Acoustic Aesthetics: A Material Exploration

by

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Acoustic Aesthetics: A Material Exploration
Abstract

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Eric Harry Hartz

Sound as an architectural material is one of our most copious and yet systematically ignored design materials worthy of exploration. If it is addressed, architecture seeks to silence the sound it encounters; it blocks our aural connection to the next room, the next building, and the outside world. This project imagines what it would mean to listen through walls, to gather information about nearby spaces with our ears and finally what it would mean if that acoustic experience could be understood to be aesthetic.
Acknowledgements

For R.L.

A thesis, like most productions, is merely steered by the author. The author stops to pick up passengers like David Brown, Art Gottschalk, Sean Latly, William Williams, & Gordon Wittenberg. These passengers voice thoughts about where we are headed; sometimes the author is listening, sometimes he is listening to himself. Without this trip together, the project would not have pulled together as it did, thanks guys.

Once embarked on a trip, cell phone calls to people important in life help the trip smooth along. Thanks to Randy, Mom & Dad, Grandma & Grandpa, & Aunt Pam.

Cheers to Chad Loucks for expertise, tools, and positive energy. And finally, thanks to Bill Mack & Gil Cepillo for letting this driver get out of the car so that I could crawl around in the cooling tower and tunnel system.

Natives sometimes point and tell the author to turn left and go a few miles when he is stopped without a map. Usually we never learn their names, but they haven’t been left behind on this trip. Thanks to: John Biln, Mary-Ann Ray, Jennifer MacKenzie, Steven Ball, Adam Hartz, Sven Zbinden, & Karim Nader. In a moment of distress, fellow drivers stop and lend a hand: thanks to Gage Reese & Lina Lee for bailing me out during the flood.
The imagining attention prepares our attention for instantaneousness.
Gaston Bachelard, The Poetics of Space

When walking in the woods, one's visual sweep is a somewhat bounded envelope of space. However, one's aural sweep could extend for miles depending on the ambient sound. Our ears reach out beyond the seen to help us hear an approaching cougar, a jet overhead, a lover walking down the gravel driveway. Once indoors, the aural sweep diminishes. Only a car alarm, a helicopter, the next-door neighbors, or the wind allow our caged perception to reach beyond the gypsum-clad insulated walls. This project imagines the experience of walking through built space with the keen aural attentiveness that accompanies a walk in the woods.
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Learning to Listen

Introduction

When one searches library databases for "acoustics" and "architecture" thousands of articles appear within two areas of research: designing the perfect concert hall and attempting to make buildings silent. To greater and lesser degrees, both research areas engage the aesthetics of acoustics in similar ways. Each approaches sound as a material that must be made environmentally uniform. Listening to a concert from the lower balcony should be just as pleasing as the upper balcony, and just like Jacques Tati’s film Playtime (Figure 1) each office cubicle should be as quiet as another. The process of making this uniform aural blanket relies on set standards, understanding what is not acceptable and what will work well. Social convention shapes this decision making and prevents making a concert hall that might, for instance, have intentional areas of greater bass response for those who enjoy it, or apartments that might have areas of
of designed sound leakage.

I have attempted to approach architectural acoustics from this point of view: architecture can embrace sound as a material design element that possesses nuances which can create a richness of meaning and enjoyment. In pursuit of nuanced sound in architecture I developed four empirical studies. These experiments are designed to help one consider the effects of the directionality of sound, dematerialization of the source of sound, the relationship between visual and aural realities, and the use of sound to engage the imagination. These studies throw off the uniform aural blanket of traditional architectural acoustics so that one might listen to space as carefully as one can see it.

There are a few projects that I referenced during the course of the semester that illustrate some of the above concerns. Michael Brewster's 1994 Geneva By-Pass is (Figure 2) an unrealized project that would groove the pavement of 3 tunnels in Switzerland. Each tunnel would give a moving vehicle's occupants a particular aural sensation keyed to the vibration of
the tires on specially grooved pavement. This project interests me for a number of reasons. First, each individual vehicle's vibration affects the background sound experience of the collective. Secondly, because the project is concealed beneath a mountain it becomes interesting to me as public infrastructure in a "blind spot". Lastly, I'm interested in the relationship between sound and vision as spatial senses when vision is limited. The changing 360 degree soundscape relates to the tunnel's section and materials while visually the experience remains ubiquitous, expected (Figure 3).

