PLAY! : Sound Toys For the Non Musical

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ABSTRACT
This paper reviews a number of projects that explore building electronic musical *things*, interfaces and objects designed to be used and enjoyed by anybody but in particular those who do not see themselves as naturally musical. On reflecting on the strengths of these projects, interesting directions for similar work in the future are considered.

Keywords
Play, exploration, sound mapping, engaging content, sound design.

INTRODUCTION
In *Experimental Music* [1] in 1958, John Cage talks about the importance of play, “the purposeful purposelessness” that serves as “ an affirmation of life - not an attempt to bring order out of chaos nor to suggest improvements in creation, but simply a way of waking up to the very life we're living”.

As we grow up the activity of play that is so important to us as children, allowing us to explore and understand the world, can become lost. This is particularly true of music in which the greater availability of recorded music has continually offered us more convenient but more passive ways in which to appreciate music.

There has been a lot of research into creating new musical interfaces for musicians. My interest lies in creating new musical interfaces for those who do not see themselves as musicians and who may well feel intimidated by traditional musical instruments. The aim has been to develop work that avoids looking and feeling like a traditional musical instrument to create something that is more readily playful. The work was developed whilst on the Computer Related Design Graduate program at the Royal College of Art in London..

PROJECTS
The process for each of these projects was to design a simple physical interface using very basic electronic components (tilt switches, linear potentiometers etc) and then design some kind of musical or sound interaction to work with this interface. Technical details can be found at the end of this paper.

Fig 1. The Piano Cubes

Piano Cubes
The first piece *Piano Cubes* presents two jam jars half filled with a golden syrup. When a jar is picked up a piano is heard playing a simple major scale arpeggio. When the jar is tilted the arpeggio changes. Tilting to the left the arpeggio goes up in pitch, to the right it drops in pitch. If the jars are tilted forwards the arpeggio speeds up and tilted back it slows down. Each jar ‘plays’ its own independent arpeggio and so picking up both jars gives two separate piano lines. The speed of the two pieces are locked together but the pitches remain independent. In this way the jars offer a complex sound space where the player is freed from some of the difficult musical responsibilities like hitting the note at exactly the right time or ensuring the note is in key, but instead offers control of parameters that are more global

to the piece of music being created. By allowing the player to control just tempo and overall pitch for the two jars offers them the chance to control and hence create coherent, interesting and rich pieces of music fluidly.

Bullroarer

Bullroarers are one of the earliest sound objects devised by humankind. It is a form of 'aerophone', a piece of hollowed wood or bone that is spun around on the end of a length of rope or twine to produce a characteristic whirling sound. This new development of the bullroarer was developed in collaboration with Mark McCabe who had already been working on the interface. The Bullroarer interface features a a slider potentiometer that provides the computer with a data value representative of how fast the Bullroarer is being spun around.

Sound Design

As a first iteration of sound design for this new bullroarer, I attempted to create an electronic version of the original sound and hence created a patch *Bullroarer* that featured a low rich drone which was timbrally modulated by the speed of the spinning object. The system was very responsive and with such a physical control of the sound quality was quite engaging.

In the next sound patch, *Float* more elements of musical content were used. As the speed increases, different notes along a scale are played. In *Phasing* the bullroarer plays through a sequence of notes at a tempo relative to the speed of the spin. The sound used incorporates a strong echo effect and as the speed of the bullroarer is increased the sequence of notes move in and out of phase with each other. Both these sound pieces were improved by adding some of the timbre control used in *Bullroarer,* so that not only were the musical notes changing along the axis but also the quality of the sound.

