INTEGRATING MOBILE MUSIC WITH PERCUSSION PERFORMANCE PRACTICE

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ABSTRACT

This paper describes a series of musical works designed to integrate mobile computer instruments into a percussion ensemble performance practice. The works were motivated by the author's desire to introduce computer music elements to non-programmer members of the percussion group *Ensemble Evolution*. Each of the works used simple setups with *Apple iOS* devices in order to facilitate rehearsals and increase the performers' engagement with the computer elements of the works. This artistic research considers the performance practices that are enabled and demanded when complementing acoustic percussion instruments with mobile music devices.

The first two works, *3p3p* and *Nordlig Vinter* used computer music elements composed in *Pure Data* running on *iPhone*s using *RjDj* in the context of semi-composed works for percussion. The third work, *Snow Music* was a collaboratively developed improvised work using percussion and a native *iOS* app developed with *libpd*.

An ethnographic analysis of the preparation and performance of the three works shows a development in the role of mobile devices in the performances and the emergence of performance practices using both natural interactions and control of generative processes.

1. INTRODUCTION

This paper describes three musical works for percussion and *Apple iOS* devices developed by the author in order to integrate mobile computer instruments into a percussion ensemble performance practice. The works were motivated by the author's desire to introduce computer based instruments to collaborators with no experience in computer music. The focus in this paper is on the evolving performance practices that emerged in response to different modes of interaction in the mobile computer instruments used in the three works.

Two of the works were developed with *Ensemble Evolution*[1], a percussion ensemble based in Piteå, Sweden, consisting of Maria Finkelmeier, Jacob Remington and the author. This ensemble was resident in Piteå from October 2010 to June 2012 and was formed in order to pursue the members' interests in composition, improvisation and performance.

[1] http://www.ensemble-evolution.com

The three works exploit the new capabilities afforded by smartphones and tablets to allow computer music elements to be integrated into percussion setups featuring a variety of instruments as well as collaborative music-making environments and busy rehearsal and performance schedules. Our use of the mobile devices was inspired by a variety of previous work. Tanaka's four-hand *iPhone* performances [10] demonstrates a collaborative improvised practice afforded by sensor-rich and portable mobile devices. Swift's *Viscotheque* [9] system demonstrates the potential for new users to engage in collaborative music-making with mobile devices.

This research was part of my master's thesis *Mobile Computer Music for Percussionists*, completed in June 2012 at Luleå University of Technology[5]. This thesis contains more thorough ethnographic analysis of the works described here and an examination of the current state of research into mobile computer music.

2. 3P3P

Figure 1. *Ensemble Evolution* rehearsing *3p3p*

3p3p[2] was the earliest experiment to integrate mobile music into a percussion work for *Ensemble Evolution*. The work consisted of three *RjDj* [8] "scenes"[3], one for each member of the ensemble's *iPhone*, and a score that sets down a basic structure to the otherwise improvised work.

[2] For: 3 percussionists, 3 phones

[3] *RjDj* "scenes" are special *Pure Data* patches that can be loaded into the *RjDj* app over a network.

To perform *3p3p*, two members of the ensemble used mallet percussion instruments with their *iPhone* while one used a drumset and percussion setup. The three *iPhone*s were connected to a pair of powered PA speakers located near the ensemble via very long mini-jack to RCA cables and a small mixer.

The three *RjDj* scenes each had two generative compositional elements that could be switched on and off independently, for example, a series of percussive-sounding notes cut from a field recording of cracking ice. While each scene had different generative elements, all three had two switchable effects, reverb and a pitch-shifting delay, that would process sound from the *iPhone*'s microphone. A simple interface of four buttons controlled these elements on each phone while the *iPhones*' accelerometers were used to influence parts of the generative processes, for example, the length of generated notes.

During rehearsals, we had determined a number of ways to use the *iPhone*s in the performance. The phones could be held in one hand while the other held sticks or mallets and in this way the phone's microphone could be brought close to different sound sources in our setups, allowing the effects to be used selectively. Since the phones were light and small, they could also be placed on the frames of our instruments allowing us to use mallets in both hands but also to access the phones and switch the generative elements on and off. The work was performed as part of a foyer performance at *Ensemble Evolution*'s own *Piteå Percussion Repertoire Festival* in March 2011. Notably, despite the fact that the work had not been rehearsed for a week prior to the performance the simple setup enabled a smooth performance with only a minimal sound check.

