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## **Sound between points: An abstraction of sound waves into physical forms**

Kimberly Enerson

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**Rochester Institute of Technology**

A Thesis Submitted to the Faculty of the College of Imaging Arts and Sciences

School for American Crafts

In Candidacy for the Degree of Masters of Fine Arts in Metals

Sound between points:

An abstraction of sound waves into physical forms

Kimberly Enerson

February 16<sup>th</sup>, 2014

## Faulty Advisors Signatures

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**Abstract:**

The whole process of metal work is an auditory or tactile language, to be fluent in this language one has to work with the material again and again to understand what the metal is saying. From this idea I propose to make the sounds of working able to be seen. For my thesis I propose to make sound visible, or to provide visual representations. From the recording of sounds I will create abstract works, either paintings or three-dimensional forms that will take the sound vibrations and give them visual representations. From these abstractions I will look at the distances and volume of sound and the connection between that and the meaning behind the sounds. I also want to investigate what the sounds of these objects mean to us, be they bells or silverware, and what the lack of those sounds mean or how the visual image that is created by sound wave changes our idea of it.

Sound is commonly heard and felt.

But to see sound move across a distance between two points is a rarer more beautiful thing.

*Between* is the abstracted rendering of the movement of sound through a space.

Sound originates at one point and terminates at another.

But it is the area "between" where the beauty lies.

**Introduction:**

In my thesis body of work, I responded to how sound moves through and is determined by space. Through the creation of sound and visualizing its wave patterns in two dimensions I created works that deal with the movement of sound through a space. By not only looking at the tone and pitch, but also the volume, these works were created to respond to the different aspects and characteristics and the nature of sound. Along with body pieces, I created a sculptural work that fills a larger space and responds to how sound itself moves across a distance, and through a volume of space.

**Research:**

I wanted to begin with the idea of sound and movement within a space and the patterns of resonance. After taking a trip to the southwest and developing an interest in seed vessels of the Navajo Tribe, the idea was to use the Tibetan singing bowl and the seed vessels as the start of my thesis. As I began to research the properties and nature of Tibetan singing bowls, I discovered the research of Denis Terwagne and John Bush. They performed experiments on a collection of singing bowls to determine the factors that went into different wave patterns. Through their research they discovered that each bowl produced a different and unique sound that was based on their material composition, process of making and wall thickness. With the research from Terwagne and Bush, I began to formulate and develop my own research. In Terwagne and Bush's research they discovered that the composition of each of the bowls varied greatly depending on region and age. Each

of the four bowls studied created different sound qualities and tones based on composition, but also in the way they were formed. Some of the bowls were hammered while some were cast and others still spun up into their shapes, each creating a different thickness and wall profile these differences were also partly the reason for the varying tones. Singing Bowls are much like, if not the same as some standing bells in many other cultures. Standing bells are, like the name suggests, bells that stand on the top; they have the same construction as bells with the fluctuating wall thickness to create better sound and resonating tones. During this investigation, I began creating my own versions of singing bowls. I worked on bowls of different sizes and shapes, though in starting, I discovered that my own artistic license with the shapes and surfaces of the bowls was limited by the responsibility to what was a traditional process and object. Despite my research and interest, it was during this process that I lost my passion and drive to continue with the idea of the singing bowls. I then had to rediscover where I was headed and how it fit with my original ideas of sound and space.

### **Analysis:**

From the start of the process, I had been recording sounds and playing with the two-dimensional images that were created. It was these images that rejuvenated my thoughts on the body of work I was creating. These two dimensional images inspired the next steps in my creative process. The sharp linear elements of the sounds and images on my screen when layered on top of one another could be manipulated to form images that would later become the Folded Frequencies Series.

As I moved away from the traditional forms where I had started, I began to focus not on how the sound was created, but how in its creation it became something more than just the sound. Sound is heard, that is how it is most often experienced, something or someone makes a noise and the sound wave travels to your ear. Here your brain processes the frequencies and pieces them together in such a way that they make sense; no longer just a jumble of sound, but a voice, the wind, the falling of a tree. But that view of sound is merely the beginning and the end. The journey that sound takes on the way from point A to B is more elaborate, more complicated and more beautiful than we could ever imagine.