A second project, Gigon and Guyer's 1999 Listening Pavilion is part of larger landscape project to "reconstitute" a battlefield from 9 A.D. in Kalkriese, Switzerland (Figure 4). This pavilion is made to intensify the battlefield experience by screening through visual information temporarily. The seeing, listening, and understanding pavilions are intended to focus the sensible history of the place deeply into the senses. A galvanized steel sound collection device mounted on a rotating pivot punctures the roof of the sound-
proof listening pavilion. In depriving the visual sense, the soundscape becomes most important—one imagines the steps of Roman soldiers advancing on the Germans as the wind rustles through the leaves.

A third project, Bernhard Leitner’s 1996 Le Cylindre Sonore is embedded in a larger bamboo garden designed by Chemetoff and Buren, which is itself embedded in the larger Parc de le Villette in Paris (Figure 5). Leitner’s project is a 10 meter diameter double shelled cylinder. The double shells allow for the resonaion of sound emanating from 24 radially mounted speakers. Leitner’s sketches indicate his notion of “Prickling Space” in which the sound material is “piercing high pitched tones.” Gilles Deleuze and

Felix Guattari write the following in A Thousand Plateaus (311), “But the song itself is already a skip: it jumps from chaos to the beginnings of order in chaos and is in danger of breaking apart at any moment. There is always sonority in Ariadne’s thread. Or the song of Orpheus.” Leitner’s project creates a sense of disorientation with the natural world and disturbs our perception of space itself. As one walks into the cylinder the singing of the birds in nearby bamboo becomes distorted, the experience becomes reminiscent of being trapped in the Doppler of a carousel pipe organ.

With an understanding of some of the very few projects that take on sound in this particular way, I was ready to start building, to find where I might take these interests.
Confessions

The Sound House

Like Gigon and Guyer's Listening Pavilion in Switzerland, the Sound House announces its relationship to listening with its broad wooden ears (Figures 6,7). The Sound House was initially conceived as a listening laboratory to consider the vibrational effects of ambient sound on stretched materials, however I quickly became interested in unintended aspects of the project. The pair of MDF boxes that conduct sound focused by the exterior ear to your own ear produce an extraordinary stereo event while one listens within the darkened, claustrophobically-proportioned box (Figures 8-10). The darkness allows your mind to focus entirely on aural stimulus. The location of the Sound House ("the box") on the bridge within the architecture school provides an endless supply of noises coming from all directions. However, because the ears of the box are arranged binaurally, sounds originating in front or behind the box are blocked thus creating a directional listening experience.
The presence of the Sound House on the bridge (the scale of which suggested a confessional, a bathroom stall, and a broom closet to passers-by and those who used it as a cell phone booth) strongly evoked the potential of concealment (Figure 11). A listener could easily be sitting within the box's opacity. The human scale, anthropomorphic form, and for those who sat in it, the memory of eavesdropping on a public place each provoke a sense of potential concealment. The Sound House captivated my attention as a blind spot with its mix of concealed spectacle and the state of heightened aural attention it offers. Aural awareness is both closed and reaching beyond the material limits of the box.
Sonic Inhabitation

The Cooling Tower

Sonic inhabitation is the insertion of oneself into a place with the intent to design not with lines or form as the medium, but with sound. Materials, architectural relationships, and temporal sequences of space inhabitation can be cued with the projection of sound. For each listener, these spaces will be imagined—and this is their power. The sound suggests smells, people, and materials as well as the space through which one moves.

The Rice Cooling Tower's form suggests an extruded basement—its lack of fenestration acts as a kind of effacement (Figure 12). Knowing that something is concealed from view moves the mind into a state of imagining what might be concealed. In this case, one also imagines how steam pours out above the parapet wall at all hours. With one's ears close to the building's effaced walls, the sounds of water rushing and motors...
whirring breathe out beyond the seemingly closed envelope. Each of these sounds suggest a space that is unseen, a space fitted with rushing water and two stories of open section capped by a steaming roof.

