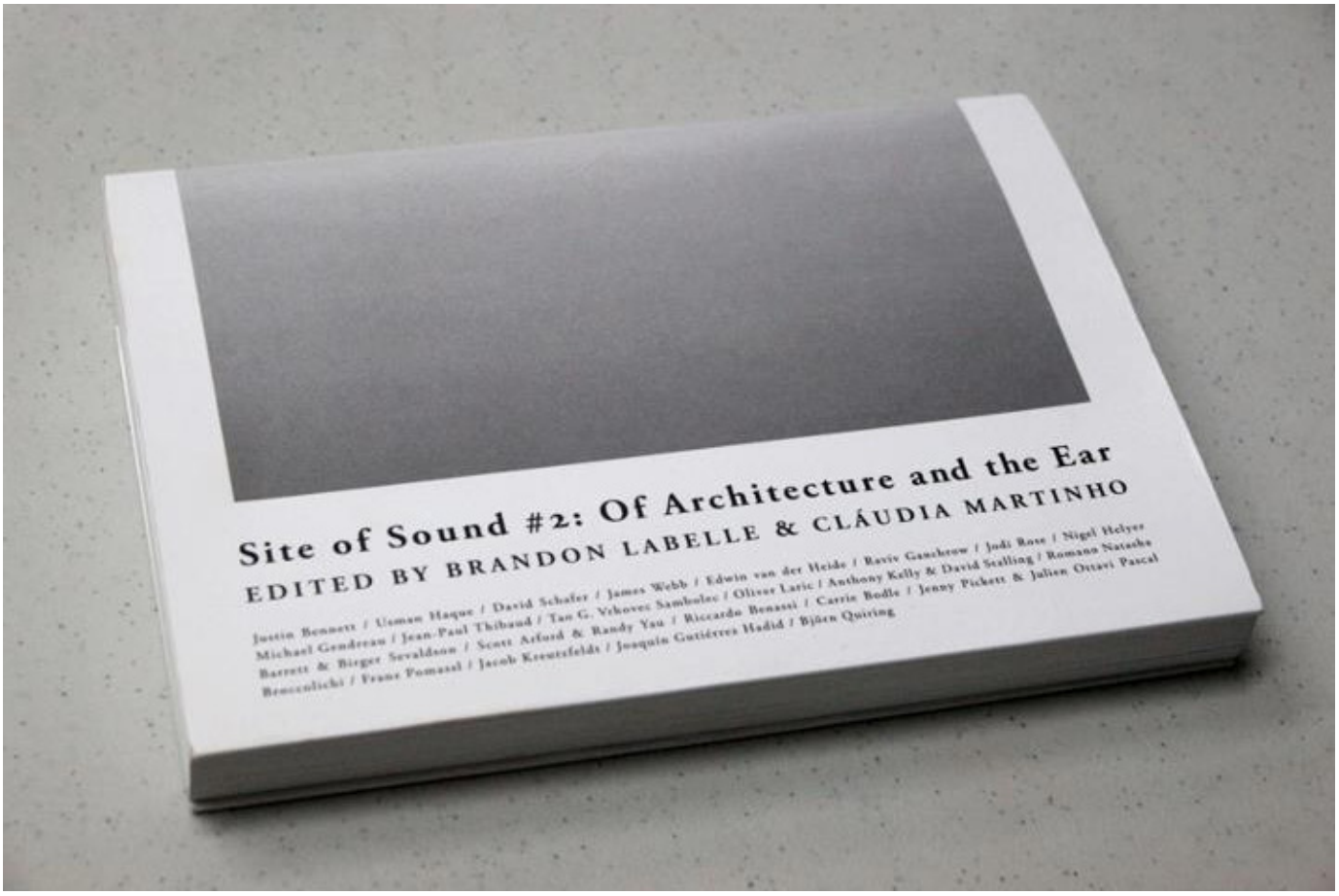
2011 "Sonification." in B. LaBelle & C. Martinho, eds. Site of Sound: Of Architecture and the Ear, Vol 2, (Errant Bodies Press, 2011)



Sonification

Carrie Bodle

My work utilizes sound as a medium to create immersive experiences responding to site. Since 2005 I have become engaged with a process called "sonification" – that is making data patterns audible, specifically in the site of their existence. This translation of inaudible or invisible phenomena into sensible experiences interests me as it engages new interactions between the site and the audience of the work, relating body to content, as mediated through technology, and set into the context of a site.

My background and area of study has been in the visual arts specifically installation art, public art, video, and sculpture, and I didn't begin working with sound until 2002. At the time I was creating a project in response to a 19th century bolt manufacturing facility in Columbus, Ohio and was primarily working with video for the site-based installation. Creating 5.1 surround sound on DVDs was a new technology at that point so I experimented with spatially distributing field recordings of a tide moving in on a shore through 6 speakers in one of the large industrial rooms of the space. What I liked about the spatialized sound is that it connected with the audience in a much different way than the video piece: it created a personal experience between body and site but at the same time its presence could not be excluded from the video and the awareness of other people in the space. It was intimate yet completely surrounding all at the same time.