The concept of Schrödinger's Cat is one that began to resonate in the back of my mind. The theory is a rather complicated idea, but the basic premise is one that is rather simple if you can piece it out. In a sealed box is placed a cat, with the cat is placed a lump of radioactive material and a vial of poisonous gas. The rest of the experiment reads like a bad Rube Goldberg experiment, but the idea is such, if within a period of time the lump of radioactive material decays and releases an electron, the vial of poisonous gas will be released, killing the cat. If within that same time period the radioactive material does not decay, the vial will not be broken and the cat will not die. Now remember that the box was sealed with no windows in the sides, so there is no way of knowing whether or not the cat is dead or alive without opening the box. Simple enough right? Open the box. But what Schrödinger was trying to explain was not a new way of killing a cat, but the nature of quantum mechanics. By opening the box you change the outcome. Before you open the box, the cat is most certainly not dead and not alive at the same time, but your observing

the cat in whichever state changes the experiment. What Schrödinger was trying to demonstrate was how in Quantum Mechanics observing an experiment changes the outcome, but it brings up an interesting notion. If in the world we live in, we could observe the natural forces that go on around us, would our preserving them change their nature? Would we cause the forces of nature to act differently if we could see them?

Around this idea, I began to frame my work. If we were so lucky as to live in a world where sound was visible, would we, by observing it change its nature? Sound was a natural extension of this thinking. Sound has two ways in which it can be measured. It can be measured by its tone; the actual simple harmonics of the sound and also by its volume. Volume is a tricky word in this case. When dealing with sound, volume tends to deal with the loudness of something. An alternative definition of volume is the amount of space that an object occupies; this generally does not apply to sound when one is describing it in a scientific way. But it never the less fits the nature of the beast. Sound fills a space and based on certain factors the amount of space can vary for the same tone. Viewing sound in this manner changes the way you can perceive something's nature. Sound reflects and changes as it moves from point A to point B. When there are moving objects, sound will change and reflect off of them in different ways. With my work in the Woven Frequency Series, I imagined and worked off of the idea of how sound fills a volume. Each of the works is a distance in which sound travels, be it a whisper or the slam of the door. The span of the sound is the connection between two points for just a moment. With the Woven Frequency Series each work was made by the weaving of metal wire to



create forms that expand and contract over the distance between the two points. The density of the weaving relates to the nature of the sound, a loose weave is a sound more of the echo and reverberation of something than that of a tighter weave. Simply the idea of elaborately “weaving” two points together by a sound made sense. The Woven Frequency Series was to respond to the more two-dimensional works in the Folded Frequency Series. Woven Frequency was the volumetric representation of sound just like those in Folded Frequency. This series allow for the sound to fill and contain a space much differently that the other. These works started by watching the simple harmonics of single tones, the wave produced by simple harmonics are steady and graceful in their curves. I expanded the linear motion to a three-dimensional one where the tone extends out from its path a full 360 degrees, creating the round forms of the Woven Frequency Series, all connected by the path of the sound.

The Folded Frequencies Series came from images of more complex sounds overlaying one another, such as a voice speaking or the cracking of wood. These sounds have a more jagged and fluctuating appearance. To create the planes that shifted in between the two edges, I imaged what these complex sounds would look like if two of them passed side by side through space, and for that brief moment were connected. These connections of the sounds would then take an image from a two-dimensional plane to a three dimensional world. The plane between the two frequencies twist and shift to keep the connection, creating in the process a new image that in its fluctuations adds to the beauty of the two sounds. The early Folded Frequency forms were just simple planes that existed between the two side

frequencies, I began to enamel the forms with a thinned liquid enamel to stress the peaks and valleys of the frequencies. But as the volumetric forms of the Woven Frequency series began to develop, I thought about adding volume to the simple lines and planes of the Folded Frequency Series. This is where the resin version of Folded Frequencies emerged. I started adding together three or four frequencies instead of just the two, creating shapes that encapsulate a volume. These forms I made with resin to produce a lightness in their visual appearance.

