

S . O . A . L  
S E A R C H I N G

AN EXPLORATIVE COMPOSITION OF  
ARCHITECTURE, AUDITION, & ECOLOGY  
IN | | | MOVEMENTS



M A T T H E W  
E D W A R D S

A                    *thesis*                    *submitted*

to the Faculty of Graduate Studies  
and Research in partial fulfillment of  
the requirements for the degree of

*Master of Architecture Professional*

Carleton University  
Ottawa, ON, Canada

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*For all those who listen; those who have listened, will listen, or  
are listening now...*

*and for Claudio Sgarbi, who has taught me much and who  
continues to remind me not to be afraid of poetics.*

*Special thanks to Roger Connah for his patience and  
guidance;*

*to Pauline Oliveros for granting me the honour and privilege  
of an interview, as well as for her many contributions to the  
world(s) of sound(s), space(s) and listening(s)...*

*and to Jesse Stewart.*

architecture

the art or practice of designing or constructing buildings.

audition

*archaic.* the power of hearing or listening.<sup>1</sup>

acology

*materia medica;* the science of remedies.<sup>2</sup>

1 *The Oxford Online Dictionary* (<http://www.oxforddictionaries.com/>). 2011

2 *The Webster's Revised Unabridged Dictionary* (1913) (<http://www.websters-dictionary-online.org/>). 2011

o c u l a r c e n t r i c  
relating to a granted authority of the eye,  
a favouring of vision above other senses.



Is it possible that if we can put aside the illusion of  
*ocularcentric dependency*, and learn to listen to the songs of  
spaces, we can gain a fuller experience of architecture?



# ABSTRACT

Our total *sense* of a space is informed by more than just what we see, but is our experience of space as much *aural* as it is *visual*? How do the acts of *listening* and *seeing* complement and contrast with one another? Can we augment the experience of architecture in a meaningful way through actively listening to its song(s)?



Interior of *St. Vitus Cathedral*. Credit: M.Edwards. Prague, CZ. Fall 2010

This thesis is an inquiry into the role that sound plays within our experience of space, with the strongest emphasis placed on architectural space. It sets out to explore whether there is an opportunity for a richer and more intimate experience of space through the cultivation of a desire to listen and the development of a greater aural acuity. It culminates with a proposal for a new type of school, the S.o.A.L, or School of Advanced Listening.

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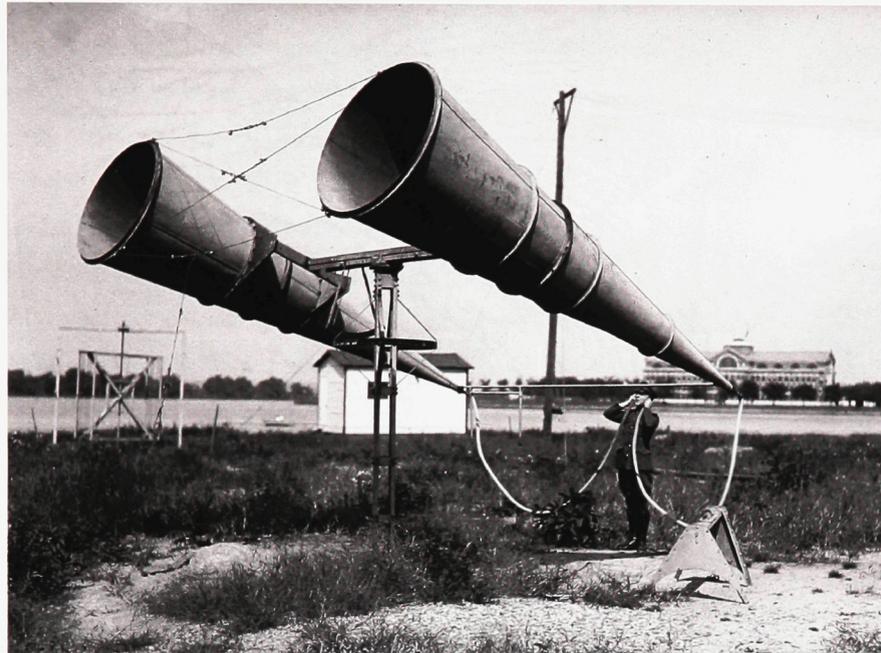
# METHODOLOGY

This thesis is structured as a performance, and is intended to be experienced as such. It consists of one prelude, followed by three movements, as well as a series of interludes, which evolve through three parallel narratives. The first narrative develops through the main body of text. The second, as a series of images, extended text and definitions beside the main body. The third is constructed using fragments of an interview that was held with musician, composer, author, philosopher, and one of the World's leading sound theorists Pauline Oliveros centered on her concept of *Deep Listening*™. These fragments are interspersed throughout the thesis and are utilized as a means of anchoring the first two narratives. The unabridged transcription of the interview is included in written form in the Appendixes.

Each portion of this thesis is intended be read in a unique way as it explores sound and space, mainly from phenomenological and poetic perspectives. As it is read, it is hoped that the reader can reserve some attention for listening to the sounds that will occur within whatever space(s) the act of reading takes place. The sounds of the immediate surrounding environment(s) will include those produced by the text itself—when a page is turned, for instance. There is an accompanying audio compendium to this composition, should readers choose to augment the aural experience. This compendium includes an audio recording of the interview described above.

Finally, as one reads, one need not think of the act of reading as purely visual. There is a widespread notion that the transition from oral to literal culture, and the oral word to the written word, brought with it a silencing of reading, propagated by figures such as Walter J. Ong, who argues in his seminal work *Orality & Literacy* that "...writing tyrannically locks [words] into a visual field forever..."<sup>1</sup> Let us think of it instead as simply having shifted the aural experience of reading from a position of exteriority to one of personalized interiority. Reading is also an aural process, since when we read, we are unable to separate the act of reading from the hearing our own voice or some other projected voice within the space of memory or imagination, which is uttering the words to us.

<sup>1</sup> *Orality & Literacy - The Technologizing of the World*. Walter J Ong. Routledge (London & New York) 1991. p. 12.



*Amplifiers at Bolling Field. Photograph. Washington, D.C. 1921*

These amplifiers were used to detect the sound of distant aircraft. They enhanced the operator's auditory capabilities beyond normal levels. This image is shown here because it illustrates a desire for a heightened awareness of sonic events occurring within the surrounding environment. Can we apply this level of auditory desire to our everyday experience?

# INTRODUCTION

While the main interest and focus of this thesis centers on the role that sound plays within our experience of architectural space, the idea that *ears* are more important than *eyes* will not feature. Nor will the notion that *audition* should supplant *vision* in terms of architectural experience. This text has never aspired to be a written account of *a battle of the senses*. If it were to succeed in convincing readers that *listening* is better than *seeing*, it would not achieve its desired end. It does not set out to make a subtractive argument, and will not advocate taking the eye out of architecture. Its only aim is to suggest that there is an opportunity for a different sensorial balance within the experience of architectural space. Any comparisons made between vision and audition are made only to highlight what makes the latter unique and special, and not to suggest a potential superiority over the former.

This composition seeks to intimate that we can learn to appreciate architecture through audition in tandem with vision.

It cannot be said for certain that it is the eye's fault that it has been placed at the forefront of our perception. Nor can it be said that it is the fault of the other senses that they are negated, or at least, that they are taken for granted. Steen Eiler Rasmussen, in *Experiencing Architecture*, describes to us how there is more to the experience of architecture than through what is purely visual.<sup>1</sup>

In *The Eyes of the Skin*, Juhani Pallasmaa argues that modern culture favours the eye<sup>2</sup>. If we combine these two ideas, can we then say that the predominance

1 *Experiencing Architecture*. Steen Eiler Rasmussen. p. 8  
 2 *The Eyes of The Skin: Architecture and the Senses*. Juhani Pallasmaa. pp 15-19.

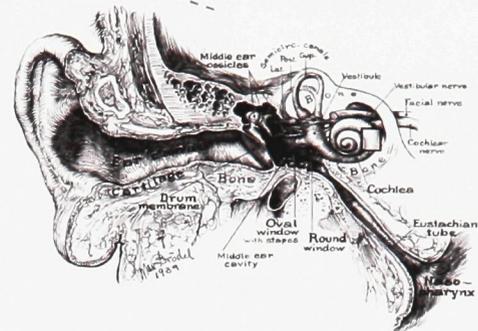
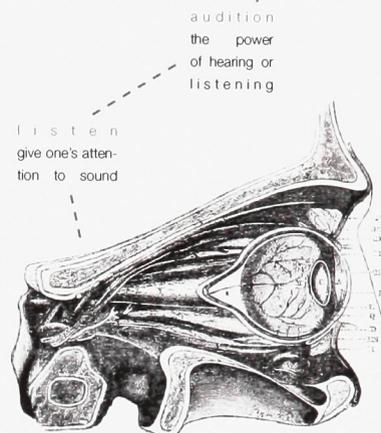


Diagram of the Human Ear. Illustration by Max Brödel. 1939



of *ocularcentricity* in our present time has stripped architecture of a totality which can only be understood and experienced when other senses are engaged and utilized, combined with vision, in order to reinforce an overall experience? Can the cultivation of a greater aural acuity, as well as a greater appreciation for sound(s) within space(s), through the act of practiced listening, serve as an acological agent in helping to combat this issue? This question is explored throughout the thesis.

Certainly, acoustic science is part of the realm where sound and space meet. It would have been possible to have filled the following pages with a myriad of technical information on the physical characteristics of sound; mathematical formulae detailing how to calculate absorption and reflection characteristics of various architectural materials; calculations of reverberation times and distortion rates, pressure levels, amplitude, phase modulation, noise cancellation. It would have been possible to have focused on the work(s) and theories of figures within the world of acoustic science such as Helmholtz, Lord Rayleigh, D'Alembert, and any number of others who have helped to move the science forward; to have shown you intimate diagrams of the differences in varying *wave phenomena*<sup>3</sup>, charts of corresponding frequencies to formant vowel centres, spectrographs and spectrograms and recordings of *bird song*, as in the work of David Rothenberg<sup>4</sup>. It would have been possible to have done all of these things, and yet, while they are all interesting, doing so may not have allowed this thesis to reveal anything about the experience of sound, *really*.

Instead, for the sake of having a discussion directed toward experience, let us focus more so on the sensorial and poetic consequences of the intersection(s) of sound and space from a

3 see *Wave Phenomena* by Dudley H. Towne. 1988. Print.  
 4 specifically *Why Birds Sing: a Journey into the Mystery of Bird Song*. David Rothenberg.

*ocularcentricity*

relates to a tendency to ascribe particular primacy to vision above other senses. It is a granted authority of the eye and of the sense of vision.



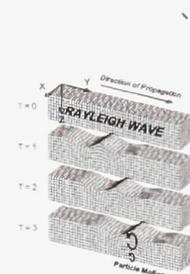
The False Mirror. Rene Ma-

*acological*  
 relating to acology, which is the science of remedies.

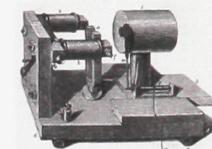
Materials	Coefficients			
	125 cps	250 cps	500 cps	1000 cps
Brick, glazed	0.01	0.03	0.03	0.04
Carpet, heavy, on concrete	0.02	0.06	0.14	0.37
Same, on 40-oz hairfelt or foam rubber	0.08	0.24	0.57	0.69
Concrete block, coarse	0.36	0.44	0.31	0.29
Concrete block, painted	0.10	0.05	0.06	0.07
Fabrics				
Light velour, 10 oz per sq yd, hung straight, in contact with wall	0.01	0.04	0.11	0.37
Medium velour, 14 oz per sq yd, draped to half area	0.07	0.31	0.49	0.75
Heavy velour, 18 oz per sq yd, draped to half area	0.14	0.35	0.55	0.72
Floors				
Linoleum, asphalt, rubber, or cork tile on concrete	0.02	0.03	0.03	0.03
Wood	0.15	0.11	0.10	0.07
Wood parquet in asphalt on concrete	0.04	0.04	0.07	0.06
Glass				
Ordinary window glass	0.35	0.25	0.18	0.12
Gypsum board, 5-in. nailed to 2 x 4's 16 in. o.c.	0.29	0.10	0.05	0.04
Plaster, gypsum, or lime, smooth finish on tile or brick	0.13	0.15	0.02	0.03
Plaster, gypsum, or lime, rough finish on lath	0.02	0.03	0.04	0.05
Same with smooth finish	0.02	0.02	0.03	0.04
Plywood paneling, 5-in. thick	0.28	0.22	0.17	0.09

Example of Sound-Absorption Coefficients for Standard Materials.

Hermann von Helmholtz (1821 - 1894) was a German born physiologist, physicist, philosopher and statesman of science. Though his scientific contributions are not limited to the field of acoustics, he is famous for his book *On the Sensations of Tone as a Physiological Basis for the Theory of Music* (1863) as well as his invention of the *Helmholtz Resonator*, a device capable of discerning individual frequencies present within complex sounds having vast sonic spectrums.\*



Rayleigh Waves in Solid Media.



Helmholtz Resonator.

Lord Rayleigh was the first to explain Surface Acoustic Waves (SAWs) in 1885. Appropriately, they are still referred to as *Rayleigh Waves*. His book, *The Theory of Sound* examines vibratory phenomena and the resonance of elastic solids and gases.\*\*

Jean Le Rond d'Alembert was a French Applied mathematician and the first to publish a one-dimensional equation for waves along a vibrating string.\*\*\*

$$K \frac{\partial^2 y}{\partial x^2} = \epsilon \frac{\partial^2 y}{\partial t^2}$$

d'Alembert's 1D wave equation

Phonetic Symbol	Example Word	F <sub>1</sub> (Hz)	F <sub>2</sub> (Hz)	F <sub>3</sub> (Hz)
/ow/	bought	570	840	2410
/oo/	boot	300	870	2240
/u/	foot	440	1020	2240
/a/	hot	730	1090	2440
/uh/	but	520	1190	2390
/er/	bird	490	1350	1690
/æ/	bat	660	1720	2410
/e/	bet	530	1840	2480
/i/	bit	390	1990	2550
/ij/	beet	270	2290	3010

Formant frequencies for common vowels in American English. Peterson and Barney, 1952

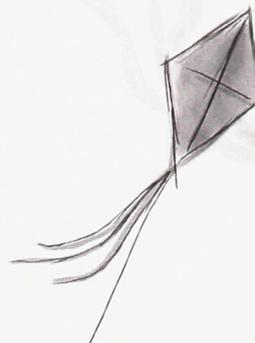
\* from *Hermann von Helmholtz and the Foundations of Nineteenth-Century Science*. David Cahan, ed. (1993).  
 \*\* from *John William Strutt, 3rd Baron Rayleigh. Encyclopædia Britannica Online*. 2011  
 \*\*\* from *Delay Lines*. J.O. Smith.

*phenomenological* perspective. Let us afford our primary concern to the aural experience of space—the simple sense of intimacy, for instance, which can be felt within a small space—the absolute vastness that can be sensed from the sonic ambience inside of a Gothic Cathedral—the presence of the near absence of any reflected sound inside of an anechoic chamber—the resulting phenomena of being able to hear the beating of our heart, the movement of blood through our veins, the sound emitted from the workings of our central nervous system, while inside the chamber. Let us also imagine other sonic phenomena such as the music that comes forth from the first crystals of ice forming on a body of water when winter's breath descends—the sound of falling leaves—the resonance of an underground cistern with a forty five second reverberation time—the first and last songs of the Universe, and so on...

It is hoped that through doing these things, the reader will be inspired to listen and to amplify the experience of space through aural engagement. Perhaps by using more than just our eyes in order to see—through listening to the songs of spaces, engaging with them on a more synesthetic level—we can add to our understanding and experience of architecture.

phenomenology  
the science of phenomena as distinct from that of the nature of being. An approach that concentrates on the study of consciousness and the objects of direct experience.

"If I must tell you why the Kite is able to fly, I might say it is because the Sky has fallen in love."



[ME]: ...can you tell me about Deep Listening?

[PO]: Yes, well... the brief definition of Deep Listening is experiencing heightened or expanded awareness of sound and silence... and sounding. So it's exploring attention—exploring and distinguishing the difference between hearing and listening...

