FROM FOLEY PROFESSIONAL PRACTICE TO SONIC INTERACTION DESIGN: INITIAL RESEARCH CONDUCTED WITHIN THE RADIO SOUND STUDIO PROJECT

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ABSTRACT

This paper describes initial research conducted in The Radio Sound Studio Project. [1] The aim of the project is to develop novel sound design tools by digitally model historical sound effects, found in the radio drama studio, utilising methods from sound computing, ethnography, and design. These novel sound tools will address both artistic sound practices as well as more utilitarian sonic interaction designs for new objects. The project also provides a tangible approach to connecting new sound design developments with historical literature and practice, and create new opportunities for radio, TV and Foley studios. This paper focuses on the process of selection of the sounding objects to be modelled, which was based on an in-depth interview with Sveriges Radio's sound engineer and sound maker Michael Johansson as well as observations of his Foley practice. It also describes the initial modelling of one of these objects, and plans for future work.

1. INTRODUCTION

Sound design research is in its infancy when compared to music or speech research. Key to its advancement is an increased understanding and connection with current and historical practices which are mainly situated in media production (radio, TV, film). Recent studies [1–5] have highlighted the important role that sound design practice in general, and Foley sound knowledge in particular, can play for the advancement sonic interaction design.

The Radio Sound Studio Project investigates the creative space between sound design tools and digital instruments. It is based on an ongoing collaboration with Sveriges Radio sound engineer and sound maker Michael Johansson, which provides us with access to expert knowledge as well as a vast archive of sounding objects used in radio drama productions. The project aims to develop novel sound design tools by modelling historical sound effects utilising methods from sound computing, ethnography, and design. The sound design tools developed through this project aim to address both artistic sound practices, and more utilitarian sonic interaction designs for new objects. We aim to expand the sonic possibilities of these tools to a continuum capable of producing both familiar sounds from the past, and new sounds for the future; developing methods for performance, composition, and sonification, and exploring new haptic and kinesthetics affordances. Finally, the work will contribute to research on how a digital archive of sounding objects and practices might be designed, creating new opportunities for radio, TV and Foley studios.

In this paper we present results from a first etnographic study of Michael Johansson´s practice, the motivations for selecting the first three sounding objects to be explored, and the initial digital model of one of these sounding objects. Finally, short term as well as future work are discussed.

2. BACKGROUND

The increasing need to give voice to silent digital objects as well as the emergence of new forms of digital and interactive storytelling (e.g. VR) ([6, 7]) challenge existing sound production methods. To address this, the development of new Sonic Interaction Design (SID) methods, rooted in existing sound making practices and expert knowledge situated in media production, are required. Foley practice [8] is key to this endeavour, as it is based on experiential knowledge about the sonic possibilities of everyday objects, and on the gestures and movements needed to utilise them. Foley practice provides a way to investigate sound production and perception from ecological [9] and enactive [10, 11] stand points. Through movement we gain knowledge about our surroundings, and the possibilities that arise inform our further actions. The unique skill of Foley artists, honed through practice and rehearsal, is to be able to perceive the many sonic affordances of objects [12], i.e. the possibilities they might offer for action and sound. The feedback loop created in performance, where the artist continuously listens and fine tunes their gestures to produce the desired sound, creates the embodied, often tacit [13], knowledge at the heart of Foley [3].

Harnessing this knowledge, by investigating current and historical methods of sound performance with acoustic materials [14], is key to be able to develop similarly intuitive and meaningful new sonic interaction with digital objects.

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Two aspects of the Foley practice are particularly amenable to SID. Firstly, Foley is often based on acoustic modelling, rather than the attempt to reproduce natural processes. For example, acoustic wind machines produced noise through friction (rubbing material on wooden slates) and the circular motion of a handle.

Secondly, the same gesture could be coupled to different resulting sounds (for example, a circular motion has been historically used for the production of wind, as well as rain sounds).

