

## Interfaces and Interactivity Proposal

### Introduction

This project will see the development of a SoundToy for use as a compositional tool. It will utilise a simple 2D interface that can be used to create a number of small animated objects that will interact to control different parameters of synthesized sound.

### 1 - Contextual Research

#### 1.1 - What is a SoundToy?

A SoundToy is a small application that focuses primarily on the production of sound. Although the term SoundToy is not completely defined, they are usually small applications with some type of simple graphic user interface which allows for some interaction with the sound creating aspect of the interface.

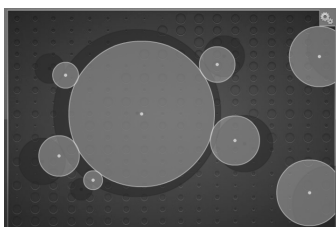
SoundToys can be applications that span a broad range of uses. Some can be compositional and generative tools, games or sound-scape creators, interactive works of art (artworks/installations/open-works), and sequencing applications. The designs of which can often be very imaginative which tend towards trying to break out of traditional sound and music creation paradigms.

#### 1.2 - A Selection of SoundToys and Their Analysis

Looking at the scope of available SoundToys gives some indication of the various approaches that can be taken when creating my own original SoundToy.

##### 1.2.1 - Circuli

Circuli is a generative musical instrument. The user clicks onto the background which creates a small dot. From this dot a growing circle emerges. The user can create many dots. When two circles touch, the larger circle continues to grow and the smaller circle shrinks. A musical note is generated when the edge of one circle hits the center of another circle.

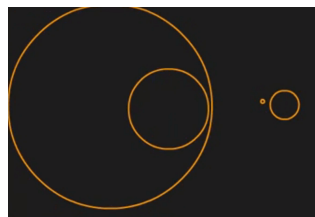


The sound is a simple polyphonic synthesizer that the user has minimal control over. There is a menu to determine reverberation, ambience, and the harmonic content of the synthesized sound. Presumably this goes from a simple sine wave up to more harmonically rich wave forms. The envelope of the sound is determined by how large the circle is and how long it interacted with another circle before triggering a note.

What determines the pitch of the note is unknown to me. But the notes are locked to selectable modal scales that will always sound pleasant.

##### 1.2.2 - Pulsate

Pulsate is very similar to Circuli. They both feature growing circles and are used to build generative music. Pulsate generates sound when the circles hit each other. There is also the added function of allowing circles to be placed inside other circles. This gives Pulsate a rhythmic functionality lacking in Circuli.



Like Circuli, the sound is generated with a simple synthesizer that allows you to change the wave shape between three presets. Other sound shaping options are note length and envelope. There is

also a delay and reverberation.

The note is determined by the smallest circle size on contact. The larger the circle the lower the pitch.

Whilst the circles in Circuli affect both note and envelope decay, Pulsate only affects the note. This gives less random variation in a single scene. It is also lacking the modal options and seems fixed to a single scale. The trans-domain-mapping is very limited in both SoundToys.

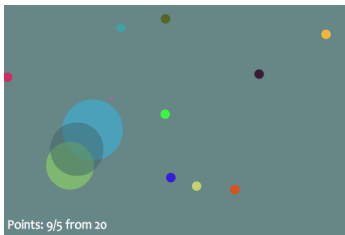
Neither Pulsate or Circuli can be considered open works. They both contain a limited sound set which is arranged in a none traditional way with an element of randomness. This means the pattern creation often takes on a life of its own, thus breaking the composer out of the traditional composing paradigm to a small extent. The musical outcome can only be considered the work of the user and not the program creator.

Pulsate and Circuli both offer a very simple interface that allows the none specialist to easily create interesting and unique melodic compositions. They are neither academic experiments or interactive art works. Their purpose is obvious. They create music.

##### 1.2.3 - Boomshine

Boomshine is an example of an interactive flash game that is not a SoundToy. The aim of the game is to create a growing circle that will devour the small randomly dispersed balls in the game area. The circle you create only lasts for a small amount of time. Once it devours a ball, another circle will be created that can also devour other balls. The aim is to devour a specific amount of

balls via a chain reaction to commence to the next level. Once your circle chain reaction times-out before hitting a ball the level ends.



When the balls are devoured a musical note sounds that fits in the key of the constant background music.

This is a good example of what a SoundToy is not. The musical element has no effect on the user's interaction with the graphical user interface. If the sound was completely removed the game would be fully functional. Circuli and Pulsate on the other hand would be rendered useless if their sounds were to be removed.

