RhythmSynthesis

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ABSTRACT

Originating as an investigation into the relationships between rhythm and technology, RhythmSynthesis applies color, shape, and sound to demonstrate how our understanding of visual music, computation, and tangible, audio-visual interactions can be applied as considerations in musical compositions. As an instrument, the final piece allows for experimentation, rewards for mastery, and is a vehicle for expression.

By asking questions about how visual music can be used to perceive rhythm, what ways visual rhythms can be used for composition, and what ways composition can be intertwined with performance and experimental notation, this project illustrates that sound is a reliable and effective way to provide users feedback for making visual composition decisions, judgments, and actions. From amateur to professional musicians, the instrument allows for unique, personal interactions and expressive choice.

ACM Classification Keywords

J.5 [Arts and Humanities]: Fine arts, Music, Performing arts

General Terms

Design, Experimentation, Performance

Keywords

Rhythm, Sound, Technology, Visual Music, Musical Performance, Composition, Design Research, TUIs, Computation

INTRODUCTION

New musical interfaces are necessary to further explore the complexities of rhythm. RhythmSynthesis proposes a new instrument for composition and performance to continue such exploration. Originating as an investigation into the relationships between rhythm and technology, RhythmSynthesis applies color, shape, and sound to demonstrate how our understanding of visual music, computation, and tangible, audio-visual interactions can be applied as considerations in musical expression.

There is a long history of investigation into rhythm (rhythm and sound, language, writing, etc) as well as the connections between the visual, sonic, and computational. The goals of this investigation are:

- reveal alternative models and interactions with rhythm composition using color, shape, and sound
- illustrate how physical objects can be encoded with sound
- design a new musical interface that allows for experimentation, rewards for mastery, and is a vehicle for expression.

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Design Questions

This project began by asking what ways can visual music be used to understand rhythm. As the research progressed, additional questions surfaced such as how is rhythm embedded within our visually-dominated experiences, how is the visual encoded with sound, and what are ways visual rhythms can be used for composition.

The building and prototyping process was key to exploring these questions, and in doing so, the final question of what are ways in which composition can be intertwined with performance and experimental notation guided the completion of this project.

What is rhythm?

Concepts such as the Gestalt principles [1] and the multiplicity of speech cadence, the notion that we are perpetually in the process of attempting to perceive and create meaning out the rhythms that surround us, is paramount to this project.

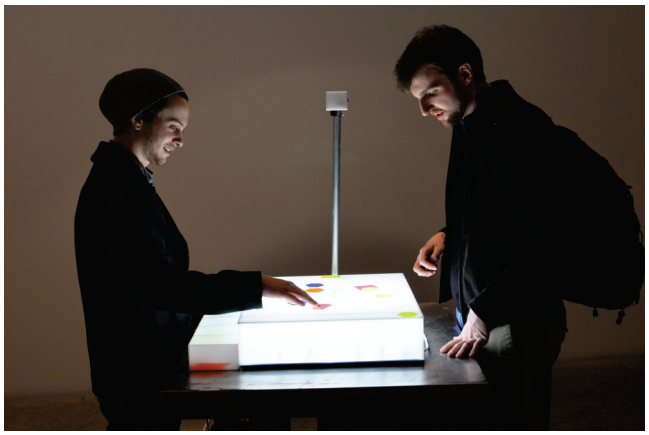

Figure 1: Gallery visitors using the project

SIGNIFICANCE

In light of the constructivist view of learning [2], the mental models and templates that allow us to understand our experiences are based on what we hear, see, feel, and smell. We now have the opportunity to use technology, not as a singular lens, but as an addition to our current senses to perceive and apply meaning to rhythms.