Using the sounds and the spaces imagined by looking at the concealed exterior, I made sketches that detail an installation of corridors, stairs, and surfaces punctured by sound windows (Figures 13-16). These sketches suggested certain sounds which I gathered through digital sampling in places that range from the sink in studio to home air conditioning units heard from the street. Using these samples and Adobe Premiere, I fit sounds together to represent my sonic inhabitation of the Cooling Tower. I paid careful attention to the manipulation of stereo experience in an effort to simulate passing sound windows, imagined existing interior sound configurations, and others occupying the interior space along with the listener.

The final recording was played into the ears of the Sound House (Figure 17). Because sound only enters the sides of the box at ear height, the stereo effect
seems to be magnified for the listener. The interior acoustic and visual properties of the Sound House, discussed previously, enhance the experience in that one's sense of the sonically inhabited space projected from the outside coalesces with the dark silence of the interior. This heightens the simulated sense of movement through binaural sound manipulation. For instance, the recording takes the listener past sound windows which sample sound from outside the building envelope while maintaining a constant hum suggesting the interior of the envelope. Listening to this space from within the Sound House is different than listening to headphones because one feels that the box's interior articulates the same relationship to the sound of the exterior speakers as it does to the surrounding ambient noise levels—that being: all sound exterior to the box can be taken to be real because it is concealed.

Note: I did indeed visit the interior of the Tower after this project was completed. In its visual and aural reality it is the most exciting space on the Rice Campus.
To the Tunnels

Recording in the Tunnel Network

The network of tunnels beneath Rice University is an enormous conduit for hot and cold HVAC water, electricity, and some computer networking. (Figure 18) Each building on campus can be reached, assuming possession of the proper keys, through this tunnel system. Their infrastructural necessity also means that they must be concealed like most building mechanical systems. This set of sweaty, claustrophobic tunnels with steam leaks, dripping water, and receding one-point perspective lines of incandescent lamps hides beneath campus. Thousands will tread over it without ever intuiting its presence.

Unlike the synthetic process of assembling sound samples in which materials and architectural relationships are simulated, this next portion of the project explores the continuous recording of the actual space. Using separate digital recording devices for the right and left
stereo tracks, I captured the continuous spatial and aural experience of walking through the tunnels for clear binaural play-back. On a 20 minute walk from the boiler room, across the north loop, past Fondren’s pipe room, to the south loop, and finally to Rayzor Hall the scratch of feet on dusty concrete, the click on and off of the next and previous tunnel lights, sump pumps running on the floor of the low areas, reverberating metal floors, and the slide of jeans over pipe insulation exerted themselves as sounds that usually can not be found outside of a blind spot.

My intention for this tunnel recording was that it be played into a pair of headphones that have a set of blinders attached which prevent one’s visual awareness from sourcing the location (and reality) of sound adjacent to the ear in a corridor. (Figures 19-25) While walking in the hallway one’s peripheral vision is cropped and thus seems to recede much more rapidly than usual as the hissing of steam re-maps within the corridor next to a doorway. The generic visual experience of a corridor filled with the richness of extra echoes, a linoleum floor that sounds crispy, etc. becomes a moving hallucination driven by sound alone.
This pair of blinder headphones (Tunnel Visi-Phones) (Figure 21) allows the stereo experience of movement which I had studied for the motionless listener in the Sound House to expand into a moving experience. (Figures 22-25) It was only short step to move to the placement of speakers from the headphones to the walls of a darkened corridor. I was ready to create an installation for large numbers of people to experience at once.
Listening to the Blind Spot

The Installation

This last installation, located on the bridge in the Rice School of Architecture, continues the exploration of "sound as a material" (Figure 26). It also represents an elaboration in the study of blind spots, exploitation of the stereo experience, and the bracketing of visual information as a method of coaxing visual thinkers into using their ears as the primary spatial sense. In pursuit of these ideas, I employ acoustic strategies that are usually avoided as aesthetically undesirable. For instance walls, ceilings, and floors of the installation are clad in sound absorptive foam, transaudient foam is used as walls and ceilings, and stereo speaker beam spreads are slightly overlapped to create zones of sound distortion within the corridor. The sheetrock exterior of the installation is covered with acetone-transferred drawings, most of which appear within these pages.
The blind spot in this installation can be read in a number of ways: organizationally, aurally, and visually. Organizationally, the plan is a continuous, rectilinear corridor loop that defines a blind spot within it. (Figure 27) This loop is pushed against the balcony wall that overlooks the 25' cubic jury room below. (Figure 33) The sliding wall panels which can expose or conceal the jury room are partially open to allow sound from the jury room to pass through foam and into the looping corridor. (Figure 30) The other three sides of the project present a sheetrock surface to the surrounding space on the bridge.