# ***PRELUDE***

*It is not the first song, but the  
last which is sacred.*

# GLI ULTIMI CANTI (LAST SONGS): ADRIATIC SYMPHONY

7

A journey through imagination. Out onto the liquid desert of Adriatic Sea.  
There, great songsters and songstresses, misunderstood, forced  
slaves of industry.

Required to fulfill desires of their masters. The bitter taste of labor and servitude.  
Songs held captive, but voices not forgotten.

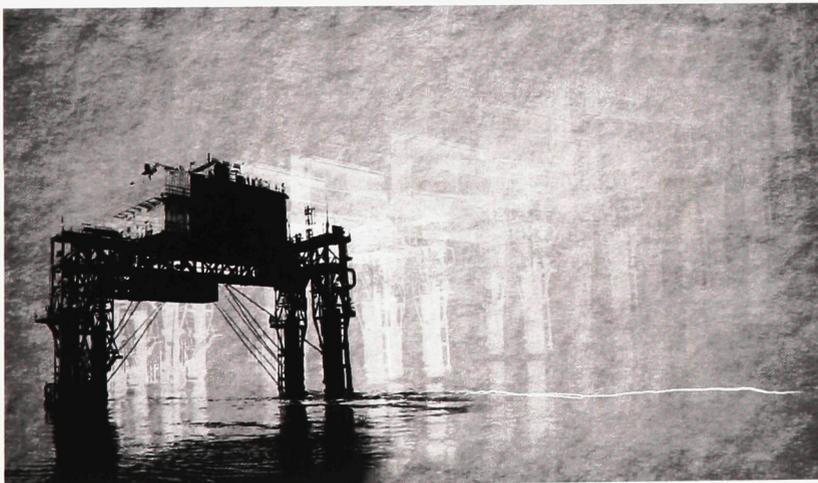
A journey through imagination. Out onto the liquid desert of Adriatic Sea.  
There, great songsters and songstresses, solemn and majestic, silenced for  
advancement of industry.

Deserving to sing twilight songs. Small recompense.

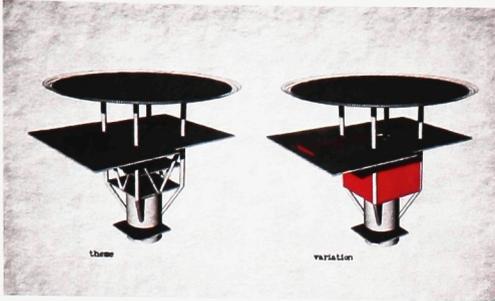
A task set forth: the freeing of voices.

Bringing forth last songs.

Requiems before the journey into undying reverie.



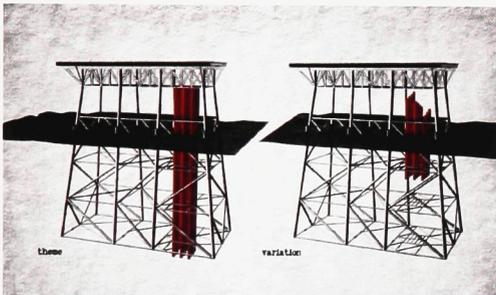
*Journey into Undying Reverie. Bologna, Italia. Spring 2010.*



This project, part of a Masters level Directed Studies Abroad (DSA) in Bologna, Italy, was framed around a series of decommissioned drilling platforms in the Adriatic Sea, functioning as blank canvases for some imagined adaptive reuse.



Having cultivated an interest in, and basic knowledge of instrument design and building, and being perpetually bound to a love of music, I immediately saw these magnificent structures as Instruments/performers.

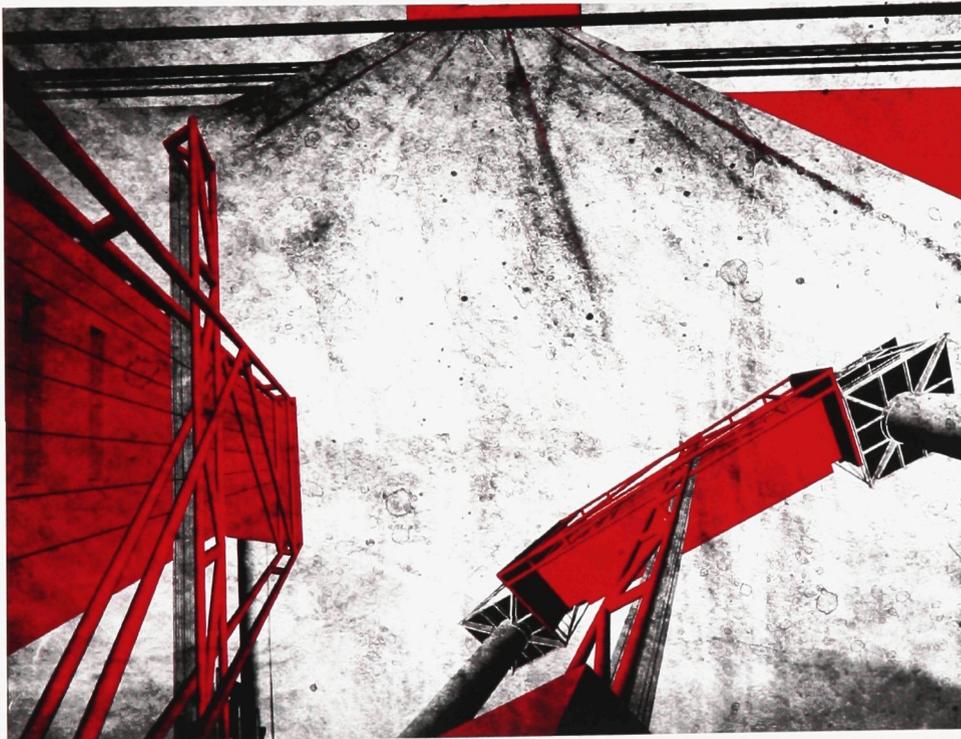
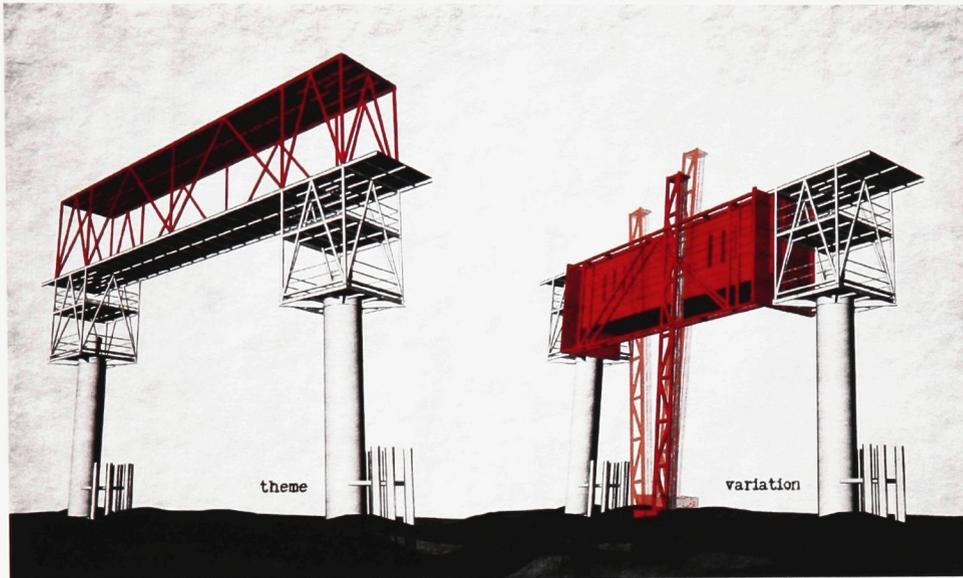


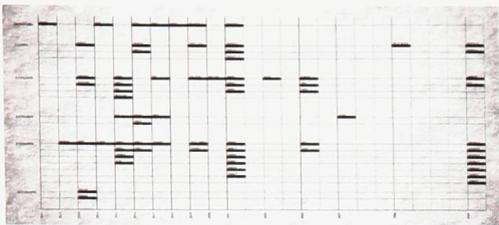
Through subtle variations in the arrangement of the comprised materiality of a series of selected platforms, the inherent music of each was intended to be set free. In theory each instrument could be activated by natural forces present in the setting of the Adriatic Sea (wind, wave motion, etc.) freed from any necessity of human intervention. A range of basic acoustic principles were implemented, such as harmonics of open and closed cylinders<sup>1</sup>, vibrations across strings (both by air and bow)<sup>2</sup>, the use of soundboards<sup>3</sup> and resonant chambers<sup>4</sup>, etc.. Transformed platforms were modelled after established instruments such as the *aeolian harp*, cello, pan flute, and natural forces were employed to replace human actions.



- 1 for information on closed cylinder harmonics, see (<http://hyperphysics.phy-astr.gsu.edu/hbase/waves/clocol.html>)
- for information on open cylinder harmonics, see (<http://hyperphysics.phy-astr.gsu.edu/hbase/waves/opecol.html>)
- 2 for information on string instrument physics, see (<http://hyperphysics.phy-astr.gsu.edu/hbase/music/strings.html>)
- 3 usually a flat surface which allows for reflection of sound waves, amplifying them.
- 4 the body of a guitar, for instance, incorporates a hollow, resonant space, across which the strings are placed, allowing their vibrations to enter the chamber, resonate and thus be amplified.

One of the more potent examples of this is in the case of the *Sea Cello*. The bow of the *Sea Cello* is imagined to have a base constructed of buoyant material so that it can be activated by natural wave motion. There are seven strings, four of which are set behind the ribbon of the bow and three of which are set in front of it. This allows for a more dynamic transfer of wave motion through the bow to affect the resultant music with frontward and backward as well as side to side and upward and downward movements.



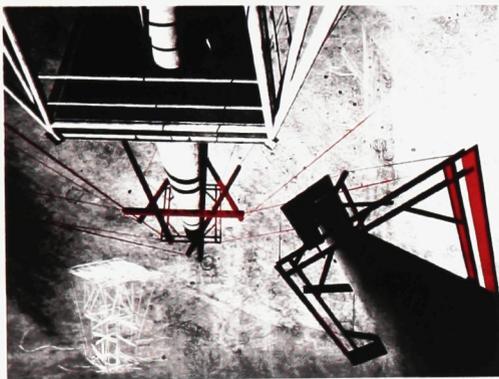


v a r i a t i o n ( m u s i c )  
 a version of a theme, modified in melody, rhythm, harmony, or ornamentation, so as to present it in a new but still recognizable form

The transformations follow the musical form of *theme and variation*<sup>5</sup> with the platforms in their original states serving as the themes, and the reconstituted materialities as the variations.

The timeline of scheduled decommissioning served as a basis for constructing an orchestrated composition wherein the performers are transformed platforms and the performance space is the Sea.

Through a series of real world sound sampling of the acoustic phenomena, similar to, but on a smaller scale than that of the imagined phenomena of the transformed instruments, and by using digital audio editing software combined with imagination to attempt to “upscale” the sound, an *Adriatic Symphony* was composed to stimulate an imagined sound journey out into the sonic playground of a transformed Adriatic Sea.



5

A musical form which emerged in the sixteenth century. Notable examples include Beethoven's *Fantasia in G Minor, Op. 77*, and Mozart's *Variations on an Aria by Gluck, K. 455*.

# MOVEMENT I

*There is no such thing as an empty space or an empty time. There is always something to see, something to hear. In fact, try as we may to make a silence, we cannot.*

*John Cage<sup>1</sup>*

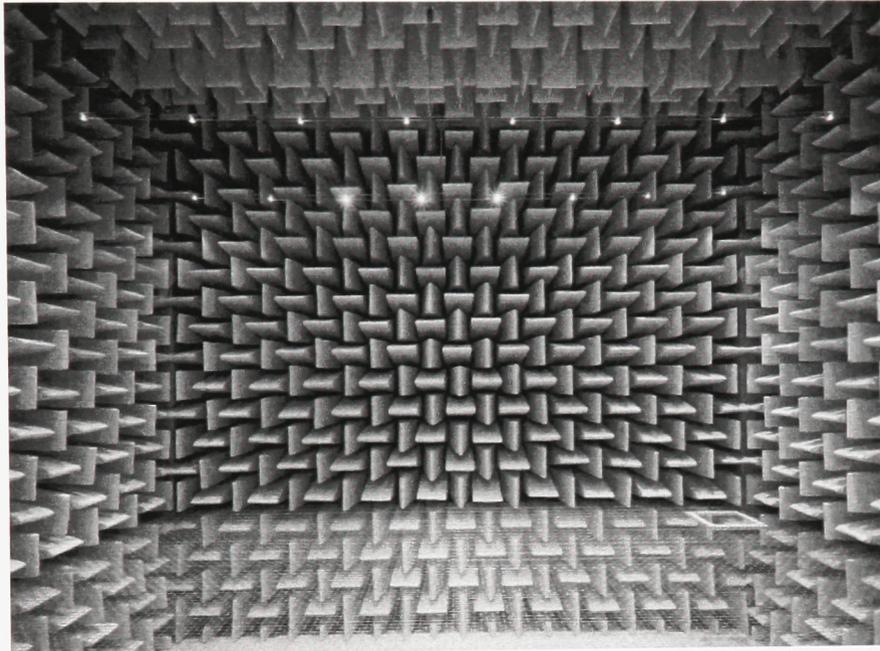
This movement explores the act of listening, distinguishing it from the act of hearing as well as establishing it as a vital component within the experience of space. Also examined is the notion of silence. Is there such a thing? To explore this, we journey inside of the anechoic chamber, but there are sounds lurking there as well; inside the chamber is where the *eigentones* come out to play...

**SOUNDOFF**

**LISTENING**

**THE SOUND OF SILENCE**

**A SPACE FOR EIGENTONES:  
THE ANECHOIC CHAMBER**



Framed view of the inside of an anechoic chamber.

The anechoic chamber offers us the closest possible real world approximation of silence. Yet, even there, silence cannot reside. Inside of the chamber, in the absence of nearly all ambient reflections, a whole new soundtrack emerges...

# SOUNDOFF

"Sound is this weird threshold space: you can't touch it or see it; it has no material and yet it occupies space."

Taraka Larson<sup>1</sup>

*Soundscape* is a term which was coined by Canadian author and acoustic ecologist R. Murray Schafer in *The Soundscape: Our Sonic Environment and the Tuning of the World*. Schafer said that a soundscape must consist of three elements: keynote sounds, sound signals, and soundmarks. *Keynotes*, in music, are tones which outline the overall tonality of a composition. Within the soundscape, keynote sounds are those which are heard by a particular society frequently enough to form a unique auditory backdrop against which other sounds are heard. They 'outline the character of the [people] living among them.' (Schafer 9) *Sound signals* are defined as being within the foreground of the soundscape, and are sounds which transmit information or messages, such as sirens, horns, bells, etc.. *Soundmark* is derived from *landmark* and functions within the soundscape as a unique sonic identifier, which makes its soundscape special.<sup>2</sup> Schafer was referring to the soundscape mostly within the larger context of society. However, soundscape will be appropriated as a term in this thesis with reference to individual spaces as well.

The Oxford English Dictionary defines soundscape as a piece of music considered in terms of its component sounds<sup>3</sup>. This thesis quite often makes reference to the idea of every space having a song. Taking this notion further, can we apply the Oxford definition of soundscape to architectural space and say that within this context, if we can agree that different spaces are filled with different sounds, the term soundscape can pertain to the unique



R. Murray Schafer.

1 Taraka Larson in *Composing Utopia - Psychotropic Sonics: New Age Music--the Second Wave*. Jay Somerset. Article. Musicworks Magazine #107 p. 36

2 *The Soundscape: Our Sonic Environment and the Tuning of the World*. R. Murray Schafer. pp. 9, 10.

3 The Oxford Online Dictionary (<http://www.oxforddictionaries.com/>) 2011

sonic characteristics of any space?

In order to explore this further, we can outline a categorical system as a record of our experience of space(s) in terms of the sounds we may encounter within them. Here is an example of the kind of system one might choose to construct. The strategy here borrows heavily from a similar strategy Schafer employs in *The Soundscape* to outline his own system<sup>4</sup>.

Here, *common spaces* are defined as those spaces which are common to the context of a routine experience. *Uncommon spaces* are not necessarily foreign spaces, and can also be thought of as simply spaces which are not often experienced. *Imagined spaces* are those spaces which evoke curiosity, either because they can never be experienced, or perhaps because they are desired to be.