In 2004 I worked with sound as a primary medium in the installation *Oscillations (2004)* using 48 speakers on 24 channels distributed across 3 four-story facades of a U-shaped loading dock area. Responding to the history of the building, which in the 1950s housed a manufacturer of instrumentation measurement systems and referencing equipment – oscillation circuits were one of their significant contributions to the technology field – I utilized sounds of audible oscillations, pure tonalities based on sine waves, that swing back and forth between the buildings' facades. The sound was provided by 24 independent sound channels through 48 speakers "swinging" the sound source spatially throughout the loading dock area. The etymology of the word "oscillate" is possibly derivative of the Latin word "oscillum," a diminutive of "mouth." I liked this

reference for the speakers on the building façade becoming "small mouths" speaking from the history of the site, forming a chorus of the building's past yet interweaving this voice with contemporary sounds of the busy street surrounding the building: the beep, beep, beep of delivery trucks backing up, the long, deep throaty call of a train passing by, and the clacking of containers being loaded onto trucks of the NECCO factory next door. This intermix of sound referencing past histories and current activities was a thought-provoking experience of the permanence of the site, posing the question "what has changed?"

At the time of creating *Sonification/Listening Up (2005)* I had heard a radio broadcast of two asteroseismologists studying the internal structure of pulsating stars through the interpretation of their frequency spectra.[1] The sound samples that were produced by this stellar data (frequency, amplitude, and phase) were phenomenal! Alpha Centauri A sounded like a wobbly, wooing top spinning in space – but what was so engaging with what I heard was the translation of scale – Alpha Centauri A was close to me and I could hear it. This was an intimate experience for me, shifting a distant and somewhat abstract entity into an immediate relationship between myself and a star 4.37 light years away. I knew that I wanted to explore this further and create this as an experience that could be shared with others.

The history of sound as an art medium originates – like photography and film – with the invention of new technology. Technology has been the theme of sound art in the work of the Futurists, propagating the themes of progress in the form of noise, destruction, speed, and ecstasy. The group was one of the first to make use of sound as an art medium, not as music, but as something else that stood in its own right. Luigi Russolo's manifesto *The Art of Noise* (1913)[2] proclaims the end of Western music and proposes its replacement with sound derived from grinding, crackling, and exploding instruments. From the Futurists perspective, life was constant warfare. In contrast, artists in the Dada movement experimented with sound playfully. In the harsh emotional and intellectual climate of post-WWI Europe, Dada saw its mission in the production of anti-art that would eventually destroy culture and in this way "end all wars." In the following decades, artists have continued to work with sound as an experimental medium between the boundaries of abstraction and representation, as intervention and as ambient form.

I have realized that the central method in my work is to use the underlining systems of data that create sounds (audible or inaudible) and then translate these sounds into evocative experiences. I am inspired by what Caroline Jones calls "interrogative practice with technology."[3] She describes this as "work that repurposes or remakes devices

to enhance their insidious or wondrous properties; available data translated into sensible systems." My process of translating data into sound is usually conducted in collaboration with a scientist who has designed the data collection. The sonification of this data makes the invisible audible and thus tangible. It is of the utmost importance to me to maintain the authentic relationship between data, its site, context, and collection.

Sonification/Listening Up (2005)

While thinking about the work of the asteroseismologists, I visited Dr. Phil Erickson at the MIT Haystack Observatory to find out more about potential data for a sonification project on the MIT campus. His research in atmospheric science has involved the capture and analysis of inaudible sound waves stemming from a region of the upper atmosphere above MIT Building 54, the site in which *Sonification/Listening Up* was later installed. To me this was particularly interesting because I already had my eye on Building 54 – IM Pei's Green Building which houses the MIT Earth and Planetary Sciences program – as a possible site for a large-scale public sound installation. Its 24 stories and 300 ft façade is subdivided as a grid of windows. Looking at the façade of Building 54 and at Dr. Erickson's graph of the ion-acoustic waves in Mathematica, I decided to map the sound graph data points to the points on the building façade where lines in the grid intersected. In my installation I positioned speakers on these points, to resemble a downward sloping graph. Each speaker was driven by a separate channel containing one frequency band in the overall ion-acoustic sound spectrum. This composition yielded 35 separate sound channels representing the spectral frequency distribution of the sounds, varying both by duration and in pitch. We did have to frequency-scale the ion-acoustic pressure wave data to translate it into audible sounds, and used as a sample data taken at 15-minute intervals over a period of 24 hours. Seven different altitude levels in the ionosphere have been used to construct ion-acoustic sounds that are broadcast from seven layers of speakers on the building's façade. The ion-acoustic data reflects the make-up of the ionosphere above Building 54, ranging from 100 km to 800 km, hence the seven subdivisions of speaker rows on the building. Integral to *Sonification/Listening Up* (and really all of my installations) were the organization, negotiations, social space, and collaborative processes that occurred during the project's conception and realization.[4] I look at the collaborative nature of my projects as a social fabric that plays an integral part in my artistic practice, perhaps even the most enjoyable aspect of making the work. Hanging and designing the speakers

