SameSameButDifferent v.02 – Iceland

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ABSTRACT

The history of computer music is to a great extent the history of algorithmic composition. Here generative approaches are seen as an artistic technique. However, the generation of algorithmic music is normally done in the studio, where the music is aesthetically valued by the composer. The public only gets to know one, or perhaps few, variations of the expressive scope of the algorithmic system itself. In this paper, we describe a generative music system of infinite compositions, where the *system itself* is aimed for distribution and to be used on personal computers. This system has a dual structure of a compositional score and a performer that performs the score in real-time every time a piece is played. We trace the contextual background of such systems and potential future applications.

1. INTRODUCTION

The number of people working in the field of sound art has increased drastically in the recent years. This is no coincidence. The exponential increase in computing power enabled people in the mid-1990s to work with sound on their personal computers. Sound now becomes an object in the memory of the computer and the limitations of the older tape medium do not apply anymore (limitations such as degeneration of quality with copying and processing, linear recordings vs. the random access of the digital medium, and the economical cost of proper equipment). Sound can now be copied, processed and combined in innumerable different ways using various digital signal processing algorithms. In the late 90s the advent of open source software for audio further strengthened the foundations of such work as open source and free environments such as Pure Data, SuperCollider, Audacity and Ardour now give people chance to produce work that 15 years ago would only have been possible in the computer labs of universities, in institutions like Bell Labs or IRCAM, or in expensive recording studios.

The *SameSameButDifferent* (SSBD) project arises from this background. Both of the authors have been ardent sound recorders for the last 15 years and have made use of software like SuperCollider and Pure Data in their work. Both are interested in live music and improvisation and have a certain discontent with the way recordings kill or fossilize the musical process. With the SSBD project we aim to create music that is never the same, but still containing an aesthetic signature. We released version 1 of the project at the Ultrasound festival[1] in Huddersfield, UK, in 2003 in the form of a CD-Rom. Each version of the project deals with different subject matter, in this case field recordings from our native country, Iceland. The SSBD project is in version 3 at the moment, but we will focus on version 2 in this paper.

Figure 1: An arctic tern (Sterna Paridisaea) singing into the microphone on a summer day.

2. COMPOSING WITH THE PROCESSOR

The advent of the digital computer brought a new understanding of complex systems, emergence and evolution. Calculations of possible worlds that hitherto were impossible to perform can be simulated on the computer with artificial intelligence and artificial life in particular. Obviously, the computer is a new medium, distribution channel and platform for all multimedia production, including data for the visual, auditory, haptic, olfactory and gustatory senses (where admittedly the last 3 sense interfaces are still in experimental stage). But it also brings forth a new method of working – of accessing and presenting data – that can only be achieved with the powerful computational power of the computer.

The computational processor as the medium for artistic production is a relatively new phenomenon that results in a new aesthetic. The matrix of processors connected to each other through a vast, global network allows for collaborative work methods that hitherto were unimaginable. It is now trivial to access data in real-time from physical sources located anywhere in the world, mining compound data from a database or calculate responses to sensor input where artificial neural nets can be used to simulate human intelligence. Modern networking enables collaborative environments where people can for example have different

[1] www.ultrasound.ws

interfaces to the same sound engine or communicate through code in a networked performance.[2] What is of main interest here though is the power of the computer to calculate music in real-time, which essentially means that the computer is not just a player that plays a recording of some performance, but an active interpreter that interprets the score (the program) written by the composers (the programmers).

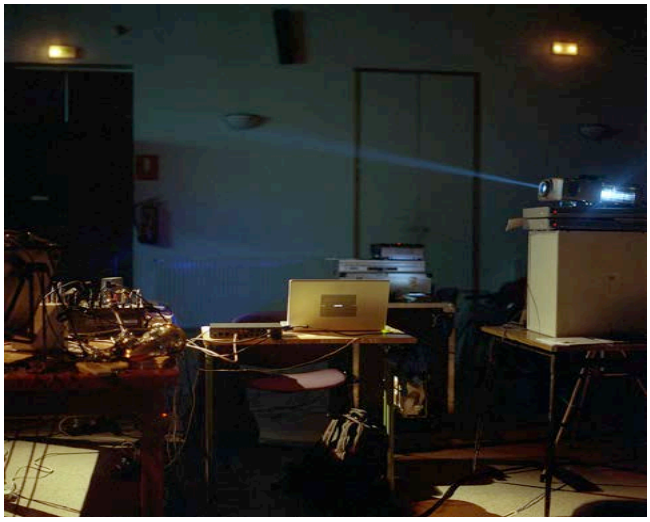

Figure 2: SSBD performed at the Ertz festival in Basque Country.