A system such as this will be contextual to the life and experience of the person creating it. One person's system may parallel that of others in some capacity, or it may be entirely divergent. Certainly the system shown here may or may not align with one the reader might outline. In any case, its intended function is not to aspire to universality as a categorical system of sounds. Nor does it profess to be a complete system. It simply aims to demonstrate a method of beginning to think about the sound/space relationship, and to promote, in its own way, as one small piece of a larger puzzle, the fundamental motivation of this entire thesis: a desire to listen.

In creating this kind of system, one may notice several instances of overlap, since many sounds are commonly experienced in a variety of different spaces. This is because no one sound or type of sound can constitute the entire soundscape of a space or place. Soundscapes are comprised of multiple layers of sonic information. Schafer tells us that "to give a totally convincing image of a soundscape would involve... thousands of recordings..."

4 *The Soundscape: Our Sonic Environment and the Tuning of the World*. R. Murray Schafer. p. 133-45

I. SOUND and COMMON SPACE

a. HOME SPACE

- [1] coffee machine percolating
- [2] water running (tap, shower, etc.)
- [3] door(s) (being knocked upon, creaking, closing, etc.)
- [4] floor(s) (being walked upon, creaking, etc.)
- [5] vacuum cleaner operating
- [6] voices (speaking, yelling, laughing, crying, etc.)
- [7] music playing (live/recorded)
- [8] television being watched (and listened to!)
- [9] toilet(s) flushing
- [10] sounds of food preparation (cutting, frying, microwave operating/ beeping, water boiling over, etc.)
- [11] telephone(s) ringing (land line & cellular)
- [12] traffic (distant).
- Etc.

b. WORK SPACE (OFFICE)

- [1] coffee machine percolating
- [2] fax machine operating
- [3] photocopier operating
- [4] telephone(s) ringing (land line & cellular)
- [5] paper rustling
- [6] voices (speaking, yelling, laughing, etc.)
- [7] keyboard clicking (typing)
- [8] printer operating
- [9] music playing (amplified system, through headphones, etc.).
- Etc.

(CONSTRUCTION & TRADES)

- [1] coffee machine percolating
- [2] powered machinery operating (powered tools, motorized vehicles)
- [3] manual tools operating (hammer, stapler, cutter, etc.)
- [4] voices (speaking, yelling, laughing, etc.)
- [5] telephone(s) ringing (primarily cellular)
- [6] music playing (amplified system)
- [7] traffic (immediate, distant).
- Etc.

tens of thousands of measurements would have to be taken..."<sup>5</sup>.

The sub-categories and delineations within them cannot be universal, since, as explained by Schafer, characteristics of soundscapes hinge on the cultures in which they are situated. It is obvious that sounds within what is named *common space* here would be drastically different from the point of view of a person living in an indigenous Australian tribe as compared to that of the typical Canadian, for instance (a similar argument can be made for *uncommon space*). Furthermore, definitions of terms such as *work* and *play* may be quite different for different people. Each of these sub-categories are defined by terms (*home*, *work*, *play*, etc.) which are subject to a wide array of interpretations and definitions. As has already been established, this is not a representation of a total and complete system. Nor could it be, unless it included all sounds, from all spaces, past, present, and future, considering the vast spectrum of cultural differences bound to *time, space, and place*. Thankfully, it need only provide a brief sampling in order to fulfill its purpose, which is to trigger thinking about listening.

In order for the reader to compare his or her own sound/space experience to the one outlined in the system here, (s)he must think about whether (s)he agrees or disagrees, and in either case must think about sound and space and of listening to sound within space.

[ME]: *And so then, how—to you—how important is—first of all—space to sound, and then, sound to space?*

[PO]: *Both are equally important, and the thing that The Deep Listening Band always does—and myself, as a soloist, or playing with anybody, or, as we did today—is to listen to the space... (pauses) primarily to open up to what it is—how is it—what is it saying? You know, what is it—how is it speaking to me? You know, and if I... if I put something in the space, like a sound, I want to know how and what it's going to reflect.*

c. PLAY SPACE

- [1] sounds of recreational sports & activities  
(hitting baseball/bumping, setting, spiking volleyball/ striking racquetball, tennis ball/  
dribbling basketball/skating, striking hockey puck/kicking soccer ball/hitting golf ball, etc.—skis/snowboard on snow, waves crashing/water rushing while surfing, rollerblades/skateboard on pavement, pool/billiard balls colliding, cards shuffling, etc.)
- [2] voices (speaking, yelling, laughing, cheering, etc.)
- [3] music (being 'played' or being listened to, live or from amplified device).
- Etc.

d. SLEEP SPACE

- [1] dream sounds (any sound which can be dreamt of)
- [2] snoring sound(s)
- [3] (possible) HOME SPACE sounds (if one is sleeping at home...)
- [4] (possible) white noise
- [5] (possible) voices (speaking, yelling, crying, laughing, etc.)
- Etc.

e. PERFORMANCE SPACE

- [1] sounds of performance (planned)
- [2] sounds of surrounding environment (unplanned) (people moving/coughing, seat sounds, doors opening/closing, baby crying, etc.)
- Etc.

To say that the notion of space is inseparably linked to architecture is to say nothing new. Nor is it new to say that there are spaces separate from the built environment which should not be thought of as non-architectural (cave spaces for instance), since the world of architectural built spaces cannot deny its relationship to, or inspiration from, the world of natural spaces, especially those dedicated to sound. As argued by the famous acoustician Wallace Clement Sabine, traditional musical performance spaces evolved from the acoustic models of the cave and the savannah<sup>6</sup>. It can be suggested then, that perhaps the realm of sound within natural spaces cannot be thought to exist outside of the realm of sound within architectural spaces. Additionally, exterior space should not be thought to be void of architecturally based sonic influence, since building facades can become sounding boards, echoic surfaces.

There are numerous examples of the works of musicians, sound artists, and architects which have utilized sound/space relationships integrally and in a variety of ways. Let us take a brief glimpse at a few notable examples.

### I AM SITTING IN A ROOM

Alvin Lucier. 1969.

"I am sitting in a room different from the one you are in now. I am recording the sound of my speaking voice and I am going to play it back into the room again and again until the resonant frequencies of the room reinforce themselves so that any semblance of my speech, with perhaps the exception of rhythm, is destroyed. What you will hear, then, are the natural resonant frequencies of the room articulated by speech. I regard this activity not so much as a demonstration of a physical fact, but more as a way to smooth out any irregularities my speech may have."<sup>7</sup>

In this piece, Lucier uses his voice, speaking the above words, as a way to trace the space in which he utters the above words. He records his voice, and then plays the

6

*Collected Papers on Acoustics*. Wallace Clement Sabine. p. 144

7

*Background Noise: Perspectives on Sound Art*. Brandon LaBelle. p. 125



Limestone Cave Formations.

## II. SOUND and UNCOMMON SPACE

### a. CAVE SPACE

- [1] ambience (some caves highly resonant, others are very quiet)
- [2] water sounds (dripping/waterfall/underground river, etc.)
- [3] creatures stirring (bats, insects, birds, snakes, etc.)
- [4] geological movement (rockfalls, for instance)

### b. SEA SPACE (ABOVE SURFACE)

- [1] wave sounds
- [2] (possible) gulls & other sea birds
- [3] (possible) tail slaps (whales)
- [4] sounds of water vessel (sailboat, cruise ship, raft, kayak, etc.)
- Etc.

### (BELOW SURFACE)

- [1] (possible) whale song
- [2] amplified sound of breathing/bubbles (if scuba diving)
- [3] sound of water vessel above (motor, paddles, etc.)

### c. RITUAL SPACE

- [1] chants (monks from various religions, *Kecak* (*Ramayana* Monkey Chant), *Gregorian Chant* (*Plainsong*), etc.)
- [2] throat singing (Tuvan, Inuit, Ainu, etc.)
- [3] sounds of various dance (Hindu circle, Sufi whirling (*Sema*), Australian Corroboree, rain dance, etc.)

recorded sound into the space, recording it once again, and repeating this pattern several times. Each time this occurs, the resonant frequencies of the space in which he is in are reinforced through layering, and his voice is subdued. By the end of the piece, his voice, 'with perhaps the exception of rhythm', as Lucier indicates, is 'destroyed'.

This piece demonstrates the inherent auditory presence of a space, and how that presence can influence sound occurring within.

### QUASIMODO THE GREAT LOVER

Alvin Lucier. 1970

Composed a year after *I am Sitting in a Room*, Lucier uses the same sound/space relationship he experimented with in that piece (that is, the colouration of sound through the auditory characteristics of the space in which the sound occurs), as well as inspiration from whale song to construct *Quasimodo the Great Lover*, a piece intended to send sound over great distances. The score specifies the piece is "for any person who wishes to send sounds over long distances through air, water, ice, metal, stone, or any other sound-carrying medium, using the sounds to capture and carry to listeners far away the acoustic characteristics of the environments through which they travel." Lucier proposes that a series of unique spaces are chosen to act as a chain. Sound, which is supposed to draw inspiration from the model of humpback whale song, but which can be made using any instrument or series of instruments, is recorded in the initial space via microphone and then transmitted to subsequent spaces. Each subsequent space contains an amplified loudspeaker to play the sound from the previous space, as well as its own microphone, in order that the sound can be recorded and sent off. Each space adds its own qualities, and by the time the sound reaches the final space, it has been influenced by all of the spaces along its journey.<sup>8</sup>

8 *Transnational Ecologies*. Laura Cameron & Matt Rogalsky. (<http://www.transnationalecologies.net/>)

[4] parade sounds (marching bands, various music, voices (singing, announcing, yelling, etc.), vehicular sounds, etc.)

[5] sounds of important ceremonies (weddings/funerals/baptisms/*Changing of the Guard* at Buckingham Palace. Etc.

d. BODY SPACE

[1] sounds of breathing  
 [2] sounds of joint movement  
 [3] sounds of copulation  
 [4] digestion sounds  
 [5] sound of voice (speaking, singing, sighing, crying, yelling, screaming, laughing, etc.)  
 Etc.

III. SOUND and IMAGINED SPACE

a. BEGINNING (CREATION) SPACE

[1] absence of sound in presence of only true silence with zero vibration... followed by...  
 [2] the ringing of an ancient bell  
 [3] a descending tone...  
 [4] the sweetest music ever not known  
 (see THE POWER OF SOUND)

b. END (APOCALYPSE) SPACE

[1] a deafening cacophony, death trumpets blown... and following...  
 [2] an ascending tone... then:  
 [3] bell tolls once again... and ends.  
 [4] total silence - zero vibration.

c. DESIGNED SPACE

[1] intimacy vs. openness  
 [2] reflective vs. anechoic  
 [3] inviting vs. alienating  
 [4] spaces that feel like \_\_\_\_\_?  
 [5] spaces that make one feel \_\_\_\_?  
 Etc.

## PERFORMANCES IN THE GROTTO OF JEITA

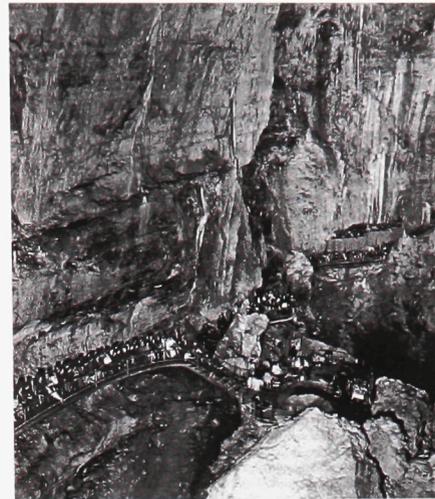
Karlheinz Stockhausen, Jeita, Lebanon. 1969.

Stockhausen used the stalactite grotto of Jeita near Beirut to showcase several of his postmodern compositions. Musicians were located on a platform which was constructed over a large gap. The distance between performance and listener varied between being quite small, to as much as 80 metres. The further away a listener was, the more the natural acoustics of the grotto were able to influence the direct sound prior to its reaching him or her. In addition, the sounds of underground rivers could be heard in the distance. Linda Ruth Salter and Barry Blesser, in *Spaces Speak, Are You Listening?* state that 'the effect of the space was total, and multisensory.' Stockhausen himself is quoted as saying that "the caves made the music sound both prehistoric and also like something out of science fiction."<sup>9</sup>

## THE PHILIPS PAVILION

Iannis Xenakis. 1958 World Fair. Brussels, Belgium.

During the time Xenakis worked with Le Corbusier, a commission came through for the design of the Philips Pavilion for the 1958 World Fair in Brussels, Belgium. The commission was given to Le Corbusier by Louis Kalf, who proposed that the pavilion demonstrate the sound and light possibilities of Philips' technologies. Le Corbusier, wanting to concentrate entirely on a composition for the pavilion, entitled "Poème électronique," delegated the task of design entirely to Xenakis. Le Corbusier took charge of the visual component of the composition, an eight minute assemblage of images, colour and light, and commissioned *musique concrète* composer Edgard Varèse to write a piece of electronic music to complement his visual 'scenario' (as he labelled it), of the same length of eight minutes. The pavilion was constructed solely to be a space, an envelope, to house the performance of the "Poème électronique,".



Performance of Stockhausen's Music.  
Grotto of Jeita, Lebanon.

### postmodernism

A cultural and intellectual trend of the twentieth and twenty-first centuries characterized by emphasis on the ideas of the decentered-ness of meaning, the value and autonomy of the local and the particular, the infinite possibilities of the human existence, and the coexistence, in a kind of collage or pastiche, of different cultures, perspectives, time periods, and ways of thinking. Postmodernism claims to address the sense of despair and fragmentation of modernism through its efforts at reconfiguring the broken pieces of the modern world into a multiplicity of new social, political, and cultural arrangements.

Much of Stockhausen's work can be considered postmodern due to his imbedded 'abandonment of a rational reason' and 'release into a cosmic, holistic consciousness' within it.



Philips Pavilion. Iannis Xenakis. Brussels, Belgium.  
World Fair 1958.

• Dr. Fidel Fajardo-Acosta's World Literature Website  
(<http://fajardo-acosta.com/worldlit/glossary.htm>)  
•• On Postmodernism in Music. Hermann Danuser.  
Chapter. *International Postmodernism: Theory and  
Literary Practice*. p. 161

## SILOPHONE - in SILO #5

[The User] (Thomas McIntosh & Emmanuel Madan)  
Montreal, Quebec, Canada. 2000-present.

Located in an abandoned grain storage facility in Montreal, Quebec, Canada (Silo #5), the Silophone is described by its creators (Thomas McIntosh & Emmanuel Madan) as a 'sonic inhabitation of Silo #5'. From the Silophone website:

The portion of the structure used by Silophone is constructed entirely of reinforced concrete, measures 200 metres long, 16 metres wide and approximately 45 metres at its highest point. The main section of the building is formed of approximately 115 vertical chambers, all 30 metres high and up to 8 metres in diameter. These tall parallel cylinders, whose form evokes the structure of an enormous organ, have exceptional acoustic properties: most notably, a stunning reverberation time of over 20 seconds. Anything played inside the Silo is euphonized, made beautiful, by the acoustics of the structure.<sup>10</sup>

The Silophone can be experienced three different ways.

The first way is by telephone. Listeners can call 1.514.844.5555 within North America in order to hear their voice played inside of the silo.

The second way is by playing a live audio feed of the silo from the Silophone website: <http://www.silophone.net/>. Sound files can be uploaded to the website, and then sent into the silo to be played, or the listener can use any sound sample from the website's extensive library of previously contributed sound files.

Lastly, there is a sonic observatory set up in the old port of Montreal which will be permanently accessible for the public. Directions to the observatory can also be found on the Silophone website.

The Silophone allows the listener to hear the effects of the tremendously reverberant space of the cylindrical silo on any sound generated from within it.



Silo # 5. Montreal, Quebec, Canada.

[ME]: ...what is the most amazing space that you've ever performed in?

[PO]: Well, I think that, the cistern, in 1988, in Washington State—it used to be the water tank, for the Army there at Fort Warden. 160 million gallons of water, 16 feet in diameter. It's reinforced concrete, 14 feet high and it has a 45 second reverberation time, so when you play, in there, the direct sound and the reflected sound is so close that it's very difficult to tell which is which. So that's pretty remarkable, and that's where we made the recording called Deep Listening. And that's in fact where I put those two words together for the first time.