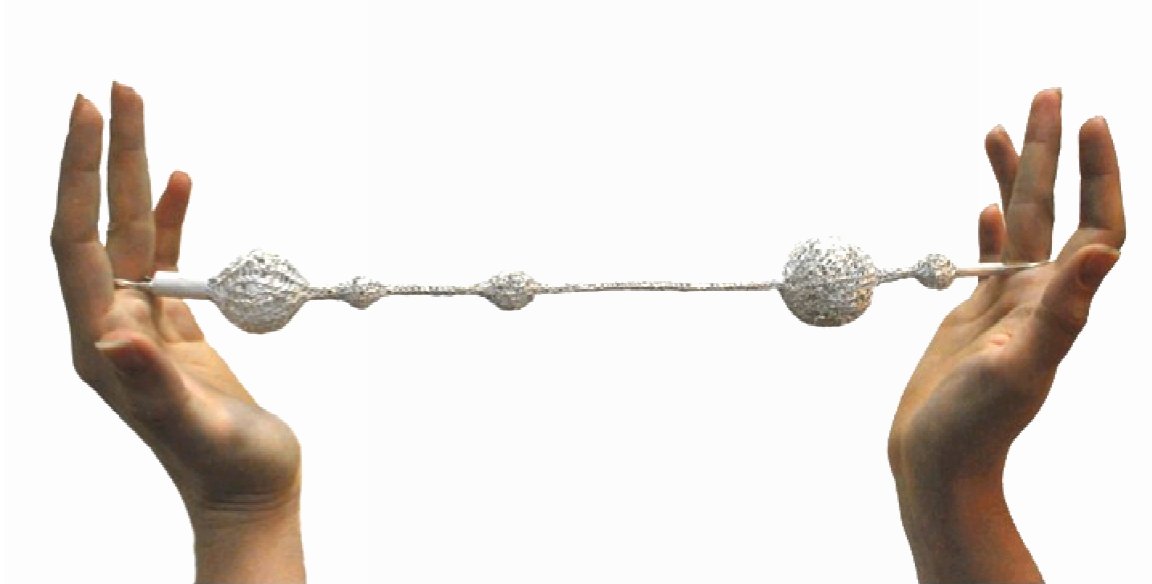
Through these forms, my goal was to portray a larger size while still maintaining those brief moments in time where sounds crossed paths. Through my work, I wanted to create objects that would exhibit both characteristics that sound has, volume and alternating tones. These works, serve as visual connections between two points, like sound is a connection between two points in time and space. For a moment in time, sound connects two points that may never have been previously connected. This connection is not just simply a person, or a recording device, sound can impact and change something that may not be able to process its meaning. The space and movement of sound ripples through the world well beyond the time when the sound itself has died out.

**Conclusion:**

The connection between points, the connection between people, the connection between two objects; these are things that are not always visible and are not always tangible. To hold the connection between two things is a rare occurrence, to see the connection another. My work makes those brief moments of connection

visible, tangible and beautiful to other beholders. I wanted to make the beauty of sound visible, but in the process I discovered that the beauty is not only in the sound itself, but where it begins and ends.

