

INTERNAL COMPLEXITY FOR EXPLORATORY INTERACTION

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ABSTRACT

When designing interactive sound for non-utilitarian ludic interaction, internal complexity can be a way of opening up a space for curiosity and exploration. Internal complexity should be understood as non-linear mappings between the input and the parameters they affect in the output (sound). This paper presents three different experiments which explore ways to create internal complexity with simple interfaces for curious exploration.

1. INTRODUCTION

This paper presents an exploration of the relations between physical and computational forms [1], [2]; how this affects the overall expression when designing for *exploration*. For us to do this we need to move past more utilitarian perspectives like affordance [3], transparency and efficiency, and instead consider factors more related to *ludic play* [4] like *curiosity* [5] and *ambiguity* [6].

Our basis for exploration lies in the searching for the *sweet spot* [7], [8] between chaos and predictability. We want people to be drawn by their own curiosity of not being able to decode the interaction pattern (chaos), while at the same time having a sense that their actions are the main contributor to the sounds (predictability). Specifically, we wonder if it is possible to forward curiosity and exploration by designing simple interfaces with relatively large non-trivial internal soundscapes.

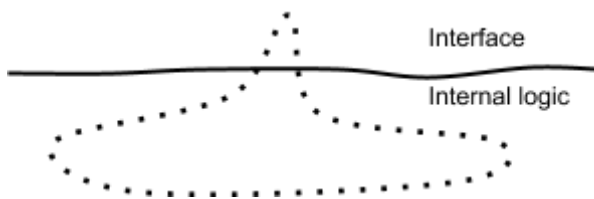


Figure 1: Can a simple interface (tip of the iceberg) with a relatively complex internal logic (bottom of the iceberg) create a space for exploration and curiosity?

2. THE MACHINES

We designed three different standalone Arduino [9] based interactive noise machines. They all used simple inputs such as potentiometers and touch sensors. The Touchbox and the Complexicator used a home-made four voice wave-table synth and the Noise machine used a set of bit-shifting algorithms to produce the soundscapes. The mapping of input to sound generator differed greatly.

2.1 The touchbox

The Touchbox offers a play session for two participants at a time. The role of the technology is to sense physical bare skin connection between the participants. The sensing yields analogue values in a range starting from a few centimetres from actual touch, via light touch to full contact. The values are converted into a relatively complex soundscape, which is played back to each participant through their headphones.

Based on the analogue touch value, activity (change) and contact over time (incremental value) is derived. The three parameters are mapped to different dimensions in the soundscape (pitch and modulation on four voices). This creates a sense of a multi-dimensional interface for a body to body interaction. E.g. kissing, stroking, tapping, grabbing etc. give different sonic results.



Figure 2: The touchbox consists of a wooden box with a meter and a light bulb.

2.2 Algorithmic Noise Machine

Bit-shifting can be used as an alternative way of creating "music". The principle yields rather unpredictable results where small changes in the bit-shifting algorithm can have a large consequence for the produced soundscape.

The different parameters are changed through the four potentiometers. One potentiometer controls the current

algorithm and the other potentiometers change the parameters for the algorithm. Although the sounds can be considered crude it is quite engaging to experiment and play with, even for the designer, who cannot predict the possibilities himself.



Figure 3: The noise machine has four potentiometers, without any instructions of how these modulate the sounds.

2.3 The Complexicator

The Complexicator is an experiment in mapping as many parameters as possible from a four-voice wavetable synth onto one potentiometer. A fast turn switches the potentiometer's role to control different sonic parameters (e.g. voice, pitch, pattern and type of wavetable). A slow turn then changes the value of the specific parameter. Technically speaking there would be a concrete coupling at all times, but in practice, the interface was overly complex and hard to grasp. This gave a sense of powerlessness while still having a sense of having some "say" in the output.

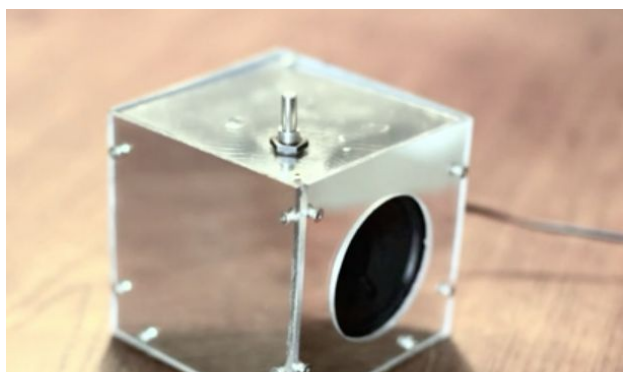


Figure 4: The Complexicator has just one potentiometer to change the internal four voices and their parameters.

3. CONCLUSION

The three different experiments are thought of as exemplary artefacts [10], [11]. Their intention is to extend space for exploration and curiosity. The different prototypes have been tested in various degrees and our preliminary findings point towards the following: The intimacy of touching other people with the *Touchbox* resonates well in such a way that the internal logic becomes an excuse to interact. The noise machine creates a sense of control and exploration. One can return to a previous setting by dialling the knobs back to a previous setting. The uncontrollable element of turning speed in the Complexicator gives a sense of random exploration; as if the box has a personality of its own.

Acknowledgments and sources

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Bit Shifting for sound generation by multiple experimenters: Duane Banks, Viznut & Tejeez:

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