## SONATAS IN ECHO

Giovanni Gabrielli & Biagio Marini. San Marco, Venezia, IT (16th c.)

These compositions took full advantage of the unique acoustic characteristics of the Basilica San Marco in Venice in order to imitate the acoustic phenomenon of echo.<sup>11</sup> The lengths of the transepts and height of the vaults are of equal value, which Matteo Melioli describes, in his essay *Inhabiting Soundscape*, written about the Basilica San Marco, allows the space to tend 'towards... an ideal circular space'<sup>12</sup> The composers' understanding and utilization of the shape of the inner architectural forms allowed for the production of complex sound distortions, such as extension of the echo, or overlapping of notes with the reverberations of previous notes. Additionally, by splitting the choir into two equal parts, and having them oppose each other on either side of the nave allowed for a doubling of '...the depth of the echo.... The echo of a sound expanding from side to side creates the illusion that the basilica... is slowly transformed into something with a sonority similar to that of the hollow belly of a grotto.'<sup>13</sup>

## LEAR

Pauline Oliveros. Track 01 of Deep Listening Album. 1989.

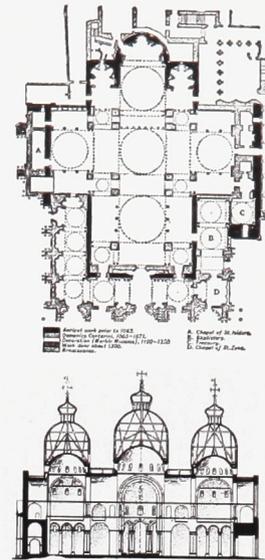
This piece was one of four pieces on the album *Deep Listening*, recorded by Pauline Oliveros and her *Deep Listening Band*, in an underground cistern at Fort Worden, Washington State, US.. The space of the cistern was highly resonant, with a 45 second reverberation time, which, Oliveros says allowed it to inspire her to coin the term *Deep Listening*, a term which has come to be quite significant within the world of sound studies.

Now that we have begun to think about sound within space, let us explore the act of listening.

11 *Inhabiting Soundscape*. Matteo Melioli. Essay in *In the Place of Sound: Architecture, Music, Acoustics*. Colin Ripley, Marco Polo and Arthur Wigglesworth. p. 47

12 *Ibid.* p. 46

13 *Ibid.*



Plan & Section of San Marco Basilica, Venezia, IT.

Pauline Oliveros is an American musician and composer who has been a central figure in the struggle (of many who care about sound) to cultivate a widespread aural awareness. Her contributions have included: as a writer, various books and other texts which investigate listening and sonic focus; as a musician, countless compositions and performances; as a philosopher, her philosophy of *Deep Listening*. She founded the *Deep Listening Institute* in 1985 (originally named *The Pauline Oliveros Foundation* until she coined the term *Deep Listening* in 1988) which features annual listening based retreats to various places around the world as well as programs focused on apprenticeship and certification. She also formed *The Deep Listening Band* which performs and records in resonant/reverberant spaces including (but not limited to) cave spaces, cathedrals, and underground cisterns.

Biography from (<http://www.paulineoliveros.us/>)

# LISTENING

How can you not listen if your ears never close?

-Pauline Oliveros<sup>1</sup>

*What does it mean to listen?* We can propose three distinctions.

Perhaps the first distinction that needs to be made is between *hearing* and *listening*.

The world of hearing is one in which, if sounds were light, there would be no night or shadow. It is a world of constant sonic information. Hearing is not a choice. Our ears are required to take part in the process of hearing involuntarily. We cannot close them. In introducing *The Auditory Culture Reader*, editors Michael Bull & Les Back describe how ears "...let every noise in indiscriminately."<sup>2</sup>

The world of listening, by contrast, is a fantasy world, a generative playground as Salomé Voegelin tells us in *Listening to Noise and Silence: Toward a Philosophy of Sound Art*.<sup>3</sup> It is a world where ears are explorers and conquerors. They take journeys through lands and fields of sound and lay claim to *unforeheard* sonic events. Listening needs to be desired, needs to be activated, needs to be an "...attitude of the heart..."<sup>4</sup>. It is a voluntary act requiring focus and practice.

The second distinction to be made is then probably between what our ears and our minds are each responsible for within the acts of hearing and listening.

hearing  
the faculty  
of perceiv-  
ing sounds.

listening  
giving one's  
attention  
to sound.



*The Hearing Sense*. Ortansa Moraru. 2006.

The piece shown above by artist Ortansa Moraru entitled *The Hearing Sense* depicts ears which are reaching out into the surrounding sonic field, or soundscape. They seem desperate to receive sound, which is depicted as being all around, enveloping them.

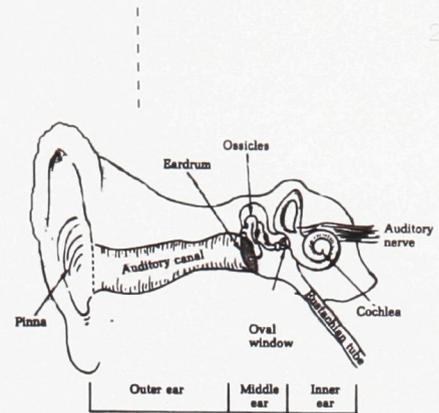
unforeheard  
the aural equivalent of unfore-  
seen; pertaining to those sonic  
events which occur but which  
have not previously been predicted

1 from her website: <http://www.paulineoliveros.us/>  
2 *The Auditory Culture Reader*. Michael Bull & Les Back. p. 6  
3 *Listening to Noise and Silence: Toward a Philosophy of Sound Art*. Salomé Voegelin. p. 4  
4 "Listening is an attitude of the heart, a genuine desire to be with another that both attracts and heals." John Isham. 17th c.

Ears are complex organs that channel sound and allow it to transfer through several processes until it is transformed within the inner ear and sent to the mind as electric information. Sound arrives to the outer ear in the form of a pressure wave. This wave may be quite multifarious, consisting of many layered sounds, all with different durations, intensities, and other sonic characteristics. It goes through a series of transferral processes within the middle ear, en route to the inner ear, where the *organ of corti* transforms physical sound information into electrical information, through a process called transduction, which is sent to the mind. When the mind receives this information, it then has to separate it into distinct sounds. This is why (with a healthy functioning sense of hearing) we are able to hear a violin, car horn, dog barking, bird singing, etc. all at once and within the same sound wave group and be able to discern between them, not only identifying them as individual sounds, but being able to sense each of their positions relative to our own within a given space.<sup>5</sup> While it may be often thought that hearing and listening are processes of the ears, they are actually tasks of the mind.

The third important distinction to be made is between *listening* and *seeing*.

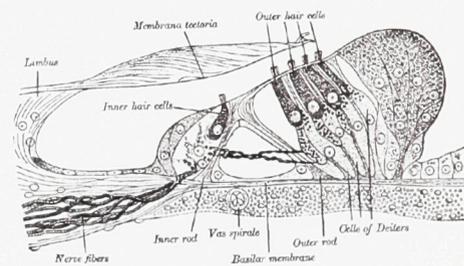
To listen to something is more than to just simply *perceive* it; it is to engage with that something, and to be engaged by it in return. It is an act of reciprocation, which, unlike the act of seeing does not involve a gap between object and subject— Voegelin tells us also that there is not a relationship between things, but only the thing (sound) itself. In listening, there is no space between the object or phenomenon and its audition, because the object itself does not precede the act of listening<sup>6</sup>. Listening is about



The human ear.

Regions of the Human Ear.

[PO]: Hearing is our... taking in sound waves continually and involuntarily. Listening is interpreting the sound waves that come, and that's in the brain, it's not in the ear. The ear is the transmitter and the brain is the interpreter.



Section through the Organ of Corti.

5 <http://science.jrank.org/pages/53/Acoustics-Reception-sound.html>  
 6 *Listening to Noise and Silence: Toward a Philosophy of Sound Art*.  
 Salomé Voegelin. p. 5

forming a union with sound. In her words: "In listening, I am in sound."<sup>7</sup> This is what makes the act of listening much more intimate than the act of seeing. Seeing occurs within a limited field extending outward from our eyes, but the auditory field, as LaBelle explains in *Background Noise: Perspectives on Sound Art*, is one that is completely enveloping<sup>8</sup> and thus unique within our overall sensorial toolset.

Since it is contingent upon interpretation, listening can be mysterious, deceptive; illusory. Sounds can be like serpents. Or they can be imagined, and not really there at all. This can lead to inventions of false truths, stemming from the kind of individual *knowing* associated with sensory perception<sup>9</sup>. Sounds follow the pattern of life. They are born, they live, and die. Once a sound is gone, it is gone forever, but if it has been listened to, there is a possibility for it to be reborn within the space of comprehension and memory. If one thinks about one's own voice, can one remember what it sounds like? If so, that is proof enough of the relationship between sound and memory.

Proof of the life of sounds can be seen in any standard two dimensional representation of a single sound wave where amplitude is plotted against time. Clear are the points of beginning and ending, as well as duration and intensity throughout. Schafer describes sound events in a chapter on *notation* within *The Soundscape*: 'every sound has a beginning, middle and end, realized through attack, body, and decay.'<sup>10</sup>

Appreciating listening is about appreciating sound, which consequently is about appreciating time and space and our place within each of those things. Each sonic event is unique and married to a distinct portion of time, marked by the inception, duration, and cessation of vibration.

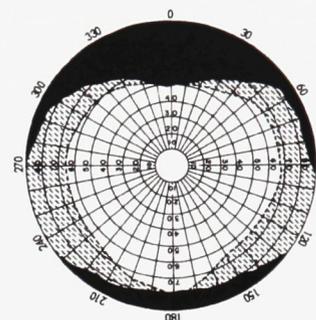
7 Ibid. p. 7.

8 *Background Noise: Perspectives on Sound Art*. Brandon LaBelle. p. x from *The Problem of Perception*. Tim Crane. Section 1.1. The Stanford Encyclopedia of Philosophy.

10 *The Soundscape: Our Sonic Environment and the Tuning of the World*. R. Murray Schafer. p. 129

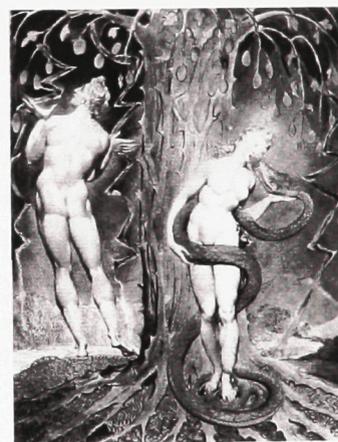
seeing  
perceiving  
with one's  
eyes; discern-  
ing visually

perceive  
become aware or con-  
scious of something; come  
to realize or understand.



Normal Human Visual Field Diagram.

The above diagram depicts the normal field of view for a pair of healthy human eyes. The white central portion depicts what can be seen by the combined vision of both eyes. The grey areas on either side depict what is seen by the left and right eyes, individually. The black areas show the cut-off by the brows, cheeks, and nose. In this case, the head and eyes are motionless.



*The Temptation of Eve*. William Blake. 1808.

Sounds can be  
like serpents.

Time is an envelope for sound and vice versa. The two cannot be separated as John Shepherd reminds us in *Music as Social Text*:

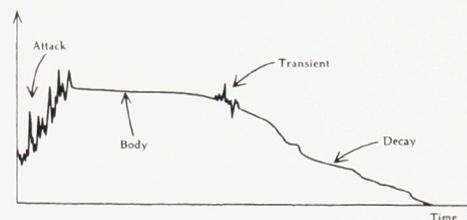
Sound is more symptomatic of the flow of time than any other phenomena... Although all other phenomena occur within a stream of time, the fact that they may be generally isolated and examined at leisure demonstrates that, *as far as their influence on the arrangement of people's sensoria is concerned*, they are not so inexorably tied to that stream as sound is.<sup>11</sup>

This is precisely the reason why it is not possible to capture an aural *picture* of sound in a single instance, as one can with visual pictures, since experiencing sound requires a measure of time. *Is listening then somehow sacred, due to the constant fleeting nature of time?*

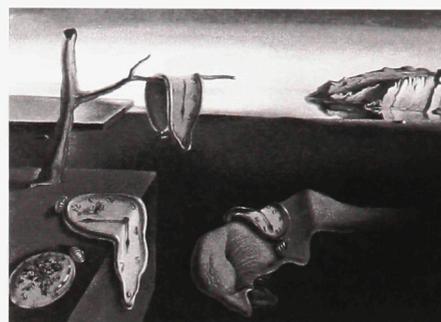
If so, then we might treat every sound as a new sound, in order to always leave an opening for the possibility of perceiving something new, even within similar sounds that we hear on a regular basis. Listening is not simply an act of receiving, but an act of discovering. In terms of architecture, the question now becomes: *can consciously engaging in acts of listening allow us to have deeper experiences of architectural spaces?*

If we are affected by the information sent to our mind by way of our multiple senses, that means, at least, that spaces are heard as well as looked at. We have established that these involuntary sensorial acts differ from the voluntary acts of listening and seeing. If our visual experience and memory of architectural spaces can be enhanced through active seeing, should not we think that active listening can augment our experience of those same spaces through direct perception as well as the memory of the sonic dimension and of sound events? Is it possible that if we can put aside the illusion of *ocularcentric dependency*, and learn to listen to the songs of spaces, we can gain a fuller experience of architecture?

Often, the songs of spaces are of silence, but—*is silence silent?*



Sound Event Diagram. from *The Soundscape*.  
R. Murray Schafer. p. 129



*The Persistence of Memory*, Salvador Dalí. 1931.

11 *Music as Social Text*. John Shepherd. 1991. p. 20-1

# THE SOUNDS OF SILENCE

When there is nothing to hear, so much starts to sound. Silence is not the absence of sound but the beginning of listening.

Salomé Voegelin, in *Listening to Noise and Silence*.<sup>1</sup>

*What we call silence is not silent.*

Perhaps the clearest assertion of this, and the most widely used point of departure in discussions of silence is John Cage's seminal composition, *4'33"*. In this piece, for a duration equal to its title, separated into three movements, performers are instructed to not play their instruments. Instead, the indeterminate sounds of the immediate space surrounding the listeners become the sounds of interest and shape the performance. When the piece was first performed, in 1952, as might be expected, it was not met with widespread acceptance. People had mixed reactions. One person, in particular, rose up at the end of the performance and exclaimed "drive these people [Cage and the other musicians] out of town!"<sup>2</sup> If that person had only been aware of the gift that was being offered—the emancipation of the definition of music through an engagement with the notion of silence being anything but silent.<sup>3</sup>

Silence is defined, by the Oxford English Dictionary, as the complete absence of sound<sup>4</sup>. We may refer to silence when we believe that sound has become absent, but as Cage stated, the absence of sound is not a possible true world condition: "In fact, try as we may to make a silence, we cannot."<sup>5</sup>

There can never be a nothingness of sound, a condition of no vibration, which would be necessary for the complete auditory void of silence to exist.

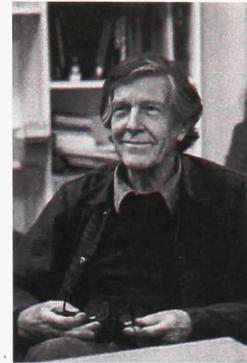
1 *Listening to Noise and Silence: Towards a Philosophy of Sound Art*. Salomé Voegelin p. 83

2 *The Roaring Silence: John Cage: A Life*. David Revill. p. 166.

3 *Background Noise: Perspectives on Sound Art*. Brandon LaBelle. p. 20

4 Oxford Online Dictionary ([www.oxforddictionaries.com](http://www.oxforddictionaries.com)) 2011

5 *Silence: Lectures & Writings by John Cage*. 1961. Wesleyan University Press. Middletown, CT. Print. p. 8



John Cage.



John Neff. Performing *4'33"*. 2002.

The pianist sits poised at his instrument, engaged in the act of inaction. He will not play a single note, as instructed. Instead, he will listen as the sounds of the immediate environment in which he, as well as the audience, is situated become the performance.