3. NORDLIG VINTER

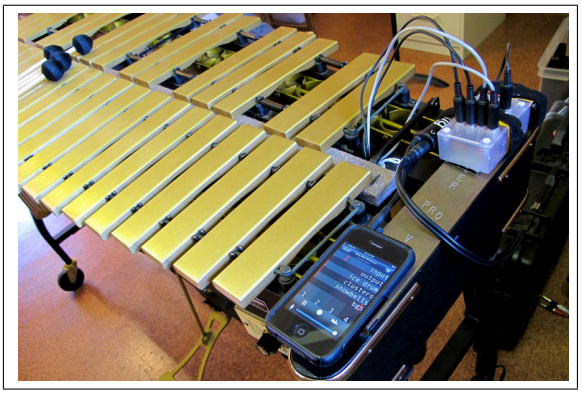

Figure 2. The vibraphone and *iPhone* setup for *Nordlig Vinter*

Nordlig Vinter is a suite of duo works for marimba, vibraphone and *iPhone* inspired by the cold, dark and snowy winters of northern Sweden. The suite was developed in Piteå and Canberra in 2011. Some of the works in the suite are composed duos for marimba and vibraphone without a computer part, while in other parts both players improvise over background compositions generated by an *RjDj* scene. The computer setup for *Nordlig Vinter* was limited to a single *iPhone* running an *RjDj* scene which would sit on the frame of the vibraphone. A home-built pickup system for the vibraphone was also part of this project. The system included four electret microphones that could be Blu-Tacked underneath the bars of the vibraphone and a battery powered preamp. This system could be connected through the *iPhone*'s headphone jack allowing the *RjDj* scene to process the vibraphone sound.

The design motivation for the setup and *RjDj* scene for *Nordlig Vinter* was focussed on bringing the computer music elements into performances with the most unobtrusive setup both from the perspective of the audience and of the performers. Using an *iPhone* and the battery powered pickups allowed the whole system to be attached to the vibraphone with a stereo audio cable being the only wired connection. This arrangement was out of sight of the audience and out of the way of the performers. A more detailed interface for the *RjDj* scene was developed for *Nordlig Vinter* with four buttons to start and stop three generative compositions and a single reverb effect as well as meters displaying the progress through the three compositions and the input and output volume levels.

Nordlig Vinter was performed with Christina Hopgood at the *Electrofringe* festival in Newcastle, Australia in September 2011. In this setting, visual feedback from the *iPhone* screen was barely used and we were able to concentrate on our performance with minimal distraction from the mobile computer system.

Further performances of *Nordlig Vinter* have taken place with different interpretations. The work was performed as a duo for vibraphone and drumset with Noah Demland at *drums + gadgets* a concert taking place in Columbus, Ohio in November 2011. The work was transformed for this performance into a free-flowing improvisation using elements from the composed works and the computer generated compositions. Further performances of *Nordlig Vinter* have taken the form of solo performances for vibraphone and *iPhone* and free improvisations played over the computer elements.

Although the computer elements of *Nordlig Vinter* were simple, a result of this simplicity was a system which could be integrated into a variety of performance contexts. Since the computer elements of the work were designed to be unobtrusive, performers were able to "set and forget" and focus on improvisation. The experimentation that was enabled by the simple, compact system had a corresponding result in creativity.

4. SNOW MUSIC

Snow Music was the result of a collaborative process with *Ensemble Evolution* designed to study the "shareability" of mobile computer instruments in a percussion ensemble context. The goal of the project was to jointly discover the performance practice for a new computer instrument.

Figure 3. A studio performance of *Snow Music* including Matteo Spano (guitar)

The instrument in question was a native *iPad* app called *Snow Music* developed using *Pure Data* [7] and *libpd* [1]. The app was inspired by the natural environment of northern Sweden and a percussion piece for "glockenspiel and amplified snow" [2] and was designed as a rough emulation of a bowl of snow. Performers could tap and slide their fingers on the screen of the *iPad* to manipulate samples and field recordings of snow.

The app also included three generative background soundscapes that produced phrases of notes in free rhythm and could be switched on and off. The three soundscapes were of bells, cymbals and a swooshing, wind-like snow sound. The bells included only notes from the C-aeolian scale while the cymbals and snow sounds were of indeterminate but changing pitch. With only a few simple musical functions, the app was designed as a simple instrument that might fit into a setup using a variety of percussion instruments.