The north side has an entry portal cut through the acoustic wall section for inhabitation. The interior blind spot, of course, can not be seen, though 3 speakers simulate the experience of hearing it. (Figure 28) Seeing and hearing the interior of this project, a subject more carefully studied later in this chapter, are the only ways to get a complete grasp on the project—thus, more so than other projects, the reader must weave together text, image, and sound information in order to develop an understanding of this misleading plan.
The aural experience of the project is firstly one of recognizing a rapid decrease in ambient sound that many liken to the feeling of descent to the runway in a jet. One becomes aware of this as quickly as one notices the very low light levels. The entry portal is only 4' high which allows one's ear to pass the open entrance but feel that the corridor is aurally continuous. At the same time, the head of the listener is concealed from those viewing from the exterior of the project. The plan creates multiple readings of blind spots in that the core of the project is perceived to be concealed by those walking around it, while the walkers themselves are perceived to be concealed by those external to the gypsum walls of the project.

Materially and visually the interior is mostly wrapped in a sound absorptive foam, represented in green in Figure 28. Occasionally this gives way to sheetrock (blue) for more sound reflection, or to a transaudient (yellow-beige) foam that adjoins the jury room. For the most part, the interior is both aurally and visually unchanging when one is not near one of the six speakers strategically inserted into the walls of the project (red). The continuous surface wrapping the core creates a
Figure 33 depicts the use of the Jury Room adjacent to the installation as an echo chamber. A radio microphone tucked into the wall near the gravel tray in the corner of the plan sends the sounds of listeners walking through the project to a large speaker in the center of the Jury Room. This beam of sound is directed at the ceiling to encourage the greatest amount of reverberation within the room (the walls have acoustic treatments that dampen echoes). These echoes then bounce back into the project through transaudient foam after having taken on the acoustic identity of the 25’ cubic space.

A visual experience in which one is unable to expect the arrival of sound zones within the corridor because the speakers are rendered inscrutable by the opaque foam wall surface (which is stapled to the 2 X 4 construction).

Each pair of stereo speakers in the project are placed to create an unexpected zone of aural manipulation within the corridor. Playing from each stereo pair are the sounds of feet walking on different materials and in spaces of varying volume. The floor materials combined with sound samples of walking through progressively more reverberant spaces create a sense of increasingly larger
Opposite Stereo

low volume sound sweep

medium volume, partial stereo

maximum volume, intense stereo

sound envelope shaped by the stud adjacent to the sound source

This plan diagram documents the zones of sound that are created when two stereo speakers are placed at equal heights opposite of one another within an 8' long corridor. The darkest zone indicates the area of greatest stereo effect. The next lighter zone maps the secondary listening area which is specifically defined by the proximity of the speaker(s) to a stud within the wall. The stud effectively shapes this lower volume sound envelope. The lightest color maps the area within the corridor that still has some residual sound audible—sound that the acoustic foam is not absorbing.]
Splayed Stereo

- low volume sound sweep
- sound envelope a: slight awareness of sound source location, medium volume
- dense stereo space, indefinite awareness of sound source location, maximum volume
- sound source
- sound envelope b: slight awareness of one sound source location, medium volume
- sound envelope shaped by the stud adjacent to the sound source, volume
- phantom stereo effect for listener moving from envelope a to b; eventually the head blocks sound source b and cancels the effect

[This plan diagram is much like the previous, however, the speakers are now offset from one another in plan. The lighter and second darkest areas are expected, but the dark areas are interesting. Three zones of stereo sound appear within this extended aural experience.]
spaces that change their material properties when read against the datum of the corridor. When one hears the sounds of hugely echoing footsteps in the corridor furthest from the entrance, the hallway seems to have grown by 10' on each side while the cladding seems to have morphed from sound absorbent foam to concrete. As a way of further communicating the experience of walking through the installation, the following pages of text and diagrams attempt to register some key moments within the walk around the loop.
Listening