Bull and Back also explain to us how sound is inescapable in *The Auditory Culture Reader*<sup>6</sup>. It is always present around us, always enveloping us. For many, the idea of silence may be found in spaces and places where the amplitude of sound is very low. The absence of loudness, though, does not constitute the absence of sound. There are spaces within which there may seem to be no sound, for listeners with less acute ears, but these spaces are not silent.

Quietness is the phenomenon we refer to as silence. It is important to make this distinction because if we think of silence as a condition of absent sound, and refer to quietness as silence, then we perhaps turn off our listening in spaces of quiet, believing that there is nothing to listen to. On the contrary, spaces of quietude can often be equally vibrant to spaces comprised of louder and more easily perceptible sounds.

Salomé Voegelin, while discussing 4'33" in her book, *Listening to Noise and Silence: Towards a Philosophy of Sound Art*, speaks of a silence which can be loud, saturated with sound:

*Silence is about listening, listening to small sounds, tiny sounds, quiet and loud sounds out of any context, musical, visual or otherwise. Silent sounds can be loud, as much as noisy sounds can be quiet, but they do not deafen my body to anything but themselves, and instead include me in their production.*<sup>7</sup>

Many ears are simply not used to finding sound in quiet spaces and this may be because most people do not often enough engage in active, focused listening, the lack of which limits aural acuity. Someone with unfocused ears might hear a soundscape in the same way that someone with poor sight sees a landscape: the general shape is present, and the colour also, but there is a lack of definition and the details are lost.

Quiet spaces require a special kind of listening, in order that

6 *The Auditory Culture Reader*. Michael Bull & Les Back. p. 25

7 *Listening to Noise and Silence: Towards a Philosophy of Sound Art*. Salomé Voegelin p. 81-2

They are only quiet.



Empty Room.

a c u i t y  
sharpness or keenness of  
thought, vision, or hearing.

the vast spectrum of their soundscapes can be perceived and experienced. This type of listening is a practiced listening—a listening that goes searching for the smallest sonic details, the most precious and delicate sound events—a listening which is unwilling to sacrifice tender sounds to the ever flowing river of time.

If we are interested in this type of listening, and are willing to use focus and practice to develop our aural acuity, then quiet spaces might offer us opportunities to discover deep and delicate soundscapes which would be otherwise lost. Learning to listen in this way might also allow us to perceive the embedded subtleties in louder sounds as well, just as more delicate flavours can be detected in a particular culinary dish as one's palate improves.

There are many sounds of silence. Cage's *4'33"* was, in many ways, a response to this not being recognized. Silence is commonly taken to be the opposite of sound, but as Evelyn Glennie, who is both profoundly deaf and also one of the world's foremost solo percussionists, sits, observing a monk rake the sacred sand of a zen garden, and pondering silence in her documentary *Touch the Sound*, she concludes that "the opposite of sound is definitely not silence" but that "it's the closest thing, [she] can imagine, to death."<sup>8</sup> While we live, we live in sound, and sound in us. That is a fundamental prerequisite. There are spaces of quiet, but not of silence. The quietest space we have, and the space in which we can move closest to silence is the anechoic chamber, but even there, sound is present. When outer sounds are cancelled, inner symphonies come forth.

[ME]: *Is there such a thing as silence? Or is silence more like a canvas for Deep Listening—what we consider s i l e n c e ?*

[PO]: *Well, silence first of all, technically is not possible. And, you know I mean, zero vibrations means zero anything. Zero death (chuckles). So, the best we can do is have quiet. So, I mean, that is very important, I think, to understand that.*

[ME]: *Evelyn Glennie said in her documentary *Touch the Sound* that "the opposite of..."—what was it?—"the opposite of sound was not silence, but was probably closer to death."*

[PO]: *Mm-hmm. Yeah... that's my understanding (chuckles)*

[ME]: *And, certainly, I mean, Cage felt something similar as well with the development of *4'33"*...*

[PO]: *Yeah. Yeah... well, he knew that people weren't listening.*

# A SPACE FOR EIGENTONES: THE ANECHOIC CHAMBER

The *anechoic chamber*, capable of cancelling out 99.8% of the ambient reflection within it, is a space wherein the nearest possible real world approximation of silence, or the absence of sound, can exist. It achieves this by isolating itself from any transmission of outside sound or vibration through complicated tectonics, and cancels any reflections of sound on the inside through complex materiality and form<sup>1</sup>.

There is a well known and widely told story about John Cage visiting an anechoic chamber for the first time, in 1951 at Harvard University. Of the experience, in one of his famed lectures, Cage said:

I heard two sounds, one high and one low. Afterwards I asked the engineer in charge why, if the room was so silent, I had heard two sounds. He said 'Describe them.' I did. He said, 'the high one was your nervous system in operation. The low one was your blood in circulation.'<sup>2</sup>

Hearing these sounds within a space he felt would be absent of sound had a strong influence on Cage and his work, as he explains in *An Autobiographical Statement*:

...I found out by experiment... that silence is not acoustic... I devoted my music to it.<sup>3</sup>

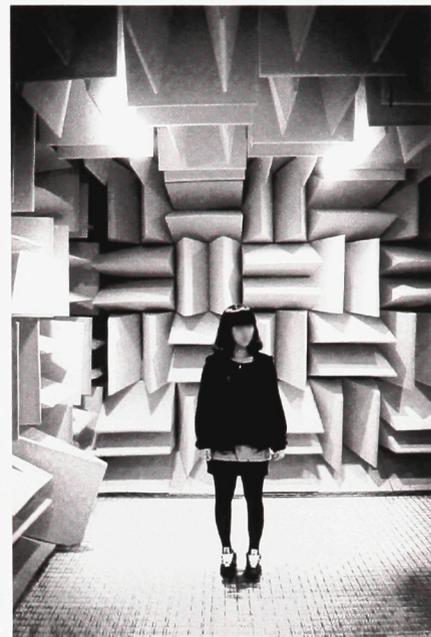
For some, the notion of quietude on the scale of that which is found within the anechoic chamber might be completely terrifying. For others, it may be unrelentingly inviting. Why is the notion of quiet so disconcerting for some? Schafer says it is because, at least within Western culture, sound reminds us we are not alone and that on some level the

1 for an explanation of the construction of the world's quietest place, the anechoic chamber at the University of Salford, Greater Manchester, UK, see <http://www.acoustics.salford.ac.uk/facilities/index.php?content=anechoic>

2 *A Year From Monday: New Lectures and Writings*. John Cage. 1968. p. 134

3 *An Autobiographical Statement*. John Cage. Lecture. 1989.

anechoic  
free from echo



Person in Anechoic Chamber.

link between sound and life is inherently understood, since fearing the absence of sound is tantamount to fearing the absence of life.<sup>4</sup>

Since modern man fears death as none before him, he avoids silence to nourish his fantasy of perpetual life. In Western society, silence is a negative, a vacuum... The contemplation of absolute silence has become negative and terrifying for Western Man. Thus when the infinity of space was first suggested by Galileo's telescope, the philosopher Pascal was deeply afraid of the prospect of eternal silence. "Le silence éternel de ces espaces infinis m'effraie."

When one stays for a while in an anechoic chamber—that is, a completely soundproof room—one feels a little of the same terror. One speaks and the sound seems to drop from one's lips to the floor. The ears strain to pick up evidence that there is still life in the world.<sup>5</sup>

It is true that the prospect of silence can perhaps be harrowing, but contrary to Schafer's assertion that experiencing the anechoic chamber evokes doubt of the existence of life, in fact it does the opposite, providing solid affirmation that life is present.

In acoustics, the term *eigentone* refers to a tone or one of several tones produced by and characteristic of a vibrating body or system. It derives from the German *eigen*, meaning 'self' or 'own' and *ton* (*tone*)<sup>6</sup>. Each individual space has a unique eigentone, and the eigentone is present simply by virtue of the existence of the space itself. Can we appropriate this term to consider the tone or tones of the self? If the presence of sound is indeed the indicator of life, then the anechoic chamber supplies the opportunity for one to listen to one's own eigentones, sounds which under normal circumstances cannot be heard, but which are ever present.

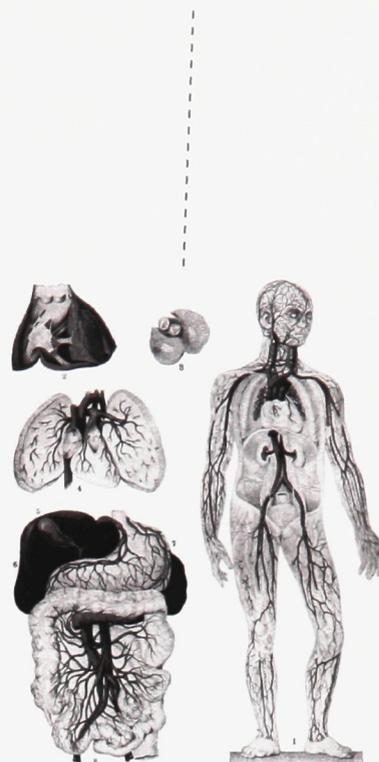
Harmony is the combination of simultaneously sounded musical notes to produce a pleasing effect, as defined by the Oxford English Dictionary.<sup>7</sup> The following idea will be

4 *The Soundscape: Our Sonic Environment and the Tuning of the World*. R. Murray Schafer. p. 256

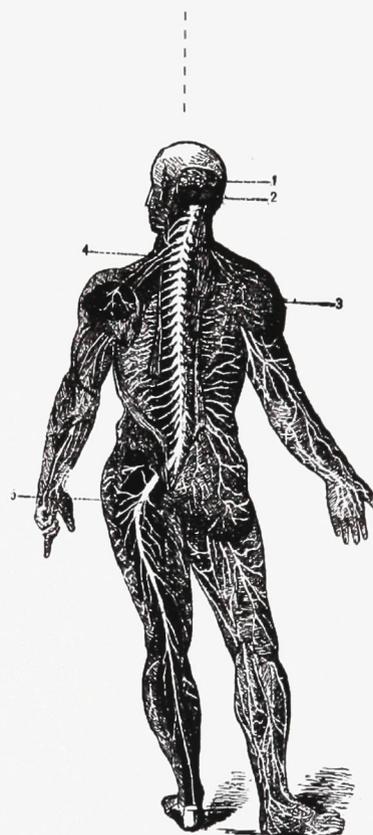
5 *Ibid.*

6 The Merriam Webster Online Dictionary. 2011. (<http://www.merriam-webster.com/>)

7 The Oxford Online Dictionary (<http://www.oxforddictionaries.com/>). 2011



*Blood Circulation within Human Body.*



*Diagram of Human Central Nervous System.*

investigated further in Movement II, but for now, let us allege that all sound can be musical, in some way, and thereby edit the definition of harmony so that it can be taken as the combination of any simultaneously occurring sounds which produce a pleasing effect. It is important to say here that harmony is not strictly based on individual interpretations or preferences. The 'pleasing effect' is married to measurable phenomena, corresponding to alignments and ratios of tonal frequencies, as Pythagoras discovered. For instance, a frequency ratio of 1:2 will yield the sound of an octave. A perfect fifth, 2:3, and a perfect fourth, 3:4.<sup>8</sup> When two sounds occur simultaneously, and there is a lack of harmony, they are referred to as being dissonant.<sup>9</sup>

Let us consider now, the sounds which Cage heard inside of the anechoic chamber, those of the circulation of blood, and the working of the central nervous system, as well as any number of other bodily sounds. Let us consider as well the inherent tones of any given space. That is to say, let us consider our own eigentones as well as the eigentones of spaces we may inhabit. In considering these together, might we then imagine the possibility of an actual harmony or dissonance occurring between the human body and the surrounding body of architecture? It is perhaps worthwhile to consider this, and further to pose the question, if harmonies and dissonances can exist between body and architecture, might this account for, in part, the reason why certain spaces evoke certain sensations, or feelings?

Even if not, a contemplation of the sounds within (us) still works well to conclude this movement, which has focused on listening, since, if to be alive is to be in sound, and to step into the anechoic chamber is to approach silence in the nearest way we can, then, sounds, our eigentones, being present there come to suggest that sound itself is fundamentally important, since there is always something to listen to.

<sup>8</sup> *Pythagoreanism - Number, Cosmos and Harmony*. David Fidler. (<http://science.jrank.org/pages/10928/Pythagoreanism-Number-Cosmos-Harmony.html>)  
<sup>9</sup> The Oxford Online Dictionary (<http://www.oxforddictionaries.com/>). 2011

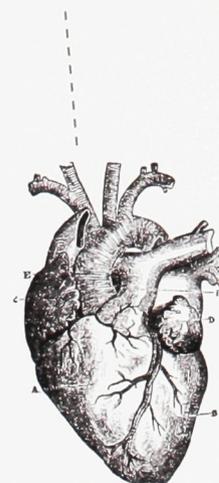


Diagram of Human Heart.

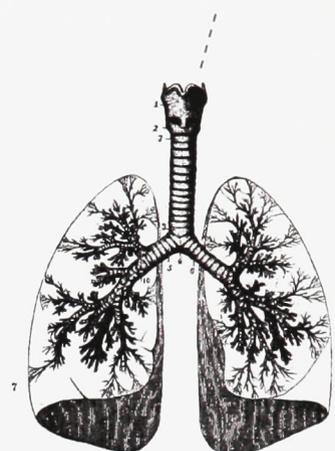


Diagram of Human Lungs.

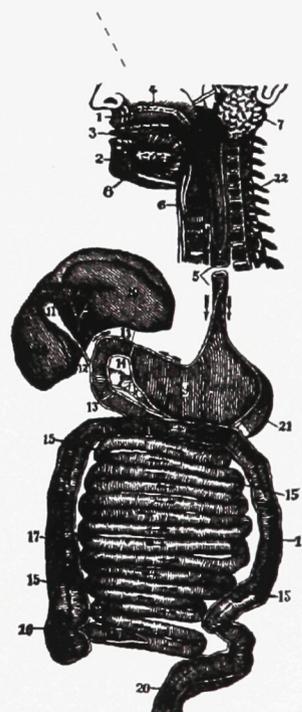


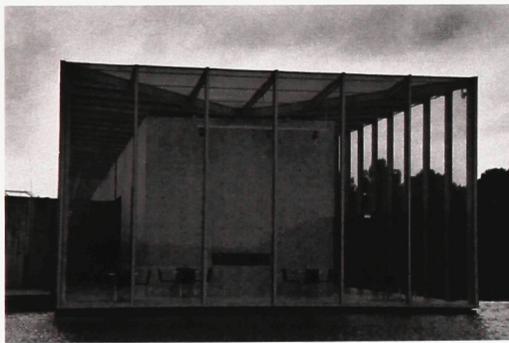
Diagram of Human Digestive System.

# ***INTERLUDE I***

*Sometimes a sound grabs you, holds you transfixed within its grasp. You are at first unsure why or how it is happening and instead simply find yourself lost in the time and space of its occurrence...*

## LISTENING TO ANDO

32



While I was studying architecture and life for a semester's time in Berlin, Germany, I made a day's pilgrimage West (by high-speed train... nothing too poetic) to Neuss to see a recent project by Tadao Ando. It was mid-November and the weather was particularly inhospitable, resulting in no other visitors to the Langen Foundation that day. It was not sound that drew me there. Ando's work has always spoken to me on a visual level. I had not had the opportunity, prior to that time, to visit one of his works in person, and while it was evident to me through readings of various two dimensional representations that there was a poetry and spirit present in his work, I was eager to have a personal, fully spatial encounter. I had daydreamed of standing between glass and concrete, staring out onto the shallow reflecting pool. The most memorable sensation, however, was one I could not have anticipated, and one which did not arrive in visual form.

Since I was the only one present that day, and since I was able to spend the entirety of seven hours alone with Ando (because architects are in their work), I had the opportunity to witness the same spaces multiple times under changing conditions of light, weather, temperature etc.. I was fascinated by the way in which the day played out its visual song on the Langen Foundation, but more compelling was the song which followed.



I was standing in one of the corridors between the exterior glass envelope and inner concrete shell happily observing the way that sunlight—which had been absent for most of the day—had found its way through intermittent gaps in the cloud cover and was dancing on the fair faced walls when something occurred which I found to be even more beautiful.