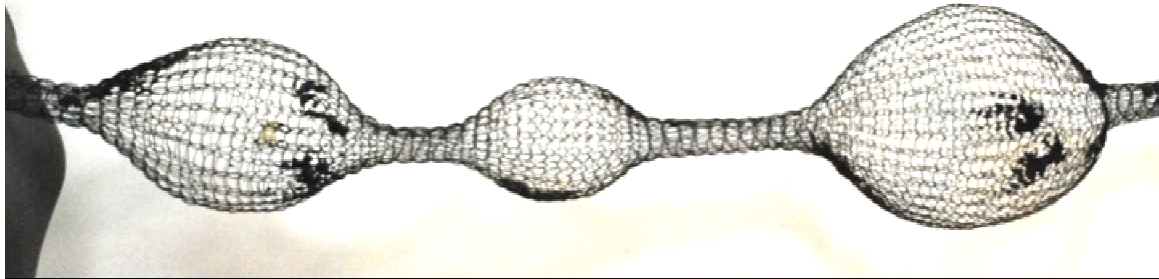
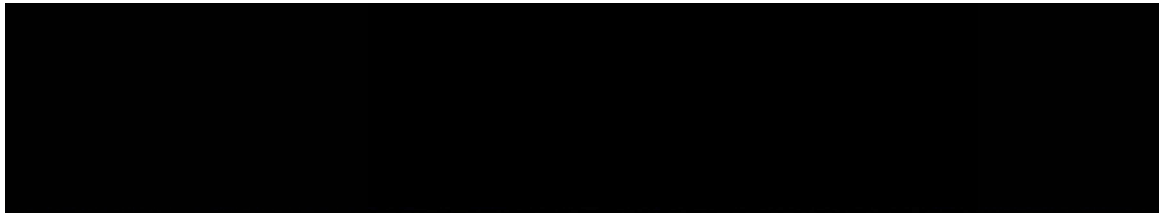
From beginning to end, sound travels and changes. It takes on the form of the space in which it is created and responds to the world around it. I began my thesis work with the idea of capturing that change and response in a physical form. At the start I would not have known the ways that the work would change and develop, much the sounds it represented, but at the end I had not lost the idea and concept I had started with. Through researching and developing ideas and practices, I created a body of work that speaks to the nature of sound as well as the image it creates. Works that not only speak to the volume and weight of a sound but also the delicate and transitional nature that it has.



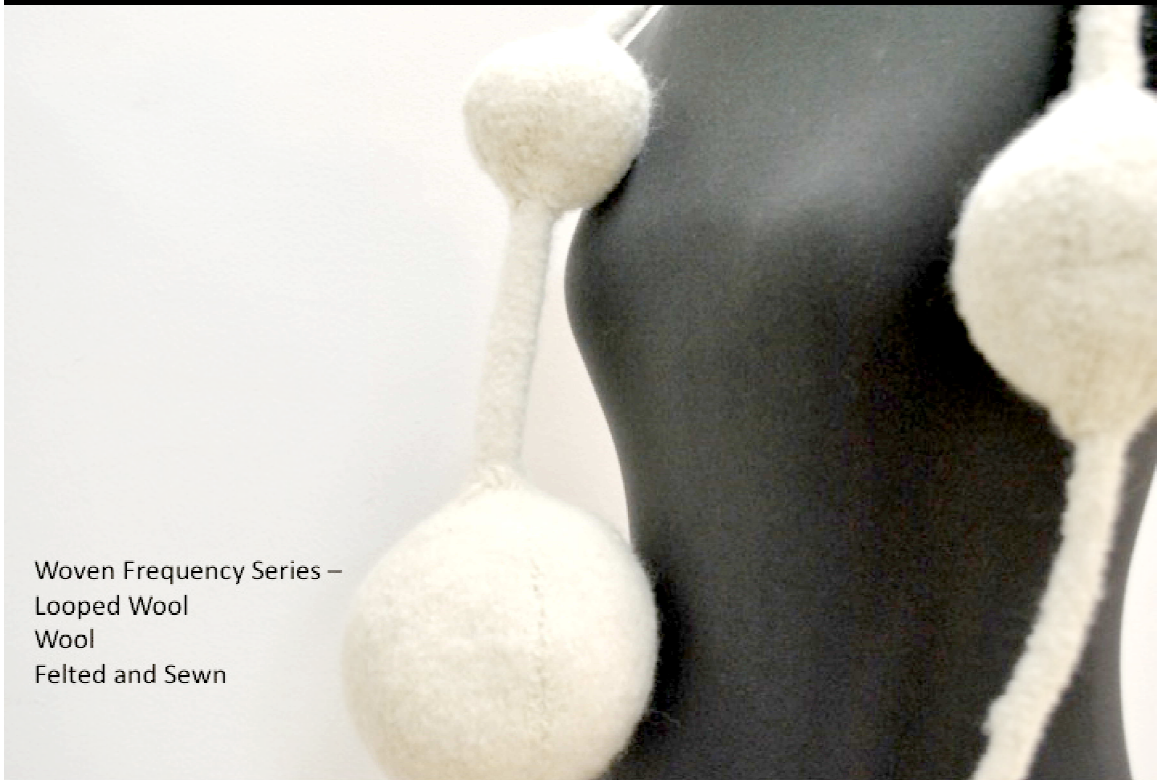
Woven Frequency Series – Connection Rings  
Steel Wire, Copper, Silver Leaf, and Pigment  
Woven, Fabricated