2.1 Live Generative Music

The term "generative music" has come to signify algorithmic music, i.e. music that is created through a system of rule following. Philip Galanter has provided a definition of generative art: "Generative art refers to any art practice where the artist uses a system, such as a set of natural language rules, a computer program, a machine, or other procedural invention, which is then set into motion with some degree of autonomy contributing to or resulting in a completed work of art". [2] Note that the generative work does not have to be computer based; it could just as well be a natural system or even a person following the instructions. (The etymology of the word "computer" shows us that the first computers were indeed humans). For the sake of focus we exclude in this paper the analysis of old generative music such as Chinese wind chimes, wind flutes, water fountains, etc. and the instruction pieces by many of the Fluxus artists, notably La Monte Young and Yoko Ono. All these pieces are generative, but not computational in the sense that we're interested in here.

For decades, people have been writing algorithmic music using programming languages as musical scores. The computer becomes the interpreter that follows the instructions written by the composer. The composer has the possibility of using stochastic processes, Markov chains, artificial intelligence, artificial life and all kinds of external sensor input into the machine, such as human gestures, weather variables or data from the internet. The history of computer music is very much a history of algorithmic music. In this context we can mention Lejaren Hiller, Iannis Xenakis, John Cage, Stockhausen, Barry Truax, David Cope, Curtis Roads, etc. as composers that all have used generative methodologies in their compositional practice. Typically the music is generated and evaluated aesthetically by the system creator in the studio and then released as a static document/documentation into the cultural domain. However, what we have not seen very much of is the production and release of *systems* that generate/perform music live for the listener. We are interested in the production of generative music where the *generative system itself* is released (sold or given away) for people to enjoy and experiment with at home. We will now look briefly at 4 such systems:

2.1.1 Eno's Generative Music 1

In 1996, Brian Eno released the *Generative Music 1*[3] software written for the SSEYO Koan program. Koan was a tool for creating generative music and SSEYO released Koan players that could interpret Koan code. It was released on a floppy disk and to run the music, the listener would need a specific range soundcard and the Koan plugin. It was relatively expensive at the time (£45) and did not achieve much popularity although media were interested. The fact that it did not sell much is more likely the novel presentation of the music. People found it hard to understand the ideas behind generative music.

2.1.2 The Infinite CD

The Infinite CD by Antoine Schmitt[4] and Vincent Epplay was released in 1999. It was distributed as a program on a CD-Rom and would work on both Macintosh and Windows operating systems. The authors state that the reasons for making the work are that composers are looking for new ways of composing and people are looking for new listening habits and non-intrusive music. Finally they point out that the affordances of today's technology enable this type of work.

2.1.3 Morpheus

The Morpheus [1] CD-Rom[5] from 2001 was initiated by John Eacott and contained works by 5 composers that all wrote their music in SuperCollider code. The CD contained a runtime version of SuperCollider that would interpret the compositions in real-time. This release was a highly successful experiment, but suffered from the fact that SuperCollider was only available on Macintosh operating systems at that time. This situation has changed now and SuperCollider is truly cross platform.

2.1.4 SSBD. V.01

Version 01 of SameSameButDifferent was released on a CD-Rom by the ixi label[6] in 2003. This version focused on the eccentric anomalies of human and insect behavior; on micro and macro intelligence in swarm behavior at both human and insect level . A version of the software is played daily at the world's first generative radio station rand()%.