We can say that the concerns of Foley artists and current sonic interaction designers are similar: how good the resulting sound is in approximating the required sound; and how performable the purposely built device (be it an acoustic machine, a combination of everyday objects or a digital model) is. As a consequence, we need to find methods to study the process of meaning creation with sound by connecting the past and the present, and we need ways to create and evaluate sonic interactions [15]. One approach, in this context, is to use the combination of physical modelling and procedural audio [16] to recreate everyday objects, materials and behaviours, and their resulting sounds (the breaking of a wood stick, or a ball rolling, for example) [17].

The development of digital 'sounding objects' and digital musical instruments (DMIs) have some common concerns particularly in relation to offering intuitive affordances while, simultaneously, producing complex and meaningful sonic articulations.

In the practice of Foley, and the history of sound machines, we can find some solutions to these concerns [18]. Examining a specific object [19], utilising ethnographic techniques such as in-studio observations and interviews, or remaking a design [20], may be particularly useful in uncovering tacit knowledge accumulated as part of the design process. Examples of work in this area include work by Serafin and De Götzen [21] with the modelling of Luigi Russolo's Intonarumori, or by Keenan and Pauletto [5, 22] with the modelling and evaluation of a wind machine.

In this project, we interview and observe the practice of Michael Johansson, a sound engineer who has worked at Sverige Radio for about 35 years. Michael worked for many years in news and sport productions and, in 1995, transferred to the drama department. Philosophy and history of film were part of his academic studies, however his training as a sound engineer took place within within the job: other sound engineers trained him as relevant courses did not exist at the time.

Once a digital model, of a given sounding object, is developed, there are a number of methods available to investigate the model and the possibility for meaningful action-sound combinations.

NIME research has used workshops to study sound-gesture relationships [23], and to prototype sound interactions from everyday objects [24, 25], for example. Borrowed from design research, the method of *Design Fiction* [26], which uses the familiar to help us imagine speculative futures, has been found to be an effective method to temporarily move aside practical concerns and free the imagination of designers [27–31].

3. METHOD

In this article we describe the initial stages of the Radio Sound Studio Project. In this phase, our methods included conducting a semi-structured interview with Michael Johansson, where we gathered information about his background and his past and present practice in the studio, as well as observing his Foley practice. We asked Michael to select a number of different sound objects, from the vast library available in the studio, and produce a demonstration for us in Zoom (access to the radio studio was forbidden due to Covid). Through this process we selected three objects to model in the digital domain. In this article we describe the initial modelling, via procedural audio and physical modelling, in Pure Data of one object called the Squeaky Box. This implementation uses components of the Sound Design Toolkit (SDT) [32] as well as a modified version of a model of a creaking sound by Andy Farnell [16].

4. OUTCOMES OF INTERVIEW ON FOLEY PRACTICE

Michael´s sound design creative ideas come from many years working in sound and radio, observing others, practicing himself, and in dialogue with the many directors and producers he has worked with. While the radio drama department used to have a dedicated Foley artist, for a number of years now Michael has been creating and recording the sounds for radio plays himself. When working on a drama, Michael records the voices first, and then fills their presence and the rest of the story world with sounds. While the director is present during the voice recording, Michael is usually left to design the rest of the sounds by himself. Talking about a specific production, Michael says: "She [the director] left it to me, to cut and put sounds in. So I did that myself. She had some wishes, e.g. 'that's too much', 'can you do something there', so we sent the files back and forth." ...[W]e kind of had a dialogue via email". In regard to the sound choices he made, Michael says: "Mostly I did [it based] on my own experience: what I feel, if there's something missing, I had to feel like I'm following her [the character]."