and assemblies proved to be one of the most challenging aspects of the *Sonification/ Listening Up* project. Early design concepts did not satisfy safety concerns and an approach that required a temporary attachment of the speakers to the building was necessary. Attaching such large speakers to Building 54's façade was no small feat. In the early design stages we found that the wind force on Building 54 was significant due to a wind channel coming off of the Charles River and speaker assemblies needed to sustain oscillating wind forces in all directions. 7500 ft. of speaker cable was used for wiring the speakers for sound and 4340 ft. of steel cable was used for speaker safety hanging. The piece was installed over a period of seven days with an installation work force of 15. Prior to the installation, the planning and approval process for the piece required numerous meetings with legal and insurance representatives, engineering and safety experts, and was backed by a proposal process which required early project design and visualization for fund raising and approval purposes.

After completing *Oscillations and Sonification/Listening Up* and various other projects, I realized that multi-channel sound use is important in my work as it invites the viewer/listener to navigate their way in time across the installation site and engage in the spatial structure of the sounds rather than establishing a relationship of listening at a singular sound source. With *Oscillations* some of the audience sat and slowly turned their bodies to intercept the changing soundscape and 48 speaker points around them. In *Sonification/Listening Up*, students played Frisbee at the opening while listening to the 35 channels above them and one person rode a bike in circles around the perimeter of the building, which I'm guessing gave an interesting twist on the whooing ion-acoustic wave sounds around them.

I've chosen to work at the scale of architecture, and specifically for *Oscillations* and *Sonification/Listening Up* the exterior building façade as medium/instrument, as I've found it aesthetically and practically necessary to integrate the work to its site. For both projects, the ambient sounds around the buildings were essential for the installation and otherwise would have isolated the sounds in the installation from their surroundings. A very different acoustic, social, and spatial experience than if the projects would have existed in an interior room. Aesthetically, working on a large scale helped me to better integrate the installations to the surrounding architecture. In the case of *Oscillations*, placing 48 speakers on the building's façade allowed me to set a counterpoint to the surrounding industrial scale, such as the NECCO factory and other industrial spaces nearby, or in the case of Building 54, the neutral yet grandiose style of IM Pei's architecture. I found it necessary to utilize its entire façade to pay justice to Building 54's overwhelming scale, at 300 ft. the tallest building in Cambridge,

MA. Due to its scale, the installation's sounds extended far beyond the perimeter of the building and witnesses told me that sounds could be heard across the Charles River into downtown Boston. Perhaps a window washer across the river hanging from a downtown high-rise heard a faint "weoo-weoo-weoo" and was puzzled by its origin.

I see the *Sonification/Listening Up* project not as an individual piece but as the marker for an ongoing Sonification series. In an upcoming project currently under development, I am investigating the sonification potential of data patterns found in Puget Sound coastal oceanographic research. Puget Sound, a vast body of water that connects the United States Pacific Northwest with the open Pacific Ocean, has a fascinating geography that affects tidal patterns, salination, and biological systems. As a site for the sound installation, I envision several locations at the Seattle waterfront.

Thinking of the waterfront areas as built environments that demarcate the line between city and water, I would like to map data points in the ocean to locations in the public space of the waterfront area to relate the experience of research happening in Puget Sound to the public in a sensual way. Might such processes of sonification lead to a deeper experience of the built environment, allowing a public to consider a larger environment or context? Or, to appreciate place as an elaborate network of social and environmental activity?

1 Dean Olsher, 2004, "*Listening to the Stars*", *The Next Big Thing*, WNCY, October 15, 2004.

2 Luigi Russolo, "*The Art of Noises: Futurist Manifesto*", in *Audio Culture: Readings in Modern Music* , edited by Christoph Cox and Daniel Warner (New York: Continuum International Publishing Group Inc), 10–14.

3 Caroline A. Jones, "The Mediated Sensorium", in *Sensorium: Embodied Experience, Technology, and Contemporary Art*, edited by Caroline A. Jones(Cambridge, MA: MIT Press, 2006), 6.

4 Carrie Bodle, "Sound and the Social Organization of Space: Sonification/Listening Up", *Leonardo Music Journal,* 16, (2006), 51–52.