A prototype of the *Snow Music* app was introduced to the two other members of *Ensemble Evolution* at the start of a series of rehearsals. The computer music setup consisted of two *iPad*s and one *iPhone* running the app, with each *iOS* device connected to a powered speaker via a headphone extension cable. In order to analyse the development of a performance practice using the app, all rehearsals and meetings relating to the *Snow Music* project were video recorded and coded following established ethnographic techniques [4]. The performances were coded following Östersjö's method of working directly from the video using time codes to identify events [6]. More detail about this investigation can be found in the author's masters thesis [5].

The early rehearsals in this project were spent improvising with the app using a variety of setups and musical motivations. Feedback from the ensemble was incorporated into the app and by the fourth rehearsal, the group had settled on the mode of performance - each player had a mallet percussion instrument, an *iOS* device and a number of cymbals and gongs spread around the group setup. The performance was an entirely free improvisation but the features and sonic material used in the app had proved to be sufficient musical motivation for meaningful performances.

Common issues that the ensemble encountered during the rehearsal process included a feeling of disconnection when interacting with the app, difficulty expressing pre-

Figure 4. The interface of the *Snow Music* app.

cise, clear rhythms with the touch interface and a lack of clarity in the sounds produced. These problems were addressed by our joint discovery of percussive techniques that worked well on the touch screens - taps, finger rolls, scraping, and rubbing - and updates to the app to produce a range of more distinct sounds. The group also learned to use the *iOS* device's hardware volume control throughout the performance to allow much more subtle combinations of percussion and computer sounds.

Snow Music was performed a number of times in the group's rehearsal studio in Piteå and on a tour of Canberra. In each public performance the three players were joined by other improvisors. The group used the app as a motivating element of the performances with "snow collages" - several players triggering snow sounds together - used to increase and decrease the intensity of the improvisation at the beginning and end of performances and the "bell" soundscape often used to trigger sections of tonal improvisation in free rhythm. The performers used the other two soundscapes as well as techniques for creating continuous sound such as "finger rolls" to create a denser texture to support various styles of improvisation.

5. AN EVOLVING MOBILE MUSIC PRACTICE

While all three of these works certainly feature the mobile devices embedded in a percussion performance context, it is interesting to explore the evolving role of the mobile devices in the performances and how the performer's interactions with the devices developed over the three projects. Flores et al [3] have articulated a set of patterns for inter-

action with mobile music devices. The most important of these for the projects described in this paper are "natural interaction" where interactions with the device trigger sounds in a one-to-one relationship, and "process control" where the performer controls parameters of a generative musical algorithm.

The focus in *3p3p* was to get the mobile devices into the hands of the performers, this experimental goal resulted in very simple generative processes and effects available on the devices which needed to be hand-held during much of the performance. While the generative elements used a "process control" interaction, the effects were used in a "natural" way, with performers able to hold the phones and selectively apply effects to different instruments or different parts of a single instrument.

In contrast to *3p3p*, the intention in *Nordlig Vinter* was to get the mobile devices out of the performer's way. The extent to which this was achieved was only possible with a mobile computer and a very simple set of "process control" interactions to trigger more detailed generative compositions. The simplicity of this system allowed a degree of freedom with its integration into different performance environments.

The *Snow Music* project strongly featured the "natural interaction" of a simulated bowl of snow. This interaction used the familiar (to percussionists) activity of bringing new objects and sound-makers into multi-instrument setups to integrate *iPad*s and the *Snow Music* app into *Ensemble Evolution*'s collaborative improvisation practice. While a vocabulary of gestures were quickly developed to take advantage of the natural interactions in the app, the performers also used the simple generative features of the app, "process control" interactions, to drive the overall structure of each performance. This aspect of the performance practice was only discovered through subsequent analysis of the recorded performances.

6. CONCLUSION

Of the three projects, the balance of interaction in *Snow Music* produced the most exciting and integrated performance practice. The natural interaction model enabled the mobile devices to be embedded in the performer's setups while the simple control over ongoing processes was used in a subtle but significant way to motivate the developed performance. Future works are planned to build on this result by using natural interactions through the device's touchscreen as the primary element of a mobile music app with secondary elements including interactions with generative processes based on input from the device's accelerometer and microphone.

7. REFERENCES

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