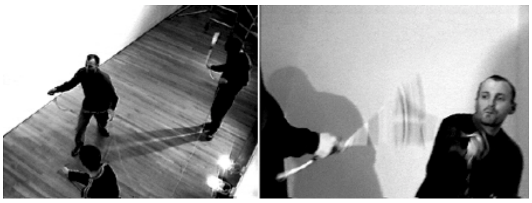

fig 2. Collaborative Pieces : 3 bullroarers

Collaborative Pieces

In this next stage the aim was to take some of these ideas and start to work towards pieces that allow people to play music together. Hence we built more bullroarers and designed different elements of sound for each one. *Float 2* uses two very different sounds, one quite soft and drone like, the other more sharp and percussive, both with note sequences harmonically linked to the other. *Disco* takes its lead from electronic dance music to create a more comprehensively rhythmic design. One bullroarer controls the rhythmic density of a simple drum track of kick drums, snare drums and high hat cymbals, another controls a rhythm track made up of presampled percussion tracks or 'break beats' and the third modulates a filter effect on a disco bass line. All the musical elements of the drums, the break beats and the bass line are synchronised together and so the bullroarer players are all playing / modifying the same piece of music.

Hit!

In Hit! I created a series of objects that each played a different chunk of music when hit. These chunks could be a bar of a drum break beat or a short melody phrase and were all designed to work musically together in that they were all in the same tempo and key. By creating a number of these objects small groups of people can play music together in a fun way without having to know the details of how to play. The simplicity of the interaction of hitting an object to get a sound playing is overcome by the multiplicity of objects. If a player gets bored with one sound then they can move onto playing another or try playing two or three at the same time.

Stretch!

Stretch! evolved as an attempt to build an interface that gives the user more hands on control of various qualities of the sound. It appears as a piece of latex rubber sheeting stretched across a frame with a circular cut out. By pressing into the rubber sheet in different directions and in different ways the sound can be manipulated and played with. The Stretch! interface uses 4 linear potentiometers which give 4 different axes for control. The first iteration of a sound design for Stretch! allowed the player to alter some parameters of an analogue synthesised bass line, primarily changing filter settings to give strong timbral changes in the sound. In an attempt to make the player feel they could could modify the sound at a more fundamental level I created a sound patch called *tone* in which the 4 axes were mapped to change the three fundamental properties of pitched sound : pitch, volume and timbre. An alternative to this was *noise,* which attempted something similar with a white noise source.

When I think of Heaven…

In its initial form Stretch! proved interesting but not as immediate as the bullroarer. It offered a better explorative space but remained less playful. Some of these weaknesses were addressed in a piece that I assembled for the Royal College of Art degree annual show. "When I think of Heaven…" took the same direction as the bullroarer project by trying to develop the Stretch interface into a piece that could be played by a number of people simultaneously. In the show 4 large Stretch panels were mounted as part of the wall. Each panel triggered and modified its own sounds. In addition two pads contained within the panels triggered a more percussive tone, the notes from which are looped into a repeating pattern which slowly dies away.

CONCLUSIONS

A Rich Space

The most immediate conclusion from the work is that the space being explored creating simple collaborative objects for those who feel musically inexperienced is very rich. First time users respond very enthusiastically, willingly placing themselves in performance like situations. Unlike musicians who will approach the objects as musical instruments that demand being mastered, the naïve users respond better to the playful qualities of the objects.

Collaborative Systems

The second conclusion is that the most interesting direction of the work was in creating environments which allowed a number of players to collaborate in playing music. As with many multi user computer games the interaction between the players becomes equally if not more important than the interaction between player and the interface.The technology recedes as the primary focus and becomes more a catalyst for social interaction.

Future Directions

This work suggests a number of possibilities for creating physical environments in which people can actively explore the nature of sound and music together. Such environments don't need to be technically complex. In creating collaborative toys that are straightforward to use the best approach seems to have been start from simple ideas and then add complexity until the experience is sufficiently engaging. This complexity can be designed in in many ways, we can create more toys allowing more people to play together or we can make the sound output richer by building more layers of sound.

TECHNICAL DETAILS

The projects detailed in this paper were developed using a variety of hardware and software applications. The physical interfaces were built using a variety of sensors in combination with a Basic Stamp 2 microcontroller. The Basic Stamp passes the sensor data to a Macintosh computer running the MAX midi programming environment. MAX was used to process the incoming data in real time and generate the midi output to control a number of external sound modules including an Oberheim Matrix 6 analogue synthesiser, an Akai S1000 sampler and a Roland Sound Canvas.

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