Examining Sonic Relationships in a Visual Context

THESIS

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By

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ABSTRACT

Sound is universal, abstract, and omnipresent. I am interested in coaxing out the nuances in sound as it transmutes from transmission to reception, through culture and form. This interest in sonic relationships and history came from a life of music that precedes and frames my evolution into sonic, video, and installation works. I have translated my musical knowledge into a body of work that examines the relationships between the unseen sonic world and the physical, visual and activated art world. This document chronicles my work over the past two years experimenting with creating new instruments and algorithmic experiences for humans and summarizes the motivations for taking sound as a material and phenomenon and transforming these sonic waves through other mediums and materials. This research culminates in a hybrid of installation sculpture, performance, and software all rooted in sonic relationships and phenomena. I do not consider myself a sound artist, but rather an artist driven by sound.
To my parents, Dave and Jane
ACKNOWLEDGMENTS

This document and the ideas within would not have been possible without the support and guidance of my colleagues and faculty members at this institution.
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I use the term “instruments” to loosely describe all of my artworks. Each piece becomes an instrument, a device of expression similar to a cello or violin. The physical object has a set of parameters, but through human expression, physical interaction, or thought, there are infinite permutations on how one could play or perceive the “instrument.” This instrumental relationship comes from my studies in percussion and composition as an undergraduate student. I became interested in the process of transforming streams of information, whether video, images, movements, or data tables into a sonic form. This transmutation of sound from information evolved into abstracted sound waves, visual waves of material, and finally brain waves in my sonic and visual installations. These are concepts that form the basis of my work.

My earliest theoretical, sonic, and visual inspiration came from the work of Italian Futurist Luigi Russolo. What interested me about Russolo was his theory of noise as a musical material. As context, industrialization had taken over in the 19th century and noise was becoming omnipresent in society. Russolo exploited these sounds and created his music from this raw material. Russolo saw a future where noise and music were seamless and intertwined and he fashioned his instruments to play this industrial noise. Figure 1.1 shows...
Russolo standing next to his Intonarumori orchestra (roughly translated as “noise machine” orchestra). The visual form and concept of Russolo’s orchestra became the material for my first explorations at the intersection of interactive sculpture and sonic installation. Noise Machine #1 (Figure 1.2) sampled sounds of everyday life and electronic instruments. The sculpture allowed human touch, mediated by programming and interaction, to allow viewer/interactants to have input into the sounds behaviors and spatialization. The device was composed of an eight-channel speaker array enclosed in a wooden sphere. Switches, knobs, and infrared sensors allowed for tangible human interactions with a soundscape that was captured and created electronically. The ability to touch the sculpture and change the
sounds instantly was important to me. This could be seen as having the same immediacy as a performer interacting with any musical instrument.

Figure 1.2: *Noise Machine #1* (2009), installation view

After the first showing of *Noise Machine #1*, I was not completely happy with the way the audience interacted with the work. I expected them to take an extended period of time to listen and experiment with the device, but many of the interactions were short, playful, and at times destructive. This was an important lesson that I carry to this day. Now my works have become a performance, with less physical interaction and more theatrical staging. This performance influence came from the work of Janet Cardiff and George
Bures Miller. In *The Killing Machine*, Cardiff and Miller create a ballet of lights, sound, and robotic arms that comment on the current system of capital punishment (Cardiff 1). The mixing of fur, old televisions, and pneumatic needles creates a space removed from reality. This reality allows viewers to investigate and question the relationship between machine, human, and death. Creating immersive environments is an element that I strive for in my own installations that began with my investigation of Russolo, sound, and interaction. With a focus on sound, I am interested in engaging the soundscapes that are part of our contemporary information culture and society.
CHAPTER 2

THE MEANING OF WARNING

I cannot remember the first time I heard the noise, the slow winding up and down of sirens. At first it had little or no effect on my psyche because no one else seemed affected by the warning. Either shielded by headphones, a cellphone, a conversation, or lack of sleep, people just kept walking when the sirens in Columbus sounded. The warning system is a network of cold war era sirens that are unseen at street level. Perched high on wooden poles the sirens are activated every Wednesday at noon.

I became interested in sirens for their musical qualities and also Edgar Varèse’s treatment of them in many of his music compositions and installations. Varèse was interested in the “wall of sound” sirens innately create, an immovable wave that is omnipresent in a volume of space. Varèse could connect them to his place in time, one of industrialization, world wars, and weapons. Sirens connoted danger and fear. After living with the sirens for over six years now, I am convinced that the meaning of these early warnings and their association to war has been lost on my generation.