Diagrams and Descriptions
The low entry portal requires one to duck into the project. Upon standing up straight within the darkened 2'–3" X 7'–0" high corridor, a splashing noise can be detected off to one's left. The floor, covered with foam for a couple of feet further, makes no sound when lighted upon by your foot. The splashing sound quite suddenly becomes clear for your left ear as your eyes become accustomed to the light. Aside from the splashing sound, the tapping of feet walking far away drift into the hall. The water seems not to echo off of the hallway's foam surfaces but instead carries off far into the dark.
A further step brings you into a zone of stereo that is diagonally dispersed (splayed) across the width of the corridor. (See Figures 34-5) The floor surface has changed to hard rubber yet the sounds emanating through walls suggest that you are walking through water. Your right ear detects a metallic constricted echo. As you round the corner the splashing quickly loses its presence as the sound coming from the speakers is carefully shaped by the 2 X 4 studs and sound absorptive acoustic foam. A subtle yellow light filters through the transaudient foam ahead of you. The green foam at right wraps tightly around the corner as if it were a piece of upholstery.
The transaudient foam at left allows light through the wall and ceiling. Sounds of the gravel corner cough into the hallway. These echoes are shaped by the jury room as one's mouth shapes sound leaving the lips. Wood floors click underfoot as one's weight shifts across the surface. These clicks conduct into the adjacent jury room and return to your ear as echoes carrying information about the volume and material quality of the room. The right ear receives muted echoes through the transaudient foam on the ceiling, but otherwise the immediately adjacent foam which wraps the blind spot absorbs most of the sound. Moving forward and around the corner plunges one into near darkness.
The sounds of walking in a huge space echo into the hallway in the same way that the splashing near the entrance does. First an awareness of sound on the left, then, as feet move forward on the rubber floor, the splayed stereo effect becomes stronger. The zone of clear audio rises up out of the dark which causes one to question visual information and aural information in turn. A metallic echo emanates from the blind spot side of the corridor. A pair of ears listening to the blind spot side and the exterior side of the corridor might create a perception of being between sound: hearing the “inside” and the “outside” of the same sound. The blind spot side of the sound receives only echoes during the recording process while the outside wall receives both the direct and indirect sound from the recorded
source. The varying sound sources place the listener in a position of understanding concealment from the outside and simultaneously being outside another concealed space.

Suddenly, one's feet encounter gravel which causes a sharp crackling to echo off of the reflecting sheet rock wall and 9' ceiling in the corner. This sound echoes a short moment later in the jury room, but this can only be faintly detected by your ears—only the ears of the person standing at the transaudient foam can clearly hear this roar of sound.
Walking further into the dark echoing space releases yet another zone of sound from the inscrutable splayed speakers. The shape of the hall seems to expand several feet beyond the actual walls while the materials change from foam to tile. The quality of sound suggests a small enclosed space, not a hallway. As your ears move away from the center of the splayed stereo, your feet, now walking on soft, silent foam occasionally synchronize with the hard steps on the recorded tile floor. Light and a bit of sound leak through the entrance portal as you pad to the last corner of the loop. Upon rounding the corner, the sound zone dissipates but the splashing can not yet be heard. The sound of gravel in the jury room booms in around the next corner—someone is behind you!
Talking about Listening

The Reviewers: Kevin Alter, Jeff Day, Nichole Wiedemann, Sean Lally, & William Williams

The following transcript is incomplete due to technical difficulties.

WW: It's almost noise at one level, but it holds you...

KA: But that's the point I'm making...

WW: But, this is where I'm not sure. I don't question the value of a shadow cast by a pole placed on a building if I stop and actually notice it. I don't interrogate it. I don't ask whether or not that is a good shadow or a bad shadow. I just appreciate that I actually see the shadow moving across the brick.

KA: I don't know—it could be that Eric is making the statement that anything that one notices is a positive aesthetic experience, and maybe you are too...

WW: No, I don't think I said that.

KA: I know you didn't but you brought up the issue of aesthetics, so I'm just thinking in terms of shadow and light. I live on the west side of Austin, and every morning I travel east, and every evening I travel west. I particular, I get a blinding light both ways. I pay attention to that sun, and it's not a good thing.