#### 1.2.4 - La Pate a Son

La Pate a Son is a compositional tool that allows the user to construct pathways for travelling pieces of dough. Sound is created when the pieces of dough hit sound generating components that are placed throughout the pathways. Its sounds are generated from samples which are triggered algorithmically. The notes can be constrained to modes to create a more pleasing composition.



The compositional element comes into play when the pathway is split causing multiple patterns of various sounds to be generated. It is quite easy to create something unpleasant, but the SoundToy is capable of creating some quite complex and pleasant sounding compositions after a steeper learning curve than the previously mentioned SoundToys.

La Pate a Son brings into question the idea of authorship. Whilst the SoundToy is created like a piece of art and the sounds and components are all contained, the user is free to create a composition.

It is hard to define levels of authorship brought by each SoundToy. La Pate a Son is a conceptual whole, the sounds match the visual aesthetic and the compositions have a unique charm that was by design. However the arrangements and compositions themselves are user generated.

Authorship is more difficult to determine for La Pate a Son than it is for a SoundToy like Circuli which has no original aesthetic value and a limited sound palate. The melodic compositions that are created are mostly random and singular in their appeal with a sound palate that can be called generic. Whilst La Pate a Son is capable of much more interesting and complex compositions but

with a very unique palate that seems defined so that the compositions can only sound as though they originated from this particular SoundToy.

This is similar in a way to Bjork's Biophilia (2011) SoundToys. Each one has a unique palate of sounds that are a trademark of the composition on Biophilia the SoundToy is created from. You are given freedom to rearrange the sounds but only in the restrained tonal palate of the original composition.

La Pate a Son may not have been derived from a composition, but the palate suggests an unwritten composition envisioned by the artist. Both La Pate a Son and the SoundToys associated with Bjork's Biophilia can be considered open works to some extent.

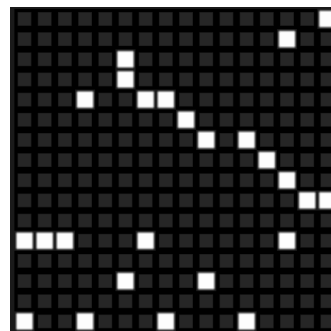
Similarly, Electroplankton - Hanenbow, a game for the Nintendo DS, can be seen as an open-work. The game designer created a work that has unique musical melodies each time it is played, but these are tied to a limited sound palate.

I would not consider Hanenbow a SoundToy. Like Boomshine, the sound can be removed and the simple puzzle game is still fully functional, albeit probably at reduced enjoyment.

In these open work SoundToys the programmer created a space of possibility in which the user can fill in (Crawford 2013). It seems counter intuitive that a SoundToy like La Pate a Son has more sonic possibilities than Circuli yet is more tied to this concept of authorship.

#### 1.2.5 - Matrix Synths (Otomata and ToneMatrix)

These are musical sequencers/performance tools known as Matrix Synths. They work by creating blocks on a sequencing grid.

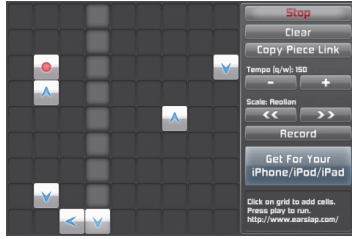


They blur the lines between composing and performing because to create a composition you have to let the software run constantly which shows the evolution of the composition over time as it is being created.

Otomata differs to ToneMatrix in that you place the squares onto the grid and they start moving at a constant rate.

A note is triggered when the block hits the walls. Because the blocks can hit other moving blocks and change direction, it adds an element of randomness not found in ToneMatrix.

Both create their sound with a synthesizer. The user has almost no control over the sound. Otomata only allows the changing of model scale and tempo.

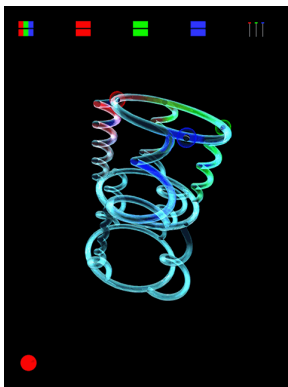


Both these SoundToys are similar to Tonori-on and other hardware matrix synths and sequencers, but with a very limited sound palate and functionality.

Unlike La Pate a Son these do not blur any lines of authorship, they use a generic sound palate and function as purely compositional/performance tools with no artistic impositions from the software developer.

### 1.2.6 - SpiralSet

We can move further away from compositional and generative music tools to what can be seen as purely artistic open works.