The wind had been strong throughout the day, but had not been strong enough until that moment to find means of passage from exterior to interior through the seams between glass and metal. To some, this might have indicated a flaw in construction, but to me, it was rapture, for when the wind made its way through, I heard the most amazing music. I am sure the voices of angels do not sound as divine. The wind, in this instance, did not come through in the way that wind normally does, screaming, screeching, moaning, complaining. Rather, there were only pure tones—sines from above—and there were many of them. They weaved between one another, ascending and descending, finding moments of harmony or resplendent dissonance, where they lingered briefly before moving off again to some other frequency.

In those moments, I forgot the sun's dancing. I forgot everything, including myself, eyes closed, completely enveloped and spellbound within a space of sonic bliss. There in the Langen Foundation, atop a hillside in Neuss, listening to a song of an aural beauty I am perhaps not to ever witness again, and which I felt was for me alone; a wondrous gift that is now but a memory to be nurtured, carried, and treasured.

# MOVEMENT II

*"There's music in the sighing of a reed;  
There's music in the gushing of a rill;  
There's music in all things, if men had ears:  
Their earth is but an echo of the spheres."*

*Lord Byron*<sup>1</sup>

This movement opens with a discussion of what constitutes music, including a brief history of its changing definitions, traced from ancient Greece, and an examination of *musique concrète* and the work of the unavoidable John Cage in the 20<sup>th</sup> century as major turning points in understanding where potential boundaries lie between music, sound, and noise. Following that is an exploration into the realm of perception and proprioceptive sense relating to the phenomenology of sound and architecture, and Merleau-Ponty pays a necessary visit. Closing this movement is a poetic foray into the forgotten song of architecture...

## MUSIC(S)

### THE POWER OF SOUND

### THE FORGOTTEN SONG



*The Enraged Musician*. Engraving by William Hogarth. 1741

In this famous eighteenth century engraving, a musician is depicted peering out of his window, covering his ears, and enraged by all of the sounds occurring in the streets which are disturbing his work inside. To him, these street sounds constitute noise, to be sure, but to other ears, they may form a music all their own...

# MUSIC(S)

Without music life would be a mistake.

- Nietzsche<sup>1</sup>

*Just what is music?* Where do the boundaries lie between what constitutes music and what does not?

When discussing the phenomenology of sound experience, these questions are perhaps fundamental. We must decide whether, in any given situation, we are listening merely to sound, or to music. Then again, it may all just be noise. Let us first begin this discussion by examining definitions of music at present, and briefly glimpsing some of the more prominent historical shifts in musical thought and philosophies. For this, Daniel Levitin's *This is Your Brain on Music* will be heavily referenced, as will the *Encyclopædia Britannica*'s tracing of musical history. Inevitably, this extremely brief tracing might seem rather inchoate to those more familiar music's history and evolution. It is not intended to function as a comprehensive account, but merely as an introduction—a small puncture; a slight aperture through which those who are unfamiliar with musical history can peer.

Oxford, at the moment, currently includes 'sound perceived as pleasingly harmonious' in its definition of music<sup>2</sup>, which, albeit incomplete, is nevertheless approaching the definition in which this section aims to culminate. However, to many, music is still viewed in very narrow terms. Levitin writes:

What is music? To many, "music" can only mean the great masters—Beethoven, Debussy, and Mozart. To others, "music" is Busta Rhymes, Dr. Dre, and Moby. To one of my saxophone teachers at Berklee College of Music—and to legions of "traditional jazz" aficionados—anything made before 1940 or after 1960 isn't *really* music at all...The Catholic Church banned music that contained polyphony...fearing that it would cause people to doubt the unity of God. The church also banned the

1 *Maxims and Arrows - Nietzsche*. Ronald King, Friedrich Wilhelm Nietzsche, and R.J. Hollindale. p. 33

2 *The Oxford Online Dictionary* (<http://www.oxforddictionaries.com/>). 2011



Overture Score. Die Zauberflöte. W.A. Mozart. K. 620

## m u s i c

1 vocal or instrumental sounds (or both) combined in such a way as to produce beauty of form, harmony, and expression of emotion:

- the art or science of composing or performing music:

- a sound perceived as pleasingly harmonious:

2 the written or printed signs representing vocal or instrumental sound:

- the score or scores of a musical composition or compositions.

## p o l y p h o n y

the style of simultaneously combining a number of parts, each forming an individual melody and harmonizing with each other.

musical interval of an augmented fourth...known as a tritone...This interval was considered so dissonant that it must have been the work of Lucifer, and so the church named it *Diabolus in musica*.<sup>3</sup>

What becomes immediately clear from this musing on music is that due to its subjective nature, music, at present, lacks a universal definition, but also, that its innate power, its intrinsic ability to evoke emotion, whether positive or negative, has been well understood throughout its continually changing history. Roger Sessions, in *The Musical Experience*, writes:

No one denies that music arouses emotions, nor do most people deny that the values of music are both qualitatively and quantitatively connected with the emotions it arouses. Yet it is not easy to say just what this connection is.<sup>4</sup>

The *Encyclopædia Britannica* begins its tracing of the history of music by acknowledging the inherent difficulty in creating such an outline. Even Aristotle said "It is not easy to determine the nature of music or why anyone should have a knowledge of it."<sup>5</sup> The history of music is vast and multifaceted, and one could occupy an entire thesis with a close examination of any small fragment of that history. For the purposes of this thesis, however, there need only be provided a brief summary.

The word *music* derives initially from the Greek *mousikê* (*tekhnhê*), 'the art of the Muses', from *mousa*, for 'muse'.<sup>6</sup> In ancient Greece, music, though separate from *gymnastics*, was related to the Muses, and derived from a generic term which pertained to any art or science practiced under them, and therefore was not considered distinct, as we may see it today, though there were examples of early speculation of that being the case.

3 *This is Your Brain on Music: The Science of a Human Obsession.* Daniel J. Levitin. p.13

4 *The Musical Experience of Composer, Performer, Listener.* Roger Sessions. 1950. p.21

5 *Politics.* Aristotle. 350 B.C.E. Trans. by Benjamin Jowett. Online. Part V. <http://classics.mit.edu/Aristotle/politics.8.eight.html>

6 *The Oxford Online Dictionary* (<http://www.oxforddictionaries.com/>). 2011



*The Nine Muses that Inspire Arion, Orpheus and Pythagoras under the auspices of the Air Personified, the source of all harmony. 13<sup>th</sup> c. Reims Public Library.*



as aiding in the maintenance of order and power. Music was used as a way to illuminate the text, but was carefully controlled, so as not to take any precedence. Both St. Augustine, and St. Thomas Aquinas, two of the most important figures in the history of Catholicism, held earlier Greek notions that music was innately mathematical, reflecting higher celestial orders.

Western conceptions of music in the seventeenth- and eighteenth-centuries saw Pythagorean ideas reborn. Kepler desired to relate music to planetary movement, extending theories of a *harmony of the spheres*. Descartes, with a similar view to Pythagoras, saw the basis of music as being mathematical. Gottfried von Leibniz, another philosopher-mathematician, also felt music was a reflection of a fundamentally mathematical reality, echoing a universal rhythm. However, Kant and Hegel, in some capacity (though not entirely) rejected music, considering it less important than the other arts, especially philosophy. However, they both acknowledged music's strange evocative nature. Prior to the nineteenth-century, theorists of music were not commonly musicians themselves. The nineteenth-century witnessed the rise of the composer-critic in Robert Schumann, Franz Liszt, and Carl Maria von Weber, etc.. Richard Wagner became composer-author. But these prominent musical figures, while not through lack of trying, did little to advance the theory of music. It was not until Schoenberg and Stravinsky arrived in the twentieth-century that composer-authors began to gain success in propagating their techniques and ideas.<sup>7</sup> Perhaps most important here is to consider Schoenberg's development of *atonal* music, through his *twelve-tone series*, which went on to spawn *serialism*. Serialism gained prominence through Schoenberg's pupil Anton von Webern, who went on to inspire other serial composers of the time, such as Luigi Nono, Pierre Boulez, and Karlheinz Stockhausen.<sup>8</sup> In the 1950's, others were expanding upon Schoenberg's work and serialism in various ways that helped music's

7 "music." Encyclopædia Britannica Online. 2011.

8 *Karlheinz Stockhausen's New Morphology of Musical Time*. Christopher K. Koenigsberg. 1991.

atonal  
in music, the absence of  
functional harmony as a  
primary structural element.

In the 12-tone method, each composition is formed from a special row or series of 12 different tones. This row may be played in its original form, inverted (played upside down), played backward, or played backward and inverted. It may also be transposed up or down to any pitch level. All of it, or any part of it, may be sounded successively as a melody or simultaneously as a harmony. In fact, all harmonies and melodies in the piece must be drawn from this row. Although such a method might seem extremely restrictive, this did not prove to be the case. Using this technique, Schoenberg composed what many consider his greatest work, the opera *Moses und Aron* (begun in 1930).

Serial techniques are essentially a systematic transference of Schoenberg's twelve-tone technique to elements of musical sound other than pitch. After frequency, the first element to which these techniques were seen to be suited was duration, i.e. the temporal dimension. Metre and rhythm are in fact the most important means apart from pitch of arranging musical sounds into organized shapes. A single note is not a musical element; it qualifies as a possible musical idea only when it joins company with other notes...

\* "serialism." Encyclopædia Britannica Online. 2011.

\*\* *Twentieth Century Music*. H.H. Stuckenschmidt. p 203

definition to shift. Perhaps one of the more important steps forward arrived in the form of *musique concrète*.

The beginnings of *musique concrète* can be found in the establishment of the Groupe de Recherche de Musique Concrète by Pierre Schaeffer and Pierre Henry in 1951. The group was formed to function as a 'specialized context for audio research and musical experimentation.'<sup>9</sup> and quickly attracted others as well, including Stockhausen, Boulez, Xenakis, Olivier Messaien, and Varesé. These early *musique concrète* composers worked with electronic recording technology, magnetic tape (and manipulation of it), and phonograph records, in order to create "sound objects", which focused on the mechanics of sound—of sound as an event—of the very mechanisms of sound recording and reproduction. *Musique concrète* began "with a prepared sound material, which is molded into its final form by a process of experimentation, trial and error, perhaps following unexpected paths to goals that were never foreseen initially..."<sup>10</sup>

The music of avant-garde composers such as... Pierre Schaeffer stretches the bounds of what most of us think music is. Going beyond the use of melody and harmony, and even beyond the use of instruments, these composers use recordings of found objects in the world such as jackhammers, trains, and waterfalls. They edit the recordings, play with their pitch, and ultimately combine them into an organized collage of sound with the same type of emotional trajectory—the same tension and release—as traditional music.<sup>11</sup>

The birth of *musique concrète* was a crucial turning point within the world of music theory and conceptualization. Perhaps Edgar Varèse was able to provide the clearest indication of this in his own succinct and potent definition of music, saying that "Music is organized sound."<sup>12</sup>

And then, once again, there is Cage, who seems unavoidable in any meaningful discourse on sound, music, or silence, and whose own theories and work,

9 *Background Noise: Perspectives on Sound Art*. Brandon LaBelle. 2007. p. 25

10 *The New Music: The Avant-Garde Since 1945*. Reginald Smith Brindle. p. 104

11 *This is Your Brain on Music*. Daniel J. Levitin. 2007. p. 14

12 *Ibid.*



Pierre Schaeffer.



Pierre Henry.

The *Prepared Piano* had several objects such as screws, nuts, bolts, and strips of leather, a doll's arm, a wooden spoon, an Aspirin box, among others, inserted between strings and acting as dampers, resulting in an atonal music in which the pitches of the struck keys would be indeterminate.<sup>13</sup>



John Cage and Prepared Piano.

<sup>13</sup> "John Cage". History Link. (<http://www.historylink.org/jt>)

though distinct, paralleled developments in musique concrète.

LaBelle, in *Background Noise*, writes:

As a contemporaneous parallel to the early work of John Cage, musique concrète significantly figures sound as

a subject of research as well as musical medium. Though to refer to musique concrète in relation to Cage...is to arrive at a philosophical and methodological split, for each occupies extreme positions in relation to questions of sonic representation and musical meaning.<sup>13</sup>

LaBelle goes on to say that the difference lies in the treatment of musical object and its context. Whereas musique concrète was interested in locating 'sound's liberation through ideal configurations, harnessing sound's intrinsic ambiguity or malleability so as to create distinct auditory experiences abstracted from an original source, beyond or in spite of material reference...', Cage desired in his work, always to place 'emphasis on the very source of sound itself, as objects, electronic circuits, and real bodies: a reference to sound as founded upon the actual object of its source...'.<sup>14</sup> And it is precisely in this aspect of Cage's treatment of sound within the world of music that the key to our own definition might ultimately be found, for it is hoped that this thesis can propose and defend the notion that there can be music in any sound.

According to Levitin,

The basic elements of any sound are loudness, pitch, contour, duration (or rhythm), tempo, timbre, spatial location, and reverberation. Our brains organize these fundamental perceptual attributes into higher level concepts...and these include meter, harmony, and melody. When we listen to music, we are actually perceiving multiple attributes or "dimensions."<sup>15</sup>

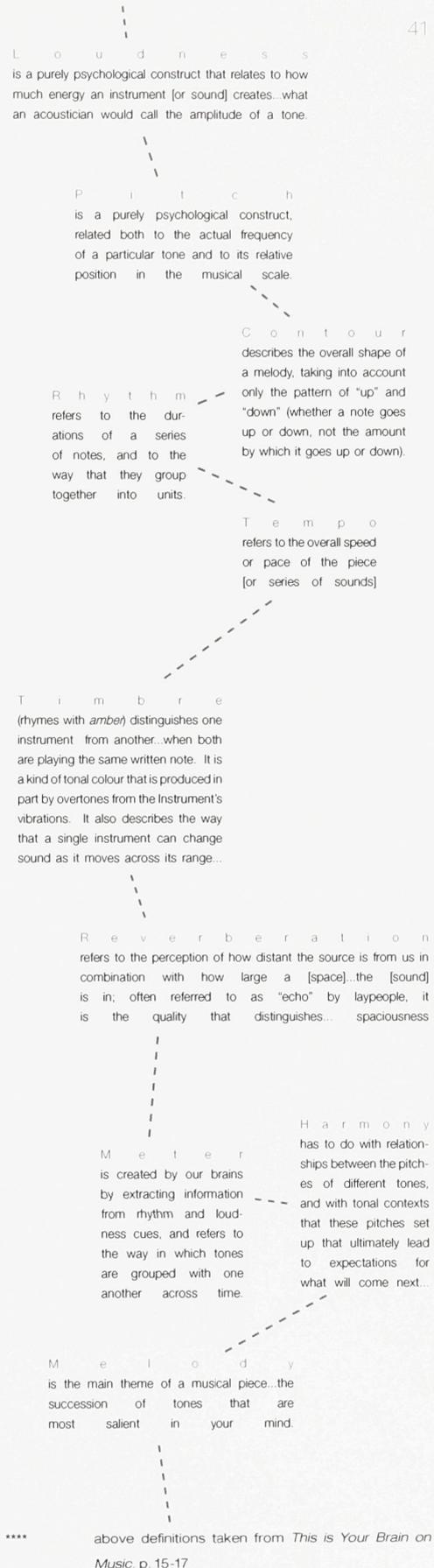
He elaborates on timbre specifically, since:

...it is the most important and...relevant feature of auditory events. The timbre of a sound is the principal feature that distinguishes the growl of a lion from the purr of a cat, the crack of thunder from the crash of ocean

13 *Background Noise: Perspectives on Sound Art*. Brandon LaBelle. 2007. p. 24

14 *Ibid.* 24-5

15 *This is Your Brain on Music*. Daniel J. Levitin. 2007. p. 14



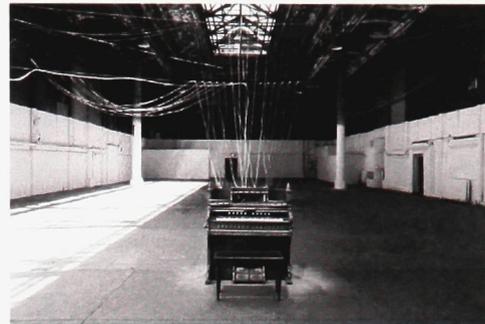
waves...Timbral discrimination is so acute in humans that most of us can recognize hundreds of different voices.<sup>16</sup>

If timbre, then, is not restricted to music, but is in fact a characteristic of any sound, pertaining to 'tonal colour', and if the avant-garde composers of the middle portion

of the last century were able to use found sounds and plan for the unplanned (as in the indeterminacy employed by Cage in his music), can we agree that, while contingent upon individual perception and "taste", every sound has potential to be listened to and experienced in a musical way? Or, that there is a potential music in every sound? If we can accept this, might we further concede the idea that there can conceivably exist a perpetual music that surrounds us and from which we cannot escape—a music of life, played out through our constant encounters with sound? Can architecture act as a framing mechanism/generator, or both, for portions of this music? Let us consider David Byrne's installation entitled *Playing the Building*, in which the famous Battery Maritime Building in Lower Manhattan was transformed through the intervention of a retrofitted pump organ connected to devices positioned in various locations within the space. These devices would strike, vibrate, or blow across architectural elements such as beams, pipes, electrical conduits, etc., allowing the building to become an extension of the organ and function as part of an interactive musical/architectural instrument.<sup>17</sup> Some might consider this noisy as opposed to musical.