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[2] One of the authors recently participated in a musical performance through a high-speed network that involved a real-time musical improvisation between musicians in Helsinki, Finland and Fairbanks, Alaska. For documentation of the performance: http://silakka.fi/netcon/fairbanks.html

[3] see: http://www.inmotionmagazine.com/eno1.html

[4] http://www.gratin.org/as

[5] http://www.mushimushi.net/morpheus/

[6] http://www.ixi-audio.net/label

2.1.5 Online presences

New media bring forth new concepts of ownership and storage. Do we need to own a physical copy of the storage medium? Do we even need to own a digital copy of it as it can be easily accessed and enjoyed from an online source? There are various generative works online, such as many of the works found on the soundtoys[7] website or on the rand()%[8] radio station. It varies whether these works are running through software in the listener's/viewer's browser or being streamed from a server in the form of audio/visual stream. Obviously both have limitations and constraints for the composer, such as platform dependencies, browser plugin support and the necessity for ubiquitous network connections. It remains to be seen how online presence of works will develop and become part of daily listening habits.

3. SSBD AS PHONOGRAPHY

In Western musical culture, the old mind/body dualism exhibits itself in the distinction between music as a score on the one hand and music as a performance through embodied and situated activity on the other. We have the intellectual system of notation and musical theory – the cerebral activity composing on paper – versus the embodied activity of playing an instrument, where style is incorporated into the body through practice. This dualism has resulted in the kitschification of two roles: of the composer as a genius and the performer as virtuoso. The latter part of the 20th century saw an increasing focus on sound itself, the rejection of the institutional middle class music education, and emphasis on improvisation in musical performances. SSBD transcends the dualism mentioned above with its blurry conceptualization of authorship and performance: the focus is on sound and texture that is generated in real-time by interpreting instructions that are created partly by humans and partly by the machine.

Figure 3: Ice and river sounds from the south of Iceland

3.1 Background

Using sound objects (objet sonore) in music was explored by Oskar Fischinger and other experimental film makers in the 1930s when the sound film was invented. However, it was only with the invention of the electromagnetic tape that musicians started using recordings as part of their music. A testimony of that is the musique concrete group that existed around Pierre Schaeffer in the 1950s in Paris. Schaeffer and others recorded sounds on tape, catalogued them in a complex system, and made systematic use of them in their compositions. In the 1980s digital samplers were introduced where people could record a sound and manipulate it digitally and control with digital interfaces. Together with these early explorations of the found sound and ever more sophisticated technology, the idea of using real world sounds in music became commonly accepted. But it took time for this to infiltrate into popular culture: just consider in this context the media attention in 1981 of the release of *My Life in the Bush of Ghosts* by Brian Eno and David Byrne or in 1998 when Matthew Herbert released his *Around the House* album (made of pure domestic sounds).

Figure 4: Recording volcanic bubbling clay pot

There is another trace that leads to the contemporary understanding of environmental sounds as music. In 1952 David Tudor performed the piece 4'33" by John Cage. It consisted of him sitting in front of the piano and opening and closing the lid 3 times. The only sounds were those of the environment: outside traffic, ambulances, people coughing, scratching and breathing. Cage himself might have been listening to his nervous system and blood pressure. Here the focus of the composer is on including the environmental sounds, the surroundings – the soundscape. A door was opened to the inclusion of the accidental, which emphasized the creative and the interpretive role of the listener.

3.2 Quick Definition of Phonography

Phonography could be defined as the sonic equivalent to photography, i.e. a methodology where the phonographer "frames" the sonic environment by carefully choosing the location and time with special attention to what he or she wants to record. There is a strong emphasis on the process of the recording; the focus on place (with its historical and geographical signification) and the time in which it is recorded. Everything that vibrates is of utter importance: if there are people in the environment, animals, natural sounds, machines, or parasensory sounds such as electromagnetic waves, ultrasound or infrasound, etc. Not only is the time-space aspect important but also which equipment is used (mono, stereo, binaural, 3D field microphones, analog or digital recording devices and the bit resolution and sample rate used in the recording) and where it is placed (zooming in to the sound source or backing off to get an overall scope of the sound field).