SpiralSet is just such a thing. It is not a compositional tool as we have defined them in the previous SoundToy examples. It is more closed than that, in a sense. Whilst the other SoundToys used singular discrete notes, SpiralSet is almost a singular composition that can be manipulated sonically by interacting with the tubular structure to navigate three

small balls around its pathways.

The sound is generated by a "spectral synthesis sound engine" with each part of the structure possessing its own "sound-set" and "each sphere corresponding to a dedicated synthesis voice".

In its installation form, it uses infra-red sensors housed in tubes to allow the user to control the movement of the structure. This gives the SoundToy an interactive element missing in these other examples.

### 1.3 - How interactive are these SoundToys?

These SoundToys all have very similar interactivity. This is in the form of visual identification of the sound generating elements which can then be interacted with to change the sound produced which is the second form of interactivity. We hear and see what is happening in the SoundToy and make decisions to alter what we hear and see in the SoundToy.

There is some contention as to what exactly constitutes as interactivity.

Garth Paine (2002) argues that "most systems are not interactive, but simply reactive or responsive because they lack a level of cognition".

By his definitions the SoundToys discussed here mostly work on a reactive level. But this definition is not the literal definition. There can be levels of interactivity and I would suggest that most of these SoundToys possess interactivity on a simple level, other than SpiralSet which has a more complex control mechanism and a wider palate of textural sounds.

The creator of SpiralSet conveys this well in the structure diagram (Dolphin 2009, Fig.3) of the SoundToy. It shows that the location of the spheres and the sound output both feedback to the user creating a constant flowing cycle of interactivity.

### 1.4 - Conclusion

We have not even touched the surface of the variety of unique SoundToys that are available. We touched upon some of the key aspects of SoundToys and showed that they all possess an interplay between sound and visuals to create an interactive experience unique to SoundToys. They could be defined thus, if the removal of sound renders it useless, it's a SoundToy.

We can see that some of them are works of art that probably would not be used as part of a secondary original composition. For instance, recording the output of La Pate a Son or SpiralSet and using them in other compositions seems less of the intended use than say Circuli or Otomata.

We see from the small selection covered that SoundToys can be divided into two types, those intended as instruments, and those intended as interactive experiences or conceptual art works.

As far as Trans-Domain-Mapping goes, a lot of the more simplistic SoundToys under utilised this whilst the more academic and artistic works like SpiralSet utilised this in a complex way.

Most focus on allowing the none experienced and none specialist to use them with ease. This can be in a form of their simplistic user interface and their limited sound set, for instance sequencers being limited to a single modal scale. There seems to be a trend of creating something that is instantly usable and fun, but conceptually complex and interesting but in a way that doesn't get in the way of their instantly approachable nature.

Maybe this is why the term SoundToy is fitting. The word Toy suggests something that is easy to understand and use, and ultimately fun. SoundToys could be seen as the epitome of what John Cage (1958) describes as "the purposeful purposelessness".

## 2 - Development / Outline of Project

### 2.1 - Ideas

When I first started the module I had the idea that I would make a simple SoundToy. I initially had the vision of a tree and leaves that would gently float down to the ground, there would be collisions against other leaves as well as the impact on the ground. The music would generate by a wind that would blow through the scene and jostle the leaves. Maybe having a control to determine how strong the wind is and the possibility of it catching the already fallen leaves and blowing them back into a position where they can once again contribute to the sound generation.

However, after researching I understand this to be only minimally interactive. By my own definition the sound could be removed leaving the interface fully functional. But the user interface would now be without purpose because the sole intent of the UI is to generate the sounds. But this does not have constant user input deriving from constant visual and sound feedback. So it can not be said to be interactive.

I would want to focus on creating something with a musical purpose on the lines of Circuli and Pulsate, but I would hope to combine this with a small sequencing aspect.

We saw that the trans-domain-mapping was very limited in the examples shown. I would like to include this to a larger extent. Maybe having the scene/pitch relationship the same as the examples, but also controlling things like filter and envelope.

I imagine a set-up with a growing circles in which their interactions produce sound, but also the inclusion of some horizontal and vertically moving objects that can interact with the scene causing abrupt changes in the generative composition by disrupting the location of the static circles.

Like Circuli and Pulsate, I will stick to a 2D scene with very minimal graphic.

I will also limit the produced notes to a modal scale possibly with the option of selecting new scales for variation of use.