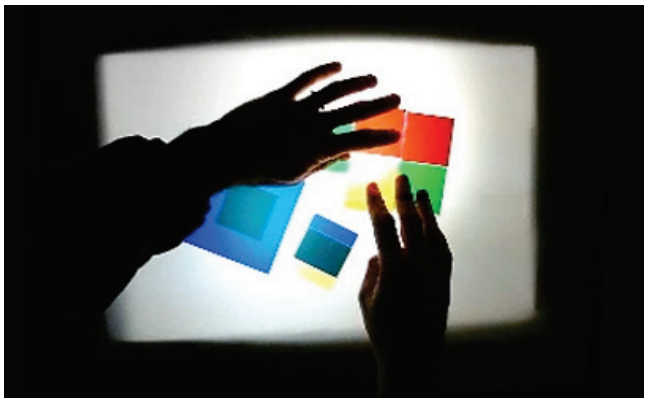

Figure 2: Gallery visitors using the project

Much has been written about how we perceive and apply meaning to all that surrounds us. The French philosopher and music critic, Gabriel Marcel, wrote, "Meaning arises when an individual becomes aware, either affectively or intellectually, of the implications of a stimulus in a particular context."[3]

Similar to the process of viewing the color coding of a resistor (ex. a 4-band resistor with the color values red, red, brown has a resistance value of 220 Ω), the colors of an object are often used to understand the physical substance and characteristics of that object. This project proposes the use of technology to introduce, rehearse, and create dialogue around the associations of color and sound.

Similar to games and the playing of games, music is not something that resides outside of what it is to be human or social beings. Rather it is a direct comment on, a clear reflection of, and a contributor to our nature and our culture.

AUDIENCE

The objective is to provide an experience that allows the novice a low enough barrier of use so that they are able to participate and create, while at the same time providing the expert a balanced level of feedback so there is a reward for experimentation, mastery, and exploration. In addition, the process of using the instrument is a method for practicing and developing mental connections between the visual and sound.

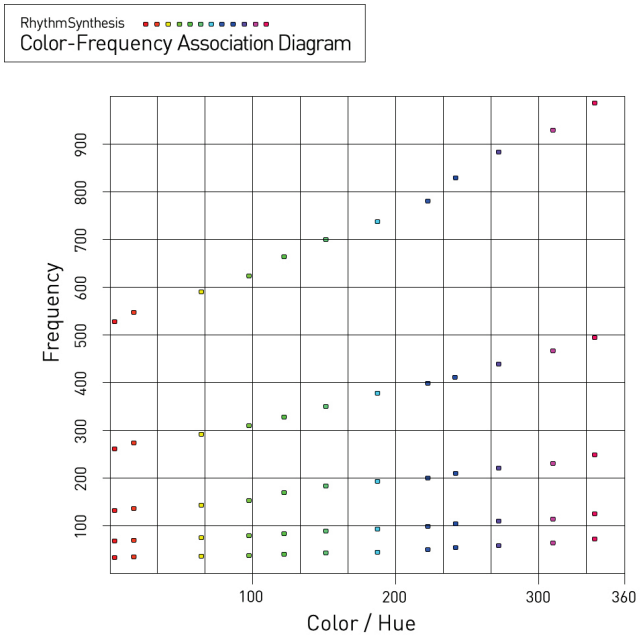

Figure 3: Color-Frequency Association Diagram

There has been much work in the area of speech and learning (from Lev Vygotsky's *Thought and Language* to Noam Chomsky's *Syntactic Structures*), but research methods and practices need to be developed to map and document human's natural links between sound, perception, and understanding. There must be a set of standards put forth that can be debated and improved. "If they are to be useful, sounds must be generated intelligently, with an understanding of the natural relationship between the sounds and the information to be conveyed," Donald Norman writes [4].

FINDINGS

Sound is a reliable and effective way to provide users feedback for making visual composition decisions, judgments, and actions. Early feedback from test sessions centered around providing users more visual feedback of the position of the rotating, play-head, but once the sounds became more distinct, represented a greater sonic range (specifically the mid-to-higher range), and had a pronounced attack, users relied less on a strictly visual association process and worked with combined senses to make expressive choices.

Both amateur and professional musicians, along with visual artists, engineers, programmers, and designers, found the experience enjoyable. Over sixty people (as individuals and groups) tested the instrument, and each testing session yielded an array of different strategies, approaches, and executions. From scientific approaches to more adventurous tactics, the testing sessions demonstrated unique and personal interactions.

There is more work needed to align the full spectrum of color to the full spectrum of sound (Figure 3). A fragment of the possible hue and frequency values have been associated and performed using the instrument. The spaces between the indicated values are an interesting space to play for future projects.

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