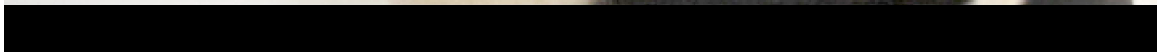
Woven Frequency Series – Connection Rings  
Steel Wire, Copper, Silver Leaf, and Pigment  
Woven, Fabricated

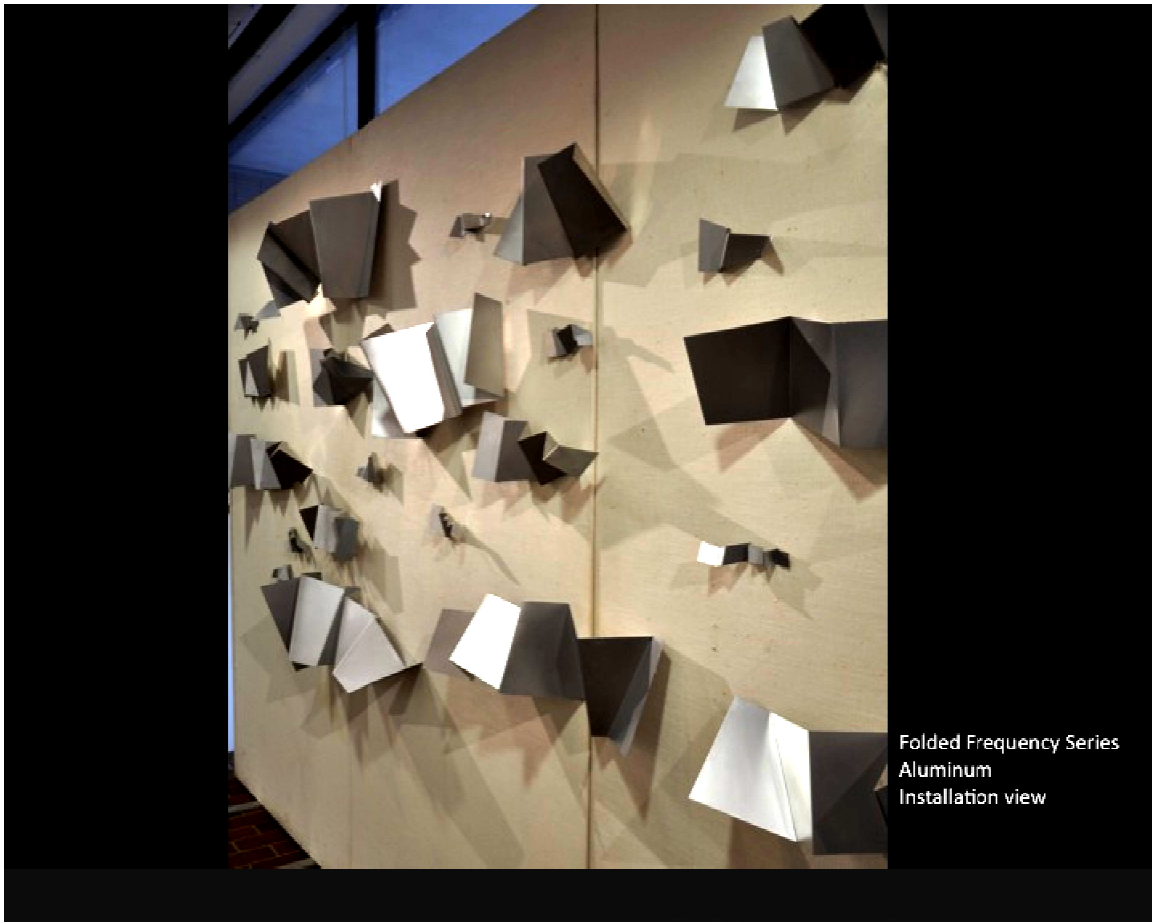


Woven Frequency Series –  
Connected Brooch  
Steel, Copper and Pigment  
Woven and Fabricated