Sections of the drama are then sent to the director, who will give some feedback to be addressed by Michael in a loop that converges to an agreed final piece. To create this immersive and complete sound world (which is radio and unsupported by images) Michael uses sound libraries and Foley. While atmospheres are often found in libraries, any sound of interaction and presence is created through Foley. Foley is used often when the character is meant to be moving. Michael says: "You can hear when you're missing something...[O]r at least I hear when I miss something – I need a movement". Differently from film, Michael does not perform Foley in synchronisation with the (sonic) story. Instead, he hears the recorded dialogue and, then separately, "I kind of get the tempo and the feeling in the movement [from the voices]. That's how I work... [M]aybe

Figure 1. Sound designer creating and using the spoon-cloth pair

I do [a movement] 10 or 15 times until I feel I got the same..., the right..., the perfect movement."

When asked how he comes up with ideas for sounds and how he decides what works Michael says:

"That's difficult. Em...I kinda..., I know I would need that sound so, you kind of work it in your head, 'how will I get that sound', then you come up with some ideas, then you try them out. But usually I do that on my way into work, or on my way from work, so I've got some ideas when I'm here. I can try that, I can try that. It's hard to say, but I'll say maybe half an hour [for a sound], I think, maybe that, fifteen minutes, half an hour. To figure it out, and then [try] some different [options]."

5. OBSERVING FOLEY DEMONSTRATIONS AND SELECTING SOUND OBJECTS FOR DIGITAL MODELLING

Following the interview, we asked Michael to demonstrate to us how he achieved interesting sounds for a drama production of his choice. Michael demonstrated a few sounds developed for the Swedish radio drama "Turid - A Viking saga". Turid is a 15-year-old royal daughter, who is forced to embark on a life-threatening journey to survive war and famine in her home village. In search of love, she is tossed between big decisions, bloody wars and visits to the spirit world. The Radio drama, which was a dramatization of the books written by Elisabeth Östnä, was directed by Ella Lemhagen and sound designed by Michael Johansson.

5.1 First object: wooden spoon wrapped on wet cloth

Among these sounds, we selected a wooden spoon covered by a wet cloth see Figure 1 as one of the sound objects to be modelled in this project.

At one point in the story, Turid needs to make a sacrifice to the gods, and that´s represented by spreading butter on the "Holy rock". In order to create this, and other sounds, Michael conducted some research on how Vikings used to live and what objects they used. After that, he decided that it would be likely that the Turid would have spread butter with a wooden utensil. Additionally, he decided to model the effect of the butter between wood and rocks with a wet cloth.

He selected a couple of wooden spoons and, by listening to them, he selected one. Then he found a not very smooth rock that he thought was the best sounding one, but the spoon on the rock sounded a bit hard, and so he decided to use a wet cloth on the spoon before doing the gesture of spreading on the rock. He says: "To me that sounds like wood on rock, but I would like to have the feeling of butter in between the spoon and the rock, that I put on a little bit of wet clothing to kinda soften it a little bit."

Michael then continues: "Then I will record that [spoon with cloth spreading on rock], and then I will record a little without any clothing, and then I can mix those two sounds. I can take one movement without the cloth, and one movement with the cloth. I don't know if you <laughs>, if you follow, but that's how I did it"

Answering the question about why he made the cloth wet, Michael answered: "It could be a dry cloth, but a dry cloth would silence the sound too much, I think."

When asked for which other sounds he has used a wet cloth, he answers: "It is not very common, but sometimes I think I have used it in ordinary plates. When you should be eating. When you put the metallic fork directly on the porcelain, the china, it's very hard... So then you have to put something in, on the china, on the plate to kind of soften when the fork hits the plate...just so you can move like you're eating. And now I'm using a wooden piece of plate, but if you go [demonstrating using spoon in wooden plate], it kinda, it sounds a little bit empty. But if you put something in, like wet, now it is clothing but it can be paper napkins, then you get the [demonstrating using spoon in wooden plate with wet cloth], you get the silence, this kind of silence, yeah." This combination of objects helped smoothing the wooden sound to an appropriate level and portrayed the "wetness" of the butter. [2]

Two aspects were particularly interesting for us about the use of the wooden spoon in this story. Firstly, that this is an example where the sounding objects are completely mundane, and secondly, that they portray something quite different from their normal use. They are not used to indicate eating, or in a percussive way (something quite typical to do with a wooden stick), but as a substitution of something highly specific to the story and that would be done differently (butter would be used) in reality. The creativity of this substitution is interesting, and we wonder whether it can be expanded to portray different feelings: for example caressing a body, or giving the feeling of a texture.