[7] http://www.soundtoys.net

[8] http://www.r4nd.org

3.3 The Schizotopia of SSBD

The sound sources of *SSBD v.02 – Iceland* are field recordings of Icelandic nature (geysers, hot springs, rivers, springs, ocean, wind, fire, birds, foxes, sheep, snow, ice, glaciers, rocks, etc.) recorded over a long period of time. In choosing the recordings we have deliberately excluded human noises, which was relatively easy as there was hardly any human noise in the remote places where the sounds were recorded. Our aim is to represent the natural soundscapes of the country in as many ways and combinations as possible and for that purpose the generative music format is ideal. The recordings serve as raw locations but in each performance of SSBD we get a unique fictional place, which could or could not possibly exist. The listener is situated in these locations with a binaural head that could or could not possibly exist, as the zooming into particular sounds and their subtle processing can be disproportionate to other sound origins. Not only is the head dispersed in space, but the sound sources themselves change locations gradually, creating the illusion of a levitation and movement inside the soundscape.

Figure 5: An artist illustration of "schizotopia" in SSBD

The focus is on location, presence, temporality and the subjective dislocation in space that we have termed here "schizotopia"; namely, the fact that we are faced with infinite locations and infinite ways of virtually placing our ears within that space. We find this creative dislocation of time, place and ears interesting and ear opening. It is as if the frames of the recordings converge into a multidimensional space where our physical laws do not exist. The experience becomes closer to the logic of dreams.

3.4 Technological Affordances in Music

Musical instruments are tools created for maximum expressivity within a certain scope. The history of acoustic instruments shows how they have been developed with concerns to the human body on the one hand and to musical tradition on the other. With the extremely young field of digital instruments the situation is different. Any interface can be built and mapped to any sound process. This means that the musician, instead of training him/herself within a certain tradition and musical culture, has less history to take into account and is less constrained by tradition in the development of the instrument or composition.

SSBD is at the same time a system of notation (the program is the notation script and it could be performed by a human that would read the programming language) and an interpreter or performer of the music. The word "music" can signify for both the written instructions on a staff notation sheet but also the sound generated by a musician playing the music. The fact is that the boundary between an instrument and a composition is blurry and undefined. We found that when working on the *SSBD v.02 – Iceland* composition, we had the option to perform any musical gymnastics that we could have come up with. The SuperCollider environment is designed to be musically neutral and unlimited. However, the focus of our algorithm design here was to be as subtle and removed from the material itself. We wanted the Icelandic nature to speak for itself.

4. TECHNICAL DETAILS

Technically, *SSBD v.02 – Iceland* is a composition in the form of software written in the SuperCollider audio programming language. The software has access to the sound files and on each performance it chooses different raw material to work with. There are different algorithms processing the sounds and defining how they are combined. Inside the piece are listening agents that perform musical tasks if they get bored. The algorithms behind the composition have been designed with a careful attention to formal structure and what we (the authors) consider suitable amount of changes and activity.

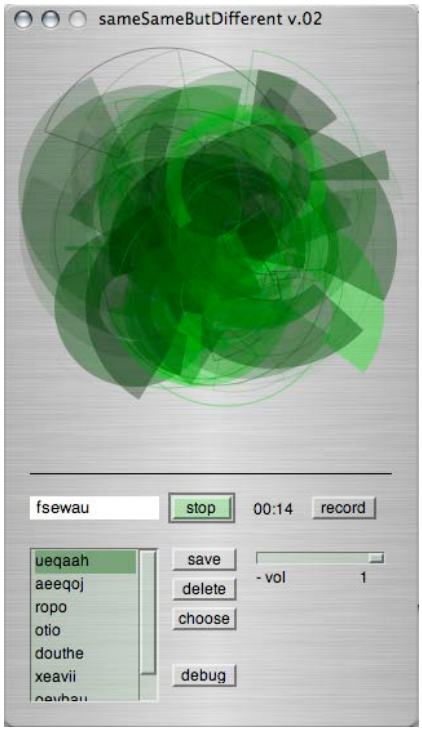

Figure 6: The user interface of SSBD v.01 - Iceland

4.1 The randomSeed in SSBD

Each rendering or variation of the composition is fundamentally run by one random seed provided by SuperCollider at the start of the performance. This random seed is the determining factor of what happens in the piece and which random numbers the program will generate for its performative decisions. On the start of a performance we convert the seed into an ASCII name that becomes the title of the piece. This title can be played back again identically as we reconvert the title into a number that becomes the random seed of the performance. The listener can choose a