WW: But if you were a [garbled] student, you would appreciate it.

KA: But the point that I'm making is that I think that the attention has been brought to bear on underlying acoustics and sound as an architectural element, but I'm just—let me just preface this by saying "I'm right with you. I think its really important"—but I'm wondering about the relative value of what it is that you are doing. Now some people would say that "Anytime you start to notice something, its good. Alison and Peter Smithson talk about a kind of counter-register or something like that. I don't know if your interest is in starting to register these
things. I am not sure if the emphasis is on the creation of something that is extraordinary...you know I would say that Carlos [Jimenez] takes light and tries to make it a beautiful thing, but subjectively beautiful, or an objectively beautiful aesthetic experience, I think you’re not yet embracing what you want to do with acoustics. I just think that you’re bringing it to the forefront...

EH: I want to hit the point about driving towards the sun—it is possible that this could be as annoying as hearing a rock concert when you’re trying to sleep. But when you see people walking by the framed opening of the installation’s portal, you see muscles stopping midway through movement, something is happening, and you’re choosing to listen to it, you want to listen to it. You don’t want to look at the sun, and you probably don’t want to listen to a rock concert when you’re sleeping. So I don’t think that these examples are directly connected.

NW: Let me just step it here...I really appreciate this thesis because I think you’ve, in many ways, gone into a territory that you don’t really know the answer to. You’ve tested some of this territory out it and you’ve found things that are very provocative to all of us, and will be for you for many years. So, in a way, you’ve unearthed ground that you can continue to test in future projects. I think that that has been the most powerful thing about your thesis. You tested and made this experiment, and yes, we hear sound and yes, it comes from different sources, and in a way it stands on its own as an experiment. One which, given your terms, has succeeded. It’s a working experiment, as is that one [gestures to Sound House]. I think that the next question for you will be, as you move these ideas forward, is to ask, for instance, what is a blind spot in relation to a school. What is a blind spot in relationship to this, or what is your rich area of acoustic effect on a normative program that you might work on later. One of the things that I’ve found—and I think it exists within your project—is that sound (and I think this could be related with light, although we track it in a very uniform way) can be projected, and we can see how it reflects, and things like that, is actually something that is very scaled. Sound that comes from the room over there is very different than the aural texture of the stones that I walk on, and so there’s the ability when you’re walking down the
street to have the scale that's directly linked to your feet on the pavement, the scale of the cars nearby, the flight overhead, things that are hugely multi-scalar. This is different for light—I don't know that light behaves in the same way. And so I think sound is this amazing untapped resource that can be a way of understanding a city, but also a way of understanding a building. It allows one to question the assumptions of "the body is to the door, is to this." It allows things to mix up in a very rich way, and I think you're beginning to find that in this study—but they are usually not isolated.

EH: I'd like to speak more about the isolation idea. I think that the idea of bracketing the visual experience so that I could study sound would be most important for a visual community such as this one. I felt that if I really squeezed down and made that experience incredibly dark, [gestures to the Sound House] and that one [the installation], everyone here would need to shift the dominant sensory function to the ears. That was intentional.

[Digital recorder switched off due to nervous speaker...]

KA: I think that for this to be aesthetic, an idea that has not come up in my mind, but I do hope that you're interested in it... The thing I lament is the focus—I understand the logic—isolating sound for a visual community so it could be explored, but I do think its worth is in relation to other things. Again one goes to light, a visual example, for instance. This is an area that has been trodden more often... Do you know Robert Irwin's work?

EH: Some.