The last element then, to consider here, is noise, perhaps the most relevant definition for which, in the context of this thesis, is unwanted sound<sup>18</sup>. By this definition, noise can only exist if sound is unwanted. Is it possible that we could learn to want every sound, negating noise altogether?

This is perhaps a Utopian consideration. For now, let us assume that there will always exist the potential for



*Playing the Building*. Installation. David Byrne. 2008.

[ME]: *So, one of the interesting things that I'm dealing with, is the boundary between what constitutes music, and what constitutes noise, and so I'm wondering, do you believe in noise anymore?*

[PO]: *(laughs!)*

[ME]: *In other words, where does music begin and where does it end? Or, does it?*

16 *Ibid.* p. 45

17 from *Creative Time*. Programs & Events. Current & Archive. (<http://www.creativetime.org/programs/255/info>)

18 *The Oxford Online Dictionary* (<http://www.oxforddictionaries.com/>). 2011

unwanted sound, in some form, and that the distinction between music and noise is entirely subjective. Voegelin, for instance, ponders a situation in which the sound of her neighbours' music enters into her living room, and which, because it disturbs her space, is noise to her, though still music to her neighbours:

My living room is increasingly saturated with *their* sound. This invisible layer litters my room and overpowers the design of my space. Filling it ever more, this noise becomes an inert block of solid auditory material, impeding my movements, my thinking and my feeling, forcing me into internal ruminations of the worst kind. My anger and resentment are intense. Can I reach their backyard with eggs thrown from my kitchen window?<sup>19</sup>

Though noise as unwanted sound may be the more relevant definition here, there are other definitions to consider. Schafer outlines, what he refers to as, the several 'shadings of meaning' of noise.

After noise as unwanted sound, he presents noise as 'unmusical sound', which, as he writes, was employed by Helmholtz in the nineteenth-century to 'describe sound composed of non-periodic vibrations, by comparison with musical sounds, which...' according to Helmholtz, must '...consist of periodic vibrations.'<sup>20</sup> This definition, however, does not align with our definition of music as having potential to exist within any sound (including sounds such as what is commonly referred to as *white noise*), which this definition negates, and so we cannot use it here.

The next 'shade' is that of noise as 'any loud sound'. This is the definition, according to Schafer, most often used by those concerned with noise abatement, who establish a sound's 'permissible limits in decibels.'<sup>21</sup> However, in Movement III we will explore whether current so-called 'noise abatement' strategies are effective or not in terms of preservation of soundscapes, and whether socially

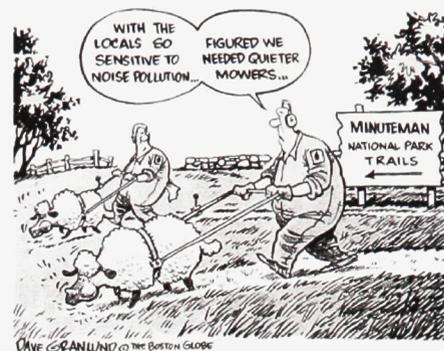
19 *Listening to Noise and Silence*. Salomé Voegelin. 2010. p. 44

20 *The Soundscape: Our Sonic Environment and the Tuning of the World*. R. Murray Schafer. p. 273

21 *Ibid.*

white  
noise  
noise containing  
many frequen-  
cies with equal  
intensities.

Following the notion that there can be music in any sound, would it make sense to rename 'white noise' to 'white sound' due to the negative connotations of the term noise?



Noise Pollution. Dave Granlund. 2001.



Noise Pollution. Brian Barredo. 2008.

acceptable sound should be determined based on volume, as opposed to other, perhaps more important, characteristics.

The final definition Schafer presents is that of noise as 'disturbance in any signaling system'. This corresponds to electronics and engineering, relating to 'any disturbances which do not represent part of the signal, such as static on a telephone or snow on a television screen.'<sup>22</sup> However, sound artists and musicians, especially those of musique concrète, may have used electronic signal disturbances in portions of their art or music, and once again, the element of subjectivity has to be considered here as well. Or, as Schafer writes, 'one man's music may be another man's noise.'

He concludes by stating that 'the most satisfactory definition of noise for general usage is still "unwanted sound."<sup>23</sup>

We have explored historical definitions of music, in the end arriving at our own—which is that there can be music in any sound—and have also examined noise, concluding, as Schafer does, that noise can be defined simply as unwanted sound. Both of these definitions rely heavily on the subjective nature of perception, which we will examine further in the following section. This suggests that the answer to the question posed at the beginning of this section, "where do the boundaries exist between what constitutes music and what does not?" is that those boundaries separating music, sound, noise, are both fuzzy and dynamic, and in some instances may not exist at all. Today's noise may be tomorrow's music, and vice versa.

The definitions we have established here will be important in the remaining sections, the first of which deals with the innate *power of sound*.

[PO]: *Well, for me, I mean, just, every day is a new day of listening... (chuckles). There are times when the threshold is different, and something—and some sound—that comes in may be interpreted as noise because it annoys me or knocks me off my focus or something. Or I have narrowed down—I am narrowed in my attention—to the point that I can't open enough to accept the sound.*

[ME]: *The sounds that you want to be focusing on?*

[PO]: *(nods)*

[ME]: *Right.*

[PO]: *But, basically, yes there's still—there is noise—the definition is unwanted sound.*

[ME]: *Exactly. That's why I was wondering if there are any sounds that are unwanted, to you, because...I'm noticing more and more that the boundaries of what I believe constitute music have expanded to the point that I hear music in almost every thing.*

22 *ibid.*

23 *ibid.*

# THE POWER OF SOUND

The Lion was pacing to and fro about that empty land and singing his new song. It was softer and more lilting than the song by which he had called up the stars and the sun; a gentle, rippling music. And as he walked and sang, the valley grew green with grass.

C.S. Lewis, in *The Magician's Nephew*<sup>1</sup>

C.S. Lewis describes in *The Magician's Nephew*, one of *The Chronicles of Narnia* how the great Lion Aslan sings a song in order to bring the world of Narnia into existence. The notion of sound being powerful enough to create worlds is not however solely restricted to fantasy.

One of the theories concerning the formation of our own Universe describes sound as having had a central role and presence. The Big Bang itself occurred in silence, but the energy dispersal resulted in sound waves which had an actual fundamental tone and set of harmonics.<sup>2</sup> Steve Goodman, in *Sonic Warfare*, provides a poetic summary of the very first sound events:

That humming background sound is ancient—the ringing of a huge bell. Exploding into a mass of intensely hot matter, pulsing out vast sound waves, contracting and expanding the matter, heating where compressed, cooling where it was less dense. This descending tone parallels the heat depth of the universe, connecting all the discrete atoms into a vibrational wave. This cosmic background radiation is the echo of the big bang.<sup>3</sup>

The first time actual evidence of sound occurring within space surfaced was in 2003, when NASA scientists discovered sound waves emanating from a black hole in the Perseus galaxy cluster. They ascertained that the vibratory forces were equivalent to what would be the frequency of a B-flat tone 57 octaves below *middle-C* on a piano.<sup>4</sup> While this tone would be inaudible for us, too

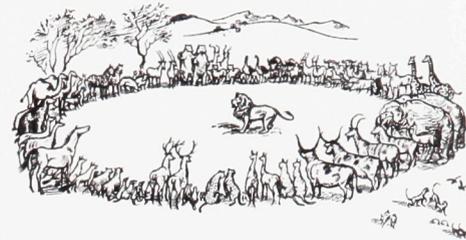
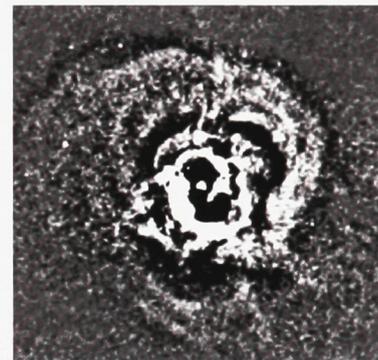


Illustration from *The Magician's Nephew*.<sup>1</sup>



Black Hole Sound Waves.

1 *The Chronicles of Narnia: The Magician's Nephew*. C.S. Lewis. p. 64

2 *Evolving Sounds*. Mark Whittle. University of Virginia.  
([http://www.astro.virginia.edu/~dmw8f/BBA\\_web/unit09/unit9.html](http://www.astro.virginia.edu/~dmw8f/BBA_web/unit09/unit9.html))

3 *Sonic Warfare: Sound, Affect, and the Ecology of Fear*.  
Steve Goodman. 2010. p 81

4 *Strange But True: Black Holes Sing*. Article. Scientific American Magazine.  
October 18, 2007

far outside the threshold of our hearing, it nevertheless is a result of a (massive) pressure wave of sound. There are other examples of interstellar objects and events producing sound waves, according to Peter Edmonds, astrophysicist at NASA's Chandra X-Ray Centre.<sup>5</sup> Another known example is one of the Universe's most massive black holes residing in the M87 galaxy, which drones out tones at frequencies around 59 octaves below middle-C. Our Sun itself has been singing for billions of years.

Long before any empirical scientific evidence existed supporting the idea of songs within space, *musica universalis* was a prominent philosophical doctrine championed by Plato, Pythagoras, Kepler, and many others. We examined this briefly in the previous section.

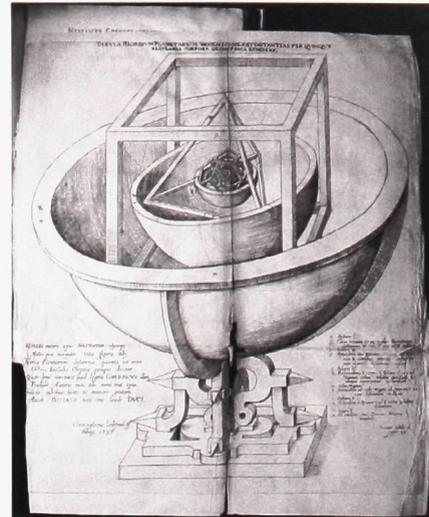
For the purposes of this thesis, which desires mainly to be about personal experiences of sound within space, as opposed to celestial ones, let us descend from the heavens now and consider the power of sound in terms of individual perception.

It was inevitable that Merleau-Ponty would feature at some point once the notion of phenomenology had been invoked in our discussion of sound and space. His seminal text, *The Phenomenology of Perception* focuses on human cognition requiring a body, and, the body, a position in space.<sup>6</sup> As LaBelle writes:

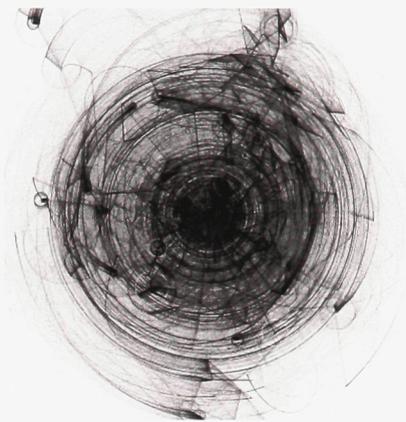
The phenomenology of space and its production through sonic interplay draws out Merleau-Ponty's original thoughts on perception and how the "ambiguous, the shifting" nature of reality is "shaped by its context."<sup>7</sup>

This involves the proprioceptive sense, which is related to stimuli that inform a body of its position within space.<sup>8</sup> Julian Henriques argues that, through sound, we can become aware of '...our intimate and multiple connections not only with our body, but also with our spatial and temporal

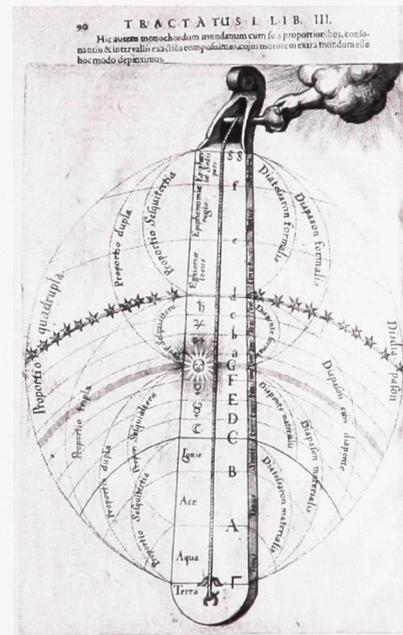
5 Ibid.  
 6 *Background Noise*. Brandon LaBelle. 2007. p. 77  
 7 Ibid. p. 174  
 8 *The Oxford Online Dictionary* (<http://www.oxforddictionaries.com/>). 2011



Music of the Spheres. Kepler's famous illustration.



Music of the Spheres. Philip Glass + Greg Laughlin.



The Tuning of The World. Robert Fludd.

environments.<sup>9</sup> He draws on Merleau-Ponty's *chiasm* (physiology: the intertwining of nerves) but considers it in terms of the aural as opposed to the visual:

The sonic operates with the qualities of mood, colour, texture, timbre and affect, rather than the quantities of measured calculation. The particular spatiality attaching to the sonic has been described as 'acoustic space'. This is a kind of space you are inside as well as outside and it is inside you as well as you being inside it. In fact with sound it simply does not make sense to think of having an inside and an outside...Sound is both surface and depth at once...sound is everywhere, hardly even making the dualistic division between here and there.<sup>10</sup>

Voegelin ponders Merleau-Ponty's writing about his world of perception through visual terms, concluding that 'the sensibility of his perception is not that of vision...it is sonic perception.'<sup>11</sup>

Can we say that the realm of perception is intrinsically connected to the realm of *epistemology*? Can we further connect epistemology to sonic experience?

Let us call upon the term *acoustemology* coined by Steven Feld in his essay, *A Rainforest Acoustemology*. Feld combines acoustics and epistemology into acoustemology, and endeavours to 'investigate the primacy of sound as a modality of knowing and being in the world.' For Feld, sound 'both emanates from and penetrates bodies; this reciprocity of reflection and absorption is a creative means of orientation—one that tunes bodies to places and times through their sounding potential.' He goes on to say that 'Hearing and producing sound are thus embodied competencies that situate actors and their agency in particular historical worlds.'<sup>12</sup> In this case, sound is indicated as a primary force within the world of the individual in terms of one's sense of existence within place, space, and time.

p r o p r i o c e p t i v e  
relating to stimuli that are produced and perceived within an organism, especially those connected with the position and movement of the body.

e p i s t e m o l o g y  
the theory of knowledge, especially with regard to its methods, validity, and scope, and the distinction between justified belief and opinion.

a c o u s t e m o l o g y  
a term comprised through the combination of acoustics and epistemology; the study of the relationship between the sonic dimension of perception and knowledge of the 'self'.