Figure 2. Clogs used in the radio play

Figure 3. Squeaky Box

5.2 Second object: old Swedish clogs

The second selected sounding object are a pair of old Swedish clogs, with a wooden base and a thick leather top (see figure 2). These we were used in Turid for two purposes: to make the sound of footsteps, but, more interestingly, to create a sense of presence. Michael describes in the interview the importance of producing, through sound, a sense of presence to voices that otherwise feel disembodied. “The sounds I had to make are usually sounds that give a body [to the characters], what they’re saying, what they’re doing...[S]o that’s the purpose, you can feel that the voice has a body. That’s what I’m trying to get, to create."

Even when the characters are supposed to be simply standing in the Viking adobe, a slight movement of the clogs on a surface, and subtle sounds of clog-to-clog contact would provide a body to the voice. Michael says: “Not standing still, but little movements that give a feeling of somebody kinda moving, of being there, the body."

And different bodies will sound different. For example, Michael moves the clogs with his hands when portraying the presence of a young girl as opposed to an adult.

The surface upon which the clogs move is also important. The outdoor is created by moving on gravel and 1/4 inch magnetic tape for leaves, while the indoor is done on a 1 cm woolen carpet to imitate the sound of mud and soil which was typical of a house´s floor in Viking times. Michael comments on this: “That was difficult because when you walk on the carpet with the wooden shoes it doesn’t make any sounds... So that’s why I had to kind of get them [the clogs] together, the wooden shoes a little together to make it... to give it some noise... sound.... [B]ut when you listen to it together with the voice, it’s almost always too much. So you have to do it until you get just a bit of movement on maybe a few places in the dialogue, but still get the feeling of... that there’s a person...So it takes some time to find the right amount of movement."

The final interesting aspect about the clogs is the fact that they produce a sound perhaps more familiar to Nordic countries, than anywhere else. We are interested to see if that geographical and cultural reference could be maintained in the digital model.

Overall, we selected this sounding object not for its typical use (signifying footsteps), but for its capacity to portray bodily presence, and for its implicit cultural and geographical references.

5.3 Third object: the squeaky box

The final object we selected is a mechanical sound machine purposely made for producing sound effects. Michael Johansson called it the "squeaky box" (see figure 3) and it consists mainly of a wooden resonance box and two handles made of wood and metal at the opposite ends of the box. This sound machine makes squeaks and creaks when one rotates one or both the handles. This due to the friction between the handle mechanism and the wooden box. Used in many different plays to produce creaks and squeaks made by imaginary doors, floors or boxes, this is not an everyday object, but an acoustic model of a sound. The object presents the performer with some explicit affordances, however, as it is not an everyday object with a given function in real life, it might provides a performer with additional possibilities for creation. [3]

6. DIGITAL MODELLING

At the time of writing, we have started the development of the digital model for the squeaky box.

A first implementation combines the friction object from the Sound Design Toolkit (SDT) [32] and a modified version of the creaking door model by Andy Farnell [16]. The friction model of the SDT is based on the friction model detailed in [33] and, in our model, simulates the rubbing between the handle wood and the box surface. The first three harmonic frequencies of the resonating object can be adjusted in order to manipulate it to make it closer to the original. The decay length and gain values of these harmonics are also available as variables. Further variables that can be adjusted include the normal force, Stribeck velocity, static and dynamic friction coefficients, stiffness,

[2] see:https://kth.box.com/s/09ldr3tx0qxw08eb7jur400wywucskgt

[3] see:https://kth.box.com/s/09ldr3tx0qxw08eb7jur400wywucskgt

damping and viscosity. Another key variable is the lateral force. This is the force that would be used to move one object along the surface of another, in order to create the friction sound effect. Because the SDT is based on physical models, this is given in Newtons and increasing the lateral force triggers the simulated 'movement', which in turn generates the friction sound.