KA: He did these a long time ago, well, all of his work is, but I think it's the cover of that biography, by Lawrence Weschler, terrific book by the way. There was a piece in Venice, California, Los Angeles, where they were going to renovate a building. It was part of a row of one-story commercial buildings, and they took off the façade. Then, over a series of several weeks, he covered that façade with scrim and painted everything inside white. It was pretty heavily published, as it was an interesting thing. While there were some interesting things about the visual effect of light, what was interesting was it in relation to everything else. You're used to walking
down and looking through plate glass windows and you want to buy whatever, a backpack, sneakers...but in relation to these other things comes a very surreal void that is quite powerful. And just like his disk paintings that you can’t actually get a grip on in the context of a museum, were very powerful, to see things that are so tangible, and then to see something that is absolutely intangible. There is an aesthetic part to this that I don’t mean to undermine, but I think the value in particular for an architect is the understanding that these things have consequence in terms of our understanding of the world, etc. And I feel that there’s such a richness in using sound or acoustics, and I lament that the primary focus has been on raising this to the level of discussion, but I’m hopeful that this is something that is going to play into your role as an architect. The great building experiences, architectural experiences, that I’ve been in that have to do with sound might be walking to the Kimbell as you rustle through the gravel, or the Christian Science Center in Boston where on one side of the glass dome you hear the exactly what is on the other, or the cacophonous sound of something like this [gestures to the laughter in the Farish Gallery during Naseema Asif’s review]. or, this is a great one, the Lewerentz church: you hear the dripping of the baptismal font where it goes into a little hole with a chamber underneath so it echoes, and it echoes throughout the whole building...the degree to which that has been balanced with the other visual and sensual experiences is one that makes them quite profound spaces. And I love that you would bring this in, but I lament that you haven’t yet been there. But, maybe that’s the next thesis, or a professional, and I hope that you take it into your work...Bruce Nauman did great installations that use sound. Lots of people have done these things, but as an architect I find them less interesting. I find just the noticing of sound less interesting than the use of it in relation to other things and occasions, and I hope you will embrace it in that way. What does get interesting is, as you cut out the visual, how the aural becomes more important...

SL: At one point, and you didn’t focus on this as much in the talk, but your interest in materials versus banal forms, a rectilinear form that doesn’t change in shape, yet as you walk
through, the experience is different than its shape. So, in sense, you've created a set of tools and techniques that allow you to control that experiential shape. As you shift things, move things, and see this [gestures to plan diagram] as another diagram that communicates that this is smaller at this point—it really feels like we experienced some other kind of room. Those were points that you had made during the semester, but not here. Because this is what is surprising, that you can take a banal shape like that and then using your tools make it into an experience which is nothing like that.

KA: It's quite interesting to think about—I keep looking at this [?]—and we spend much of our time in this building that is slightly post-modern, just slightly, and outside the elevator (it's a classical building [in Austin] that was renovated during a "certain" period of time) and there's a little dome right outside the elevator, and its part of a much larger corridor, and its quite beautiful. When you're there, you're isolated aurally, but there's a kind of echo as one stands by the elevator, beside the shaft. It reverberates and make you part of a much larger space that's quite different, and it's a very unusual experience. I don't know if you felt the same way [gesture to NW] but people are coming and going (its in the main thoroughfare of the architecture school) but you end being isolated in a kind of clutch with someone because of this reverberation, and its really interesting and its quite different than standing 3' over to the side. Well, it's not a great experience, but its one that one notices and recognizes that it is has some kind of use and interest, especially in a hall in an architecture school where there are also people whispering various things.

NW: I think that of the four ways that you are working, they all have different avenues and couldn't coexist. I think that's more like this [gestures to the Sound House] and the other one is more like the transportation of sound in Janet Cardiff...

EH: Yes, great.

NW: And not only the walks, but also how she remakes the symphony within a space just with a series of speakers, each with a recording of an instrument. It's really quite fascinating, that it is an overlay to a site that is not changed, so
it is much more electronic.

EH: That's sounds a bit like an experience I had while walking through a 20,000 pipe pipe organ while it was being played [Aeolian-Skinner at Hill Auditorium, Ann Arbor, MI]. Some speaking pipes are much closer than others—it sounds a bit like Cardiff's Symphony.

WW: Much of this experiment has been controlling and finding your variables, such that you can work with this body of knowledge and begin to use it toward an aesthetic end. You do have to control a lot of variables, and it would be hard for you to factually say that you can manipulate sound in this way. So, as an instrument, I think that this has different responsibilities than just the sole creation of an aesthetic experience. You could manipulate sound without knowing all of the factors that cause it and therefore its not that useful if you can't quantify it. And so as an instrument, its done what its supposed to do—but, its like a microscope.

