ICA 2013 Montreal
Montreal, Canada
2 - 7 June 2013

Architectural Acoustics
Session 4aAAb: Methods and Materials That Improve Speech Intelligibility for the Elderly and Hearing Impaired

4aAAb6. Still able
Trent Still and Daniel Butko*

*Corresponding author's address: Division of Architecture, The University of Oklahoma, 830 Van Vleet Oval, Norman, Oklahoma 73019, butko@ou.edu

In a world where most students are habitually connected to headphones, one student is harnessing power outside the sense of hearing to unite acoustics and craft into particular listening environments. Trent Still is a student, a craftsman, an avid fan of acoustics, and surprisingly legally deaf in one ear. What initially could be viewed as a hindrance within the study of acoustics, has developed into an avenue of expressive talent and determination. As a student of architectural design, Still focuses on materials, connections, and overall aesthetics of the listening environment. For example: in a recent gallery exhibit of handcrafted furniture, one of Trent's entries was a pair of handmade loudspeaker enclosures that were French cleated to the wall. They were not merely wall mounted; they were wall dependent. The wall cavity between framing members and the wall finish was part of the installation; thereby actively integrating acoustics into architecture. This paper does not focus solely on one student; it's about unequivocal enthusiasm for acoustical craft within inhabitable space. No matter what seems like a disadvantage or disability, students and educators can work together to ascertain visual and auditory beauty. Sight and sound are uniquely codependent.

Published by the Acoustical Society of America through the American Institute of Physics
Introduction

In a time when tangible personal experiences are shrinking and the range of relationships to other cultures is thriving through constant virtual and digital dialogue, people are presented with an acoustical dilemma. Society has allowed technology to diminish relational interaction within the environments people physically inhabit. Personal space, once ruled by the senses, is now made up mostly of bandwidths and pixels; personal exploration within the built environment is a dwindling desire of the contemporary generation. Likewise, society has become increasingly dependent upon personal audio players, digital music sharing, and the ubiquitous headphones or ear buds that have become more fashion statements than tools to feel and understand the complexities of audible art. Is there a bridge that allows designers and scientists the ability to create objects or space capable of conveying acoustic feeling for coming generations to respect space, time, and the effects of acoustically superb environments?

Modern crusaders for acoustical causes ensure a visual yet powerfully auditory connection to the past and future vision through acoustical design. With an understanding of historical context, modern explorations, and the metaphysical side of acoustics, diversity can shape acoustical equality through talent and determination. What follows is a brief idea of how the acoustical crusaders – including one who cannot fully experience the sound of space but is “Still able” - integrate sound and manufacture the interactive experience of sound into space that will move and inspire generations to come. This paper focuses on enthusiasm for acoustical craft and preserving the sensory relationship between people and inhabitable space.

Historical Context

The historic connection between acoustics and self-expression can be understood through the grand cathedrals and speaking venues of ancient civilizations. Certain spaces became the centermost point within the culture. Often designed as robust monuments to some idea or philosophical teaching, each became known not for the sermons or politics practiced, but the housing of grand sounds and support of the invoked acoustics. When abstracting these spaces from their intended use, the acoustical superiority was by far the most prolific and important aspect inherent to the site. The intended uses and impact on societal operations can be conveyed by examining the auditory significance of those spaces. These sites allowed for a small group, and sometimes merely a single person, to project a message to a mass audience with relative ease, which in turn supported the importance of the message being presented. History, and especially cultural significance of historical venues, must be understood to develop interactive acoustical experiences. Looking back, one can unequivocally see the prominence of acoustics within the built environment and how these grand spaces likely molded much of mankind’s present understanding of science, philosophy, and religious belief systems.

Modern Explorations

Society’s connection to the built environment is changing as relationships to virtual spaces are expanding. Some experiments have started to address the issues of reconnecting space to the people who inhabit it. David Byrne’s “playing the building” project begins a discussion of space and the fabricated auditory concoction produced by the users. In speaking about the installation, Byrne explains “...this democratizes the whole experience, and people know that when they approach it.” A simple recipe for the reconnection of space and sound to human senses allows

Figure 1. “Playing the Warehouse” by Creative Times
any person, regardless of experience or ability to become one with the space, to appreciate the audible traits that make up the built environment. The immense diversity of auditory history and the events that have molded participants’ senses spawns the question: how do designers and scientists create an experience that is unique?

The democratization of space and sound is pertinent, but also hard to achieve. One issue is the shrinking sensual exploration of each person’s life. The personal “bubble” is continually expanding with data and virtual information, but shrinking in the context of personal spatial exploration. How designers create spaces or craft items that allow for a conversation between the site and the occupant is vital to the success of how people perceive space. This can be answered by creating small but complex items within spaces that require viewers or inhabitants to interact with the surrounding environment, allowing a reconnection to a functional environment that expands one’s spatial awareness beyond the binaural experience of hearing.