I would like to incorporate more tonal palate to the SoundToy by maybe having multiple synthesizer oscillators for different wave shapes which would give the generative music an extra dimension. I will stick to a simple synthesizer design. I will add a delay to the SoundToy and possibly tempo options.

Circuli and Pulsate both utilise circles differently from each other (note on edge impact vs. note on center impact). I do not know yet how mine should work, but I

hope to do something slightly different from both Circuli and Pulsate in this regard.

I am still intrigued by the idea of an open work. Making the scene more interesting. Since I am new to this subject and do not know my way around the software creation tools. I must leave quite a lot to experiment and seeing where the process of creation takes the project. This much is true, I will create a 2D SoundToy of a generative/compositional nature.

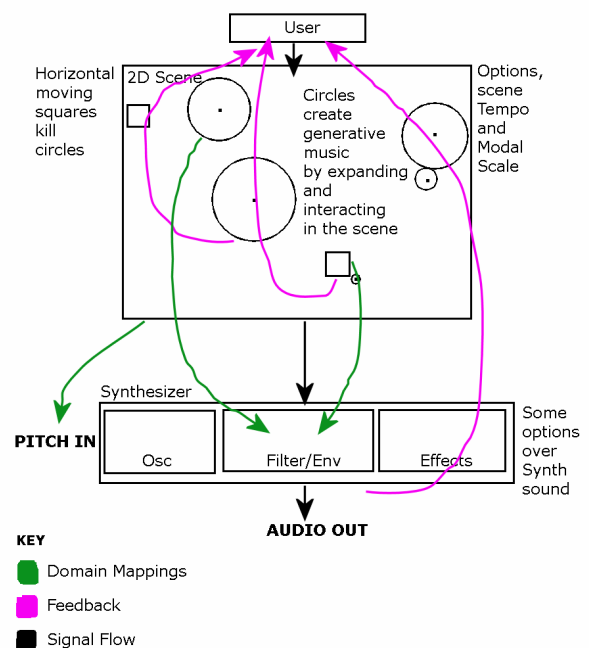
### 2.2 - Sounds, Structure, Process

#### 2.2.1 - Sounds

Simple multi oscillator and polyphonic synthesizer, filter and envelope section. Note data restricted to modal scales. Simple delay effect. Tempo options and modal scale selection. Simple options to change synthesizer sound.

#### 2.2.2 - Structure

This is a very basic and roughly sketched idea of how the SoundToy could be structured.



#### 2.2.3 - Process

The software will be built in Max/MSP. The synthesizer element should be relatively simple. Although I may find this difficult because I do not have much experience with Max/MSP.

For the SoundToy interface I have the option of using either Unity 3D or Jitter.

Creating a scene and adding in some moving object with collisions and physics is fairly straight forward in Unity

3D. Having that data sent via internal networks is also fairly straight forward. However because I'm learning Max from scratch, it would be beneficial to stick to the one software environment.

Is Max capable of doing this project? a small amount of searching brought up a wealth of information and demonstration videos of what Jitter's Physics engine is capable of (Cycling 74, 2012). Max has extensive help and reference documentation that will aid in seeing this project through.

## 2.3 - Time and Resources

### 2.3.1 - Gantt Chart

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Ideas	■	■	■	■										
Proposal					■									
Project Hand-in													■	
Evaluation														■
Build - Overall						■	■	■	■	■	■	■	■	
	Resources - Max 6.1 (Bought). Working mostly from home on my powerful and stable Windows PC. Max and Jitter Physics help/reference files. Max/Jitter user forums for help with problems encountered. Extensive use of online resources.													
Build - Synth						■	■							
Build - Interface								■	■	■	■	■	■	
Feedback/ Testing						■	■	■	■	■	■	■	■	
	Feedback will be gotten from module tutor Andy Dolphin. Testing will be done along the way. Progress documented and tested by myself and module peers and tutor. Videos of the work as well as progress saves will be uploaded to my development blog.													

Week 6 is where the real work starts. It is difficult to determine how long it will take to learn how to build a SoundToy from scratch. Often when developing software it is possible to get stuck for far too long on the small things. Past experiences have gone both ways, learning UDK and Kismet was a snap and I was doing complex things within days. On the other hand when working on a complex drum sampler in Kontakt, learning the Scripting language made the project slow to almost a halt for weeks. Also competing to get work done for others modules will be a big part of the challenge.

Hopefully the experience I have gained from past projects should ensure my working method goes smoothly. I know the help resources exist and I know how to use them. My development set-up is complete

and functional. It is now down to the development of the required technical skills that will see this project a success.

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