In my first siren work, Elevated, I set out to completely defeat the sound of the siren by placing it in a vacuum. For me, the action of desounding the siren created a disillusion, a break from reality for the viewer. The history of the siren is still loaded with fear and danger, but the experience of seeing a siren devoid of sound directly contradicts its function.
and history. The removal of historical significance relates to Hans-George Gadamer’s theory of Phenomenology. Gadamer states, “The present is only ever understandable through the past, with which it forms a living continuity; and the past is always grasped from our own partial viewpoint of the present…rather than leaving home, we come home” (Eagleton 62). The viewer’s “partial viewpoint” of the present is augmented by the siren’s inability to sound, erasing a sonic history while questioning its visual form and relationship. The loss of meaning between my generation and the siren was an important conceptual starting point for my graduate work.

Ray Lee, a British composer and artist, greatly inspired me with his work *Siren*. In this work, mechanical arms with single tone oscillators affixed on the ends spin around the viewer’s head, creating a Doppler sound effect, mixed with a performative light environment (Lee 1). His work captures perceptual phenomena innate to sound waves and I wanted to emulate this in *Elevated*. Conceptually, I had originally intended the siren to be placed high in the air, similar to my experiences with other air raid sirens.

When I first begin conceptualizing an installation I use computer-generated 3D modeling because I was never trained in hand sketching or drawing. *Figure 2.1* shows the original concept for *Elevated*, situated on a 20 ft. pole. I wanted the viewer to come into a familiar environment and see the siren perched in the air, but I soon realized that I did not want the siren to be out of reach, but close to the viewer. This would create a more intimate space and allow the viewer to examine the silence. 3D modeling was instrumental in helping me to work out early formal relationships for the piece. *Figure 2.2* shows the final installation view of *Elevated*. The siren was encased in a plastic doom devoid of air with gauges and valves hanging below the sculpture to show a motive or meaning behind the silence. The viewer could only hear a faint hum from the motor, as if the siren was trying to alert the
viewer of something but did not have the strength. This work created an expectation that was immediately broken, an augmented reality where new relationships between viewer and siren were questioned.

The second work in my siren series, *Detector Neurons.001*, brought the siren out of the gallery and into a public space. I was still interested in why people could not relate to this warning object, so I speculated that people could not relate to the loud and dissonant sound. A dissonant or minor sound in popular culture is unfamiliar because most, if not all, of pop music is built from major chords. Research has shown that major chords create
a biological response of happiness and joy in our brains, whereas minor chords create a feeling of melancholy and sadness (Cook 3). I wanted to combat this dissonant sound, so I fashioned a three-note siren to be outfitted on the top of the Art building, designed to play only major chords. Three notes, commonly known as a major triad, were necessary to create this harmonic relationship that is recognized as major sounding to the human ear. Figure 2.3 shows an installation view of the siren, control box, and cable.
In playing the major chords during the test I hoped to elicit this “happy” biological response in the brain. If the brain senses something out of the ordinary, detector neurons fire and alert the person that something has changed in their environment. Many other artists such as Stelarc and Sabrina Raaf explore these biological and environmental responses in their work through robotics, prosthetics, and interaction. My hope was that by hearing a major chord during the Columbus siren test that the viewer would create new neural connection in their brain, associated with happiness and popular culture. I was hoping that this link would help the viewer better understand their own relationship to warning signals in a present context.
For many, the meaning of the siren has been lost in the 21st century, I feel the opposite. Fear is becoming more and more engrained in culture through our news stream based culture. Terrorists, biological warfare, and omnipresent nuclear weapons are just a few of the many dangers reported in an increasingly technological world. So why has the siren become emblematic of a time past? It seems that now, more than ever, the siren should hold onto its history while creating new meanings of “warning” in society.
CHAPTER 3

CONNECTIONS BETWEEN COMPUTER INTELLIGENCE AND POLITICAL THOUGHT

While producing my siren series, I was simultaneously exploring ideas surrounding machine intelligence by writing drawing programs with pseudo-random operations. These works were implemented with Max/MSP and Jitter, a graphical programming environment. Although artists such as Ben Fry and Casey Reas have popularized drawing algorithms, I was looking at the program not as a drawing machine, though rather as a view into the computer’s intelligence. Pseudo-random algorithms produce particular types of complex visual output that allude to intelligence.

The result was a series of 24 inch x 36 inch archival prints, entitled Visual Articulation. An example of a piece from the series can be seen in Figure 3.1. The visual output for the work is algorithmically composed within the CPU and output from an archival ink printer as a continuous line, with 2 million segments of varying RGB grayscale values. The visual output was strikingly organic and similar to cloud shapes even though the program only drew one line. This connection between organic shapes and mathematical operations instantly reminded of fractals and Benoit Mandelbrot. His theories paved the way for software engineers to create realistic landscape environments in videogames and simulations in the 1980’s and 1990’s. In his book on fractals he said that “Clouds are not
spheres, mountains are not cones, coastlines are not circles, and bark is not smooth, nor
does lightning travel in a straight line. The complexity of nature’s shapes differs in kind,
not merely degree, from that of the shapes of ordinary geometry, the geometry of fractal
shapes” (Mandelbrot 1). Unknowingly, I had created a pseudo-fractal from pseudo-random
computer operations. The organic form of the work allowed the viewer to both see a beau-
tiful landscape created by a computer and look beyond the computer screen into a visual
representation of a computer’s intelligence.