KA: In that gallery in Massachusetts, the name is Barusch (?) or something, but I see here a version of what he did, which is over the top visually. You are obviously getting rid of visual concerns...you've got the sort of anechoic chamber version, but, of course there's a plethora of ways to go about doing it. I just think that the encyclopedia approach is not as useful, but that's just a suggestion. You enjoy making things, don't you? I really wish that that was in a wall with two faces [gestures to the Sound House]. I wish that you had set this thing up so that you would have some people going one way and some going the other [within the installation]. Find some way that it wouldn't be a totally removed experience. something more relevant, or more architectural instead of architectonic, which it is. But its pregnant with possibilities. I hope you carry them into your work.

EH: Thank you.
Press Play

Appendix 1: Play list

Track 1: Recording of walk through final installation (left turn and loop)
Track 2: Sonic Inhabitation of Cooling Tower
Track 3: To the Tunnels
In-Process

Appendix 2: Construction Photos

This semester was also about building, retreating to listen to what I had built, and then building again. Full-scale models appeared in the hallway every few weeks interrupted by weeks of sketching, reading, and empirically testing what I had made. Moving speakers around to discover new and wonderful distortion patterns, manipulating the section of the corridor, listening to music through the project's in-wall speakers, manipulating the floor materials, trying to explain why walking into the project makes your ears feel like you've descending 1000 feet suddenly—all of these things happened in around the spaces in these snapshots.
The corridor at the center of Figure 37 is made of two 8' test modules set end to end. (Figure 38) They are fitted with acoustic foam, speakers, and varying floor materials. (Figure 39) Because this corridor is open at either end, sound coming from these directions easily permeates to its center. However, you would be unable to hear a person walking past the long side of the corridor due to the sound insulation of acoustic foam, studs, and gypsum panels. The sound of gravel on the floor of the corridor is absorbed by the lateral walls, but these same sounds will echo in the open longitudinal direction. These corridors were the experimental grounds upon which I uncovered the shapes of stereo sound emanating from speakers ferreted away within the wall construction. Figures 34 and 35 are some of the results of this inquiry.
Figure 40 is an interior image of the test corridor. The acoustic foam prevents your eye from seeing the 4 strategically placed speakers as represented in Figures 34 and 35. The speakers produce two zones of sound that envelope the listener in the corridor while overriding the sound entering the corridor from either end. The visual experience of "merely walking" is transformed into a series of spaces heard beyond the walls. First, the splayed stereo zone occurs followed by the opposite stereo zone. Figure 41 details one of the splayed speakers in the wall.
These figures give a sense of the reconfigured test modules in their final organization of a continuous loop. Figures 43 and 44 indicate that the loop is not yet closed because the corner pieces have not been put in place yet. At this point, the project acoustically resembles the test corridor more than the final installation’s sound experience because 3 of 4 corridors allow sound to enter at least one of the corridor’s ends. In the final installation, all corridors were sealed at their ends (and in general except for the entry portal and the transaudient wall and ceiling).
Comparing Figure 45 to Figure 46 opens up the discussion of acoustic differences in the corridor before and after the acoustic foam has been applied. Figure 45 does not sound like the open space surrounding the corridor. It loudly echoes the noise produced by one’s movement because its gypsum surfaces do not absorb much sound; they only reflect it. If a layer of acoustic foam is only applied to one side of the corridor, the resulting space feels unstable, dizzying, or pressurized.
Figure 47 shows the wrapped blind spot (at right) which acts as a continuous sound absorption surface. The open area of wall just above the floor was filled in with foam because the sound of one's feet on the rubber floor audibly conducted up behind the foam without being adequately absorbed. Figure 48 shows the corner piece about to be fixed in place with screws and joint compound to silence ambient sound as much as possible. Once placed, the project radically changed its acoustic and visual relationships from those found in the test corridor to those found in pages 22 through 28.
Figure 49 shows the exterior of the project after all of the sheet rock work was complete. Figure 50 shows the exterior at the time of the presentation. Joint compound applied to cracks and gaps in the sheet rock blocked both sound and light leakage. All drawings were transferred to the sheet rock with acetone and reverse toner printing.
Index of Figures

All credits are the author's except:

01 Playtime, Jacques Tati. 1967
02 Martin, Elizabeth ed. Architecture as a Translation of Music. Pamphlet
03 Ibid.
05 Chemetoff, Alexandre. Le Jardin des Bambous au Parc de la Villette. Paris:
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