The creaking door model by Farnell simulates the creaks and aspects of the squeak. This model uses the resonant frequencies of a square membranes based on the harmonic relationships found in [34], setting the fundamental frequency as 125Hz to simulate a wooden door. The fundamental has been made adjustable as well as the harmonic relationship, which is not necessarily suitable for the synthesis model of the squeaky box described here.

The creaking door model of [16] model is triggered by an equivalent lateral force, although it is not called this in the original. The lateral force from the SDT model can be scaled and mapped to also control the creaking model. A final parameter of 'tightness' has been added by the authors to control the level of creaks and squeaks. If the handle of the squeaky box is very tight, then the squeaks are less likely as the handle cannot move any significant distance, and more impulsive creaks are created instead. This parameter has a similar effect as increasing the normal force in the SDT model and investigation as to how this might be applied to the model from [16] are ongoing. [4]

Plans for the modelling of the wooden spoon include using the same friction model combined with filtering to simulate the damping of the wet cloth. Plans for the modelling of the clogs include modifying existing models of footsteps sounds on different surfaces, and mixing in impact sounds to simulate the clogs touching each other. For these two last models, we envisage that finding the correct parameter values and ranges might be crucial to obtaining a resulting sound similar to the acoustic counterparts.

7. PLANNED AND FUTURE WORK

At the time of writing we are concentrating on the third object, the squeaky box. We are improving the model and conducting two tests. Firstly, we are testing the plausibility of the digital model´s sonic output as a representation of the sonic output of the squeaky box. Similarly to other evaluations from previous studies [35], we will conduct an acoustic comparison between the model and the acoustic sonic output. Following that, we will evaluate the performability [22] of the digital model when imitating the sonic output of the squeaky box, we well as when imitating other creaks and squeaks recorded in everyday life. We have selected a number of simple interfaces, such as a 30cm strip and a circular potentiometers, a rotary encoder and an handle, to investigate the coupling of a simple gesture with a complex sound. Models of the first and second object will undergo similar development stages and tests.

Following this, we plan a design fiction workshop with music makers and sound designers at KMH Royal College of Music, Stockholm, to imagine new ways to perform with the digital models, ideate new interfaces, and experiment with extended parameter ranges. Finally, some of these ideas will be implemented for use in a workshop with the general public at the Tekniska Museum in Stockholm in December 2021.

Throughout this process, we will continue the dialogue with sound engineer and sound maker Michael Johansson who will provide valuable feedback on the development and performability of the sound models.

We will also aim to record and formalise the process of digitalisation of the sound objects and the practice in order to inform the development of a methodology for designing digital archives of sound objects and practices.

[4] see:https://kth.box.com/s/09ldr3tx0qxw08eb7jur400wywucskgt

8. CONCLUSIONS

This paper presented the initial research conducted in the Radio Sound Studio Project. The paper summarises results from an interview with sound engineer and sound maker from Sveriges Radio which provides information about Foley practice in context, as well as information about the use, in a specific drama, of two of the sound objects selected in this project for modelling. In total, three very different sounding objects have been selected for digital modelling. Two consist of everyday objects that are used in unusual ways in a radio drama. This original use is of particular interest to us. The third object is a purposely made sound machine for creaks and squeaks. We are interested to investigate how its shape and configuration, which are unrelated to everyday existing objects and functions, might provide designers with new ways to explore sonic affordances. Finally, we have described the initial implementation of the digital model of the third object (the squeaky box) and we have summarised our plans for future work.

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