Woven Frequency Series –  
Looped Wool  
Wool  
Felted and Sewn

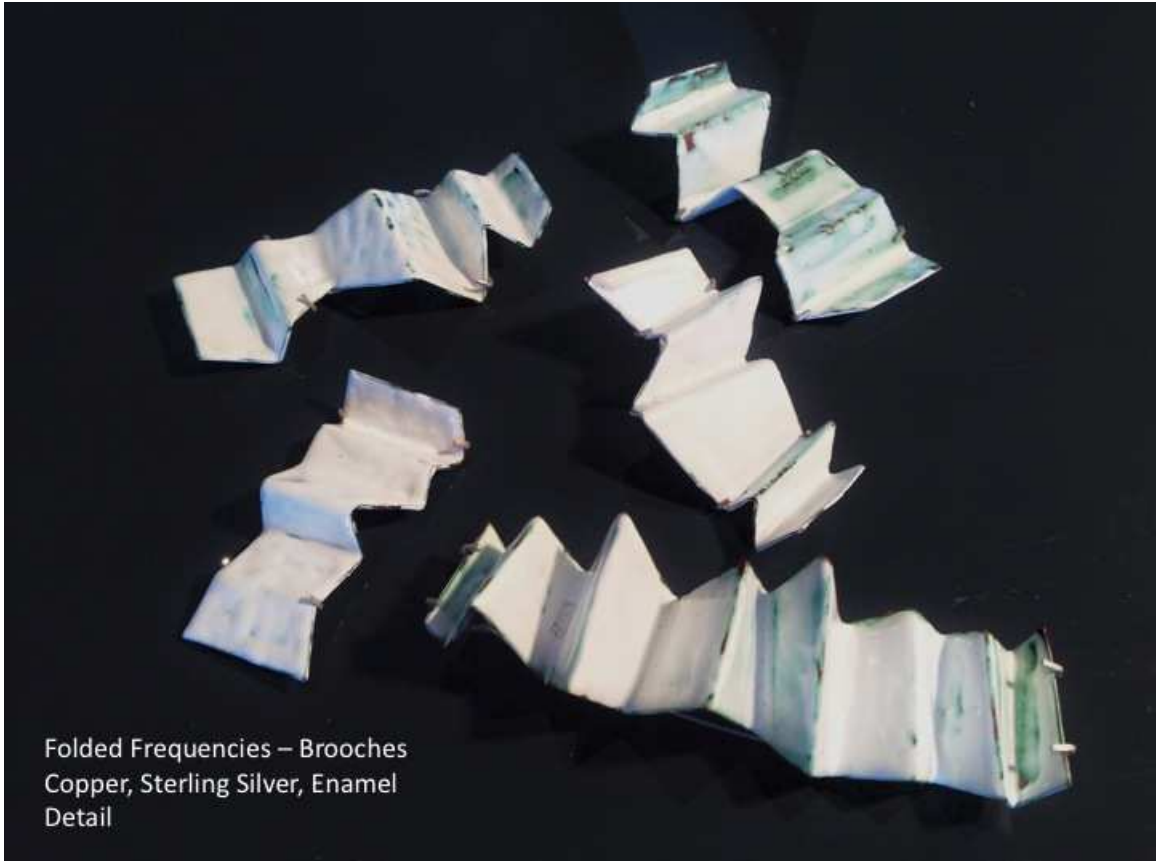




Folded Frequency Series  
Aluminum  
Installation view



Folded Frequency Series - Brooches  
Copper and Enamel  
Installation view



Folded Frequencies – Brooches  
Copper, Sterling Silver, Enamel  
Detail



Folded Frequency Series  
Resin, Silver Leaf and Silver  
Cast



Folded Frequencies  
Resin, Silver Leaf, Sterling Silver  
Cast



Folded Frequencies  
Resin, Silver Leaf, Sterling Silver  
Cast







Woven Frequency Series  
Silver  
Woven



Woven Frequency Series  
Silver  
Woven

## Works Cited

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Acoustics, Metallurgical

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