title that will sound the same every time on all computers as it will be turned into the random seed that defines the performance. One could therefore tell a friend to listen to a specific piece and both would be listening to the same performance without it ever have been composed or recorded before.

This allows users to save performances and store them in a track list. They can also record a performance as a stereo AIF file in full quality. Finally there is a volume slider on the interface that allows the user to adjust the sound level of the piece. As SSBD is a generative composition, we deliberately do not allow the users to change the compositional algorithms or the choices the software makes as that would make it more of a tool than a player for SSBD compositions.

4.2 Systems for Production

Works of generative art can be written in any environment and distributed by any means. A programming language like C has an almost unlimited potential and portability. However, the biggest question for the artist is: what is the most efficient, quick and portable environment to make the work in? Higher level programming languages are better for development, but at the cost of less expressivity. Director and Flash are commercial coding and multi-media environments that have been popular with artists for years, but open source and cross platform environments such as Processing/Java, Python and Ruby are becoming ever more popular. In the world of sound, Pure Data, SuperCollider, ChucK and CSound are amongst the most expressive environments for generative composition and so is Max/MSP although that is closed source and commercial software.

Figure 7: The fog silences the animals but not the water streams

4.3 Systems for Distribution

Systems of generative art can be viewed and distributed in various forms: One can view the works in a browser player (such as the Shockwave or Java players) where the player accesses the code from an online server and executes it from within the browser (The soundtoys model). Another way is to do all the calculations on the server and then stream audio or video to the viewer that views the content with an audio or video player. This puts extra load on the processing power of the server (the rand()% radio model). Both of these methods create strong aesthetical limitations for the artist. The player model requires the artist to work with Shockwave or Java, which are arguably limited in expressive scope and the streaming model reduces the sound and picture quality of the works. The third model, and the one we have chosen here, is to distribute the work as a software package, a player that does all calculations in real-time and allows for a free choice of which programming environment is utilized.

5. CONCLUSION

The SameSameButDifferent project explores generative music and composition techniques, but also the practicalities of distribution of generative systems. Each project focuses on a specific topic, in this case on natural soundscapes from Iceland. Future projects explore literature, synthetic spaces, noise, children music, microtonality, etc. A part of our interest is how technology defines our cultural productions and in this case we are determined by the computational power of the processor to create our music. But we are limited to large machines. SSBD does not run on any portable device at current time, as they don't yet have the processing power needed for the calculations. It remains to be seen how future technology (such as surround sound home cinemas or ubiquitous mobile devices) will enable generative works to be played in contexts removed from computer workstations or laptops.

6. ACKNOWLEDGMENT

SSBD is a continuous collaboration between Runar Magnusson and Thor Magnusson. We would like to thank all the people that have been passionate about this project by featuring it in festivals and concerts over the last year:

Concert - At the exhibition Lavaland. Copenhagen (2007).

Concert - Deiglan, Akureyri, Iceland (2007).

Pulsar Festival - Plex, Copenhagen, Denmark (2007).

Concert - Musikafeen, Århus, Denmark (2006).

Ertz Festival - Bera De Bidasoa, Spain (2006).

SuperCollider Symposium - Birmingham, UK (2006).

ImprovMasters - Sibelius Academy, Helsinki, Finland (2006).

Installation in SoundAsArt Festival - Aberdeen, UK (2006).

We would also like to thank the SuperCollider community for creating the most beautiful and fantastically expressive compositional environment.

7. REFERENCES

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[2] Galanter, Philip. "What is Generative Art? Complexity Theory as a Context for Art Theory" in *Proceedings of Generative Art Conference*. Milano, Italy: 2003.