After completing these prints, I was driven use a similar pseudo-random method to
create a performance-based work. Instead of printing the visual output of the algorithm I
wanted to project the process of the computer drawing each line on a large wall. My process was to copy each line by hand that was projected on the wall, essentially creating a large hand drawn print directed by the machine code. Through the results that I had achieved with the smaller prints I was curious to see if the same organic structure would be apparent on a larger scale.

The performance took place in Ignition 4.0, a curated exhibition I was invited to participate in at the Shot Tower Gallery located on the Fort Hayes Campus in Columbus, OH. My performance lasted four hours and consisted of me depressing the space bar on the computer, advancing the program, which signaled the program to draw a new line from its
previous spot. As process, I was moving a ladder to the appropriate position, lining up a straight edge with the projected line, and then drawing that line. In the four hours, a continuous line made of 47 segments was drawn and copied. Figure 3.2 and 3.3 contain images of the final installation view for Visual Articulation Series: 10ft. by 15ft. wall (2011). This worked harkened back to my musical performances of previous years. At times it was clear to the audience what I was doing and at other times the audience seemed to think I was fixing the projector. Unknowingly, the audience created a stage and platform for me to act and react. This showed me that even in an art context, viewers are drawn into action and performance. Inserting myself performatively also harkened back to my research as a
percussionist. Additionally, as with a musical score the computer code was directing my performance. As lines are the basis for text, I started searching for ways of thinking about the basis of language and text and their relationship to the drawings explored in *Visual Articulation*. Coincidentally, around this time the Wikileaks scandal broke. This seemed the perfect time to explore this complex data set and abstract the meaning from the physical and formal output, normally associated with that data.

![Image](image.png)

**Figure 3.4: SomethingDemocratic in 2010? (2011), installation view**

I was drawn to the sheer mass of data, thousands of cables had been sent in a matter of months between dignitaries, government officials, and high-ranking military personnel.
At the time, I was also interested in the process of formation of words, in speech and in print. This led me to organize the documents in an alphabetic order, for easy reference. I also concentrated only on the information from 2010 because the political events from the previous year were still fresh in the public consciousness.

Figure 3.5: *Something Democratic in 2010?* (2011), detailed installation view

In the process of conceptualizing and creating this work I chose not use Max/MSP in the separation and organization of the documents because other programs already existed for alphabetizing documents. The process took multiple tries with the computer crashing several times. The result was a four foot wide and twenty-four foot long print, of all the
documents from the Wikileaks scandal, in 2010. Figures 3.4 and 3.5 show installation views of Something Democratic in 2010?. What was fascinating for me was seeing how reorganizing the information alphabetically changed how we could view the preponderance of certain words, which seemed far more prevalent, such as security and democracy.

For me this work felt spontaneous and instinctive. In the process of making there was not a lot of time to think, only time to execute and this made the work feel more gestural. The size of the printed document installation was pleasing and asserted itself in sheer scale. The installation allowed viewers to step back and only see columns, rivers, and lines of information. When viewers moved closer, details became more visible. Because the data was alphabetized particular words formed large blocks of text, influencing the formal look of the work. This method separates the political message from the information and reveals underlying truths about society and political culture in 2010.

In 2011, I revisited this Wikileaks information in a looped audio work entitled Yellow-shirt, Yemen. Instead of working visually in this piece I decided to use the same data set and work sonically. The audio version, contained in a four by six inch silver box, was a fifteen-hour recording of each word contained in my previous work Something Democratic in 2010?. It was important that each word be read like a text, in order, word by word. While I originally intended to read all of the words as a performance, because the information originated from a digital space, I decided it was more appropriate to allow the computer to be that voice.

The computer voice turned out to be very interesting because it tried to make sentences out of a continuous string of the similar words. This created an incessant, but intriguing composition of sound and computer intonations. The viewer had no control over the playback of the audio, unlike in the work Something Democratic 2010? where viewers could
survey the work and peruse the printed document. This created a kind of durational sonic experience that pointed to the sheer volume of information, while creating a barrier referencing the original security and secrecy of the information. Figure 3.6 shows an installation view of Yellowshirt, Yemen in the Hopkins Gallery in Columbus, Ohio.