**Metaphysical Approach**

In The Poetics of Space, Gaston Bachelard speaks of the metaphysical connection between inhabitant and site. Bachelard states, “If I were asked to name the chief benefit of the house, I should say: the house shelters daydreaming, the house protects the dreamer, the house allows one to dream in peace.” Bachelard goes on to make many connections between the psychological and physical importance of site and self. In his work, he equates the use of drawers, chests, and wardrobes to the place where people hide their secrets. The relationship of furniture and psyche is an important metaphysical connection that needs to be remembered and practiced in the acoustical exploration of space. How does the experience of a child hearing a grandparent’s rocking chair mold that child’s understanding of space, sound, and craft? Bachelard says, “Even a minor event in the life of a child is an event of that child’s world and thus a world event.” This idea that any event, specifically any audible event, has an influence on daily life is an important idea which warrants consideration.

**Disabled Equality**

Events can become building blocks in a person’s understanding of space and design. As designers and scientists, this theory needs to be taken into account when creating inhabitable space. Often equations and rigorous research outline the design of space to achieve acoustic superiority. Thus, senses are nothing more than an extension of opinion and with opinions come a diverse definition of acoustic superiority. However, there are events that shape senses in a way that can be seen as disability; but what is seen as a hindrance to an observer can be an opportunity for expression of diversity. It’s through this diversity that a new opinion on acoustic superiority is created. Those who are hearing-impaired are affected more than others in the audible world, and it’s through the impaired sense that a new aspect of acoustics is created. The physically tangible aspects of acoustics become important traits and the audible nature less necessary. Through vibrations and sound, those who are hearing-impaired are able to experience acoustics in a manner that creates a new layer of audio to be explored. Acousticians can design for the hearing-impaired through the integration of sound and physical object. Through the integration of sound, site, and the physicality of craft, designers are able to introduce an aspect often overlooked in acoustic design - the sensory impact of vibration.

In a world where most students are habitually connected to headphones, one student is harnessing power outside the sense of hearing to unite acoustics and craft into particular listening environments. Trent Still (the first author of this paper) is a student, a craftsman, an avid fan of acoustics, and surprisingly legally deaf in one ear. What initially could be viewed as a hindrance within the study of acoustics has developed into an avenue of expressive talent and determination. As a student of architectural design, Still focuses on materials, connections, and overall aesthetics of the listening environment. He has found a way to express acoustics in furniture design.

**Impact of Furniture on Space**

Furniture is often seen as a placeholder for the spatial environment; but just like acoustics, furniture can be audibly interactive. Furniture allows for dynamic equilibrium between site and people. Interaction with craft happens at all points through a person’s day; it is as simple as the favorite chair or the directness of a coffee table. No matter the piece, lives are continually influenced and guided by the furniture that surrounds and supports them. The ability to use this influence, and the structure the furniture provides, is an important tool that should be explored. In addition to the utilitarian function furniture fulfills, there is an opportunity to expand on this idea and integrate it into the site itself. The relationship between site, craft, and inhabitants is often overlooked. The use of
furniture within inhabitable space creates an opportunity to expand sensory awareness by highlighting reciprocity between acoustics and craft.

**Birch Boxes**

Designers are still able to achieve a symbiotic relationship between site and inhabitants through developing people’s explorative nature. People are integral to the production of sound within space. The interaction between them, the site, and the items that fill the space will again reconnect audiences to the power of acoustics and the significance of their actions within the built environment. Designers, scientists, hobbyist, and audiences can harness and utilize acoustics in the ever-changing world. The practical application of these concepts becomes apparent in one spatial study by Trent Still. In Still’s “Birch Boxes,” he was able to interweave site and craft to expand on the relationship between the two.

![Figure 2. “Birch Boxes” by Trent Still](image1)

![Figure 3. Detailed view of “Birch Boxes” by Trent Still](image2)

Still used the cavity created by the studs in a typical conventionally framed wall as expansion chambers for lower frequency sound waves - thereby actively integrating acoustics into architecture. With the placement of studs governed in all new construction by the International Code Council, this standardization of building created an
opportunity to design a transferrable piece that would be able to utilize the wall as an integral part of the loudspeaker’s operation. In doing this, Still started a dialogue between the objects; no longer is the wall simply used as a support for space, and the loudspeaker a spatial placeholder. These two objects are now interrelated, creating a dependency on one another to fulfill their intended design purpose. The creation of objects that are dependent on site is pertinent to the problems associated with the reconnection of inhabitants to space. This answer demands an awareness of the space being occupied. In creating an awareness of site, craft is able to nurture a natural curiosity within people and the use of an acoustical object that is not only wall mounted but also wall dependent.

Figure 4. Perspective view and section of “Birch Boxes” on stud wall assembly.

**Conclusion**

Acoustics is a rigid science, but it is a science that is perceived through our senses. Senses, or lack there of, are an extension of and characterized by personal experience. If designers accept this as the way people perceive space, designers are challenged to create spaces that will spark a dialogue between user and site. Acoustics is crucial to the success of inhabitable space. If the goal is to create spaces that inspire generations to come, designers can no longer separate aesthetics, acoustic functionality, and interior design as three separate entities. It is only through the blending of these three practices that a truly unique and important piece of experiential architecture can be produced. No matter what seems like a disadvantage or disability, students and educators can work together to ascertain visual and auditory beauty.

**REFERENCES**