure using a Midi File as an input. See pp. 109–112.

1.3 Žižek!?

Zizek? is a computer-mediated improvisation that gives a live alternative soundtrack to the Zizek! (2005) movie. Each performer has a laptop in front of them. The laptops are connected through a network by which the composer guides the improvisers by sending them written directions, animations (moving graphical notation) and through headphones, an aural score that consists of sound and music derived from the audio of the film.

Alexander Hawkins (piano), Dominic Lash (double bass), Javier Carmona (drums)

1.4 FreuPinta

1.5 Improvisations