While the Wikileaks documents as a data source is constantly evolving, I plan to revisit the wealth of new information for works that are variations on the theme. This work inspired me think about all the data streams available for my artistic exploitations. Everything from how many phone calls we make to how many times toilets are flushed at any given
moment. I like to imagine and raise the question of how artists will use this information to make meaningful and revealing commentaries on the world around them.
CHAPTER 4

OVERPREPARED PIANO

Since beginning my Graduate studies, I have been dragging a 900-pound piano from studio to studio. After many moves, the resulting work, The Harrington Project, turns an upright piano into a gigantic analog, robotic speaker. The piano could be considered in a class of works associated with ‘prepared pianos’ general created by using nuts, bolts, wire, and weather stripping placed between the strings to allow the piano to sound more like a percussion orchestra than a traditional piano when struck.

The inspiration for the work came from the composers, John Cage and Peter Abling. John Cage, the inventor of the prepared piano, has long influenced my artistic works through his orchestration of percussion instruments and his performance works. What interests me about the invention of the prepared piano is that it was born out of necessity. James Pritchett, a Cage scholar, writes, “In 1940...Cage was working mostly with percussion music...[A] dancer, Syvilia Fort asked Cage to write the score for her dance Bacchanale...However, the concert was to be held in a space too limited for the battery of instruments that Cage typically used. All he would have at his disposal was a piano” (1). He saw a use for the piano beyond its normal cultural heritage and created a whole new class of instrument. On the other hand, Peter Abling, an Austrian composer, created more of a robotic player piano. In his treatment, he attached 88 solenoids to the keys of an
upright piano, which essentially gave him complete control over how the piano could be played. He used this control to playback human speech, with a high degree of accuracy, creating a piano that mimicked the function of a traditional loudspeaker.

![The Harrington Project installation view](image)

Figure 4.1: *The Harrington Project* (2012), installation view

My treatment of *The Harrington Project* piano is a mix of these two composers’ ideas. I created a player piano that has individual control over each string, but is stripped of its original function and given a new one, through robotic preparation and computer control.

*The Harrington Project* works to animate the information of Franklin Delano Roosevelt’s voice through an upright piano. *Figure 4.1* shows an installation view from my
thesis exhibition. His voice is broken apart by a patch written in Max/MSP (Figure 4.2) into individual notes and played back using motors and monofilament wrapped around each piano string. This creates friction, which in turn creates sound. Brass weights hold tension on the strings and become a 3-dimensional waveform of his voice and cadence. The recording I chose of FDR was important for me because I wanted to not only embody the piano’s history, but also a shared political and social history between the past and present. The speech was an FDR fireside speech discussing the National Industrial Recovery Act (NIRA). He spoke of the need to boost small business endeavors, the looming mortgage and housing crisis, and the need to curb unemployment by stimulating industry (Fireside 1). For me FDR’s words are eerily familiar. By abstracting FDR’s speech through the piano, FDR and the piano become intertwined. A speech that was at one time resonant in physical space was digitally captured and mutated by the computer to abstract the FDR’s
words into sound. This work suggests many possibilities for future incorporation of a video component.

![Image](image_url)

Figure 4.3: *Obama and FDR discuss a quote by George Santayana* (2012), installation view

In my thesis exhibition and in a different space, a video piece entitled *Obama and FDR discuss a quote by George Santayana* accompanied *The Harrington Project*. Santayana famously wrote, “Those who cannot remember the past are condemned to repeat it” (82). The work riffs on this quote and examines a manufactured video space where President Obama and FDR can be seen discussing similar issues. In this video work they appear to be repeating each other, creating phasing rhythms and broken sentences. *Figure 4.3* shows an installation view of the work. As the video focuses only on the presidents’ mouths, it amplified how each respective leader said certain words that are indicative of the past
and current political climates. In this work, the sound and video suddenly stops and starts, creating a freeze-frame of the utterance of each word. This creates a sonic and visual break, a rhythmic respite, in the halting and continuous discussion by Obama and FDR. As a percussionist I realized that my approaches to video are certainly influenced by my experience in thinking and making rhythmic artworks.

Both The Harrington Project and Obama and FDR discuss a quote by George Santayana reveal my interest and artistic pursuit of political and social commentary. Abstraction and transformation are important to me and in one work the physical auditory and visual recreations of a voice are mutated. In the other, I have zoomed in and amplified aspects of vocal and rhythmic cadences through the video.
CHAPTER 5

CONCLUSION

I have been profoundly influenced by my history in music. I have worked to transpose and evolve this history by creating a new body of visual and auditory installations through the study of Art and Technology. Translation, transformation, and abstraction of computer data into a 3-dimensional space will continue to be a driving force in my digital artworks. In the future, I will continue to further explore my interest in science and natural phenomena as a source for new data streams to create dynamic visual works. My auditory work has expanded into data streams, light, video, and sculpture. I want to activate my viewers’ sensorial field and create unexpected environments that transport them to a reality connected by that data and abstraction. In so doing I will continue to explore and find poetic relationships between data, visual meaning, and political culture in my visual and auditory art installations.
BIBLIOGRAPHY