9 *Sonic Dominance and the Reggae Sound System Session*. Julian Henriques. in *The Auditory Culture Reader*. Michael Bull and Les Back. p. 458

10 *Ibid.* p. 458-9

11 *Listening to Noise and Silence*. Salomé Voegelin. 2010. p. 10

12 *A Rainforest Acoustemology*. Steven Feld. in *The Auditory Culture Reader*. Michael Bull and Les Back. p. 226

Having, to this point, mainly focused on sound as an audible phenomenon, might we now, in considering the overall power of sound, briefly examine sound outside the realm of human hearing capabilities? Even when inaudible, the power of sound can bear effect. There are three distinctions of sound to consider here, and they have to do with our threshold of hearing. Sound can either be beneath, within, or above that threshold.<sup>13</sup>

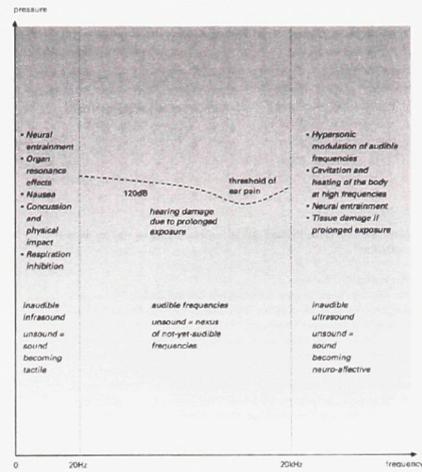
A diagram at the beginning of Steve Goodman's *Sonic Warfare* graphically depicts this. Human beings are capable of hearing sonic vibrations having frequencies between 20Hz and 20kHz. Below this range, we get infrasound, and above it, we get ultrasound. In short, for humans, infrasound allows sound to become tactile, while ultrasound allows sound to become neuro-affective.<sup>14</sup> Schafer writes about when sound goes below 20Hz and begins to engage our haptic sense, becoming tactile:

Touch is the most personal of the senses. Hearing and touch meet where the lower frequencies of audible sound pass over to tactile vibrations (at about 20Hz). Hearing is a way of touching at a distance...

That you can feel heavy bass response in some modern music vibrating inside the cavities of your body is one example of this phenomenon.

Ultrasonic sound is employed by a wide array of modern technologies for various purposes from ultrasonic cleaning, to medical ultrasound imaging. Since ultrasound is a mechanical vibration which can be focused at high frequencies, it is often employed in tissue therapy, due to its ability to heat localized tissue without affecting tissues surrounding the damaged area. Developing research is even using ultrasound technology to treat certain types of cancer.<sup>15</sup> However, the affect of inaudible sound can also be brought to bear in negative ways.

13 "sound." Encyclopædia Britannica Online. 2011.  
 14 *Sonic Warfare: Sound, Affect, and the Ecology of Fear.* Steve Goodman. 2010. p. x  
 15 "ultrasonics." Encyclopædia Britannica Online. 2011.



Thresholds of Human Hearing. Dave Goodman.

due to her extremely well developed haptic sense, profoundly deaf percussionist Evelyn Glennie has been able to teach her mind to hear sound through touching it. Rather, she is able to sense sonic vibrations on the surface of her skin, to the degree that she is even able to detect pitch. This allows her to play melodic percussion instruments such as the marimba, and even improvise with other musicians. Glennie's ability to touch sound is proof of sound's power to extend even beyond the ability to hear through the ears.



Evelyn Glennie playing Marimba.

Sound can be dangerous and can be employed for harmful purposes. Such forms the basis for Goodman's *Sonic Warfare*, the closing chapters of which engage with inaudible sound and its potential for negative affect, embodied in his term *unsound*, which he predicts will be used in future techniques of warfare. Of *unsound*, Goodman writes:

*Unsound* refers to the apparently paradoxical field of inaudible audio, infrasonic and ultrasonic...<sup>16</sup>

In beginning his discussion of *unsound*, Goodman describes a commercially available sonic weapon called the *Mosquito Anti-Social Device (M.A.D.)* 'which emits a high-frequency sound with an effective range of 15 to 20 metres, and is supposedly detectable only by youths.' Goodman describes how the M.A.D. is intended to be used by people such as shop owners wishing to fend off 'hooded youth'.<sup>17</sup> While perhaps disheartening, M.A.D. is a less extreme example of sonic weaponry than say, in the case of the Austrian researcher Dr. Zippermeyer's *Windkanone*, allegedly an experimental sonic weapon designed in the time of Nazi Germany to destroy Allied aircraft 'by generating an explosion in a combustion chamber and directing them through specially designed nozzles at their target'.<sup>18</sup> Then there are the rumours of experimental weapons currently being developed and tested for military use, employing infrasonic frequencies at 7Hz, a frequency which has been shown to generate sensations of fear and anxiety in animals, and which can move through armor and heavy concrete.<sup>19</sup>

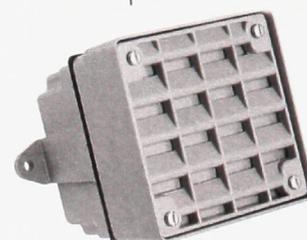
The intention of bringing this forth is not to employ any sort of 'sky is falling'/'doomsday' strategy, but rather, simply to acknowledge that sound is recognized, even outside the boundaries of audibility, from both positive and negative perspectives, as having power. Let us now

16 *Sonic Warfare: Sound, Affect, and the Ecology of Fear*. Steve Goodman. 2010. p. 184

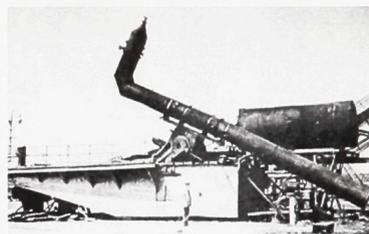
17 *Ibid.* p. 183

18 *Ibid.* p. 16

19 *Ibid.* p. 18, 206n - Ch. 3, n. 7



"The Mosquito Anti-Social Device"



Windkanone.

once again enter the realm of considering the power of audible sound and its potential phenomenological effects/affects on perception, with specific attention afforded to the experience of architecture and of space.

Rasmussen makes his return:

We are seldom aware of how much we can hear. We receive a total impression of the thing we are looking at and give no thought to the various senses that have contributed to that impression.<sup>20</sup>

In order that we might further understand the innate power of sound to augment our experience of architecture, as hinted by Rasmussen in the above excerpt, let us explore the argument outlined in *Spaces Speak, Are You Listening?* concerning audition and architectural space.

In introducing the concept of auditory spatial awareness, Blesser and Salter begin by describing the physical presence of sound:

Physical sound is a pressure wave that transports both sonic events and the attributes of an acoustic space to the listener, thereby connecting the external world to the listener's ears. Because the physics of sound is complex, transmission includes such processes as reflection, dispersion, refraction, absorption, and so on, all of which depend on the acoustic properties of the space....At one extreme of auditory awareness, there is only raw sensation....Farther along the continuum, the next stage is perception....At the far end...we find high-impact, emotionally engaged listening. In this case, sounds produce a visceral response, a heightened arousal.<sup>21</sup>

They continue the argument by describing the way in which sound can 'illuminate' architectural spaces via the occurrence of sound events:

On the one hand, just as light sources are required to illuminate visual architecture, so sound sources (sonic events) are required to "illuminate" aural architecture in order to make it aurally perceptible. On the other hand, we can think of aural architecture as simply modifying our experience of sonic events....Both perspectives are accurate.<sup>22</sup>

20 *Experiencing Architecture*. Steen Eiler Rasmussen. p. 224

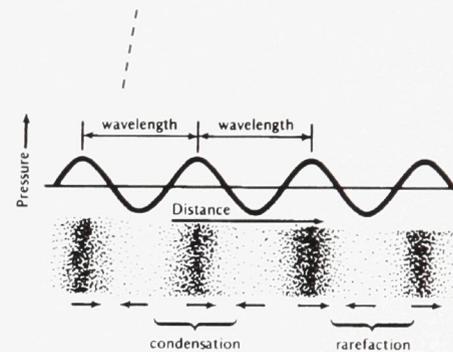
21 *Spaces Speak, Are You Listening?*. Barry Blesser and Linda Ruth Salter. p. 12-13

22 *Ibid.* p. 15-16



*A Synesthetic Space*. Credit: M. Edwards. Philadelphia, PA. 2007.

This space was engaging on many sensory levels. Visually it was captivating, a result of the many layers of visual texture. The olfactory sense was engaged due to the smell of ash, the space having been the victim (or benefactor, I'm not sure) of fire. The sounds from the surrounding exterior permeated through the open windows, which were devoid of glass, and turned the mostly vacant space into a resonant chamber. The presence of a burned piano conjured up the sounds of imagined music(s).



*Properties of Sound Diagram*.

Simply as an extended point of interest within the discussion of the power of sound, another example of sonic illumination occurs within the phenomenon of sonoluminescence, which is the emission of short light bursts resulting from miniature bubble implosions within a specific liquid of specific characteristics that is excited by sound. It was first observed by H. Frenzel and H. Schultes at the University of Cologne in an ultrasonic water bath in 1934, resulting indirectly from wartime research focused on marine acoustic radar.

"Sonoluminescence". Tech Mind.  
(<http://techmind.org/>)

Next, the idea of architecture requiring an intimate inner experience is put forth:

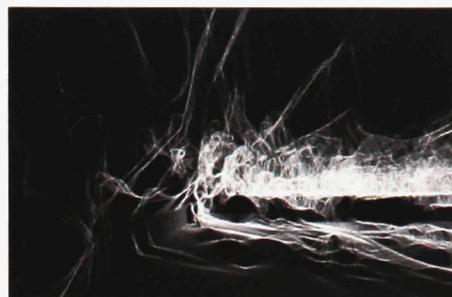
Architecture, like a giant, hollowed-out sculpture, embeds those who find themselves within it; it is to be apprehended from within....the environment responds as if it were a partner in an auditory dialogue. Snap your fingers, and the space responds. Whistle a note, and the space returns one or more echoes. Sing a song, and the space emphasizes particular pitches.... The listener is immersed in the space's aural response, and there is rarely a discernible location for that response. By responding to human presence, aural architecture is dynamic, reactive, and enveloping.<sup>23</sup>

Finally, a consideration is made concerning the experience of sound within space as it connects to memory:

Because experiencing sound involves time and because spatial acoustics are difficult to record, auditory memory plays a large role in acquiring the ability to hear space.<sup>24</sup>

It might be, however, that memory is not only important in hearing space, but that through *listening* to space, memory is engaged. Should not the Gothic Cathedral be remembered for the vastness and ethereality of its aural architecture as much as for its grandeur and scale, as experienced visually?

Sound matters. Though it has power, both audibly and inaudibly to act, as an affective force (in both positive and negative terms), its true power may reside in its tracing of spaces, acting as intermediary between bodies (e.g. the human body within the body of architecture), in centering our architectural spatial experience, aiding in our proprioception, affording us the intimacy with architecture that vision restricts, allowing us to absorb architecture through its reflection of sound. Our listening, in and to space, can provide us a gateway to architecture's song—a song which seems, to be too often forgotten...



*Nauru Elegies*. Shannon O'Neill. 2009.

[ME]: *Yeah, because it's kind of a symbiotic relationship right? Because when we make a sound, or if a sound occurs, in space, then that sound—let's say it comes from us—it leaves us, and moves out into the space, and it actually takes the form of the space. It's shaped by the space and then sent back to us, and then of course, it enters our ears, which, in turn, allows it to enter our mind, but also just physically, the vibratory forces of sound enter into our body and resonate through us in that way, s o ... ( p a u s e s ) it's like, our body is wrapped in the body of sound is wrapped in the body of architecture.*

[PO]: *Yes... that's right. I do feel that—agree with that.*

23 Ibid. p. 17

24 Ibid.

# THE FORGOTTEN SONG

52

---

I imagine now that I am both the singer and the song  
Or the speaker and the spoken  
Of a single word or tone  
That simultaneously, I am both the body  
From which the sound emanates,  
And the body of  
Sound itself...

pulsing **out** I

leave myself, and **go**

*i n t o t h e m e d i u m*  
and all directions

excited particles, **dance!**

before me, around me

nymphs of **æther**

**send** me to these surfaces

let most of **me** become **imprint...**

and some of **me** residue

now I am *memory of space*

trace **of form**

*o n c e a g a i n i n t o t h e a i r*

but

somehow **changed**

**altered** by encounter of boundaries

into body, into *r e - e n t e r i n g*  
ears, into  
*mind and reborn*

but

53

into **flesh** also

v i b r a t i n g

through **muscle**

and **bone**

finding small caves

re-sound-ing through resonance

passing

through

**myself**

and onto **floor**

**reflect**-ing back to

**walls...**

**r e p e a t**

**r e p e a t**

r e p e a t

r e p e a t

r e p e a t

until *I am* no more.

---

---

Sing to me oh forgotten song  
Illuminate space and sense of self  
Place, simultaneously  
Inside and  
Outside and  
I n s i d e  
Eyes closed I try  
To see more.  
Has it not been said  
That it is easier for a camel to pass  
Through the  
Eye of a needle  
Than for one with too much  
Concern for the  
Eye to truly see?  
My Goethe, my Goethe  
Why hast thou forsaken me?  
Thou hast professed  
That my  
Spaces are frozen?  
That music here  
Has ceased?  
P l e a s e  
Tell me that you  
J e s t  
What could be less true?

---

---

Why

Have we closed

Our ears?

Do we not know that there can be

Music in any sound?

Do we not know that there is

Power in every sound?

To listen is

May be

To find

Oneself?

Listening

In space

In place

In identity and

Memory

If

I am sitting in a room

Why

Has the song been

Forgotten?

---

## ***INTERLUDE II***

*iSpace is a virtual space created and influenced by sound(s) and music(s) which are removed from the actual surrounding auditory environment and listened to by way of a stereo audio device, the most prominent example of which, in the world today, is the iPod. iSpace can be dangerous...*

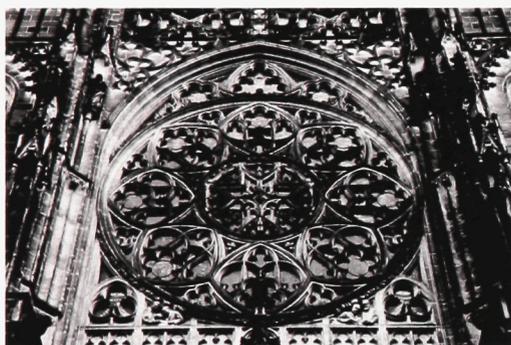


The Original iPod.

## *iSpace: THE iPod PHENOMENON & AURAL EXPERIENCE*



St. Vitus Cathedral. Exterior. Prague, CZ. 2010.



St. Vitus Cathedral. Exterior Detail 01.



St. Vitus Cathedral. Exterior Detail 02.

*Gothic Cathedrals are perhaps among the world's greatest built spaces. While in Prague recently, I was able to visit the St. Vitus Cathedral—certainly one of the more magnificent examples of Gothic construction—and while I have always held a great admiration and appreciation for this kind of architecture on a visual level, in my encounters, I have found the aural qualities to be equally fascinating.*

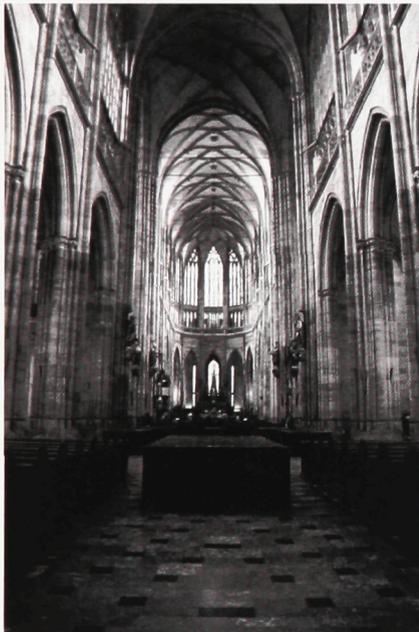
*In particular, I find myself unable to truly appreciate the immensity of a Gothic Cathedral through vision alone, so once inside and having ingested a satisfying portion of the sumptuous visual feast of St. Vitus, I closed my eyes and began to listen. A short while into my listening, a faint rhythm and guitar riff caught my ear. Half disturbed and half intrigued, I opened my eyes in the direction I had heard the foreign sound and noticed a girl staring up into the ceiling spaces, donning the familiar white 'earbud' headphones and gently bobbing her head. I scanned my immediate area, and was able to count six more people who were doing the same—listening to something other than the Cathedral itself. At first, witnessing this made me feel as though perhaps those people had stopped caring about sound, but I have since come to view the situation in a different manner.*



St. Vitus Cathedral. Exterior Detail 03.

lo-fi is an abbreviation for low fidelity, that is, an unfavorable signal-to-noise ratio. Applied to soundscape studies a lo-fi environment is one in which signals are overcrowded, resulting in masking or lack of clarity.\*

signal-to-noise ratio is a measurement of how much a given signal (important information conveyed through sound) is distorted by noise (unwanted sound)



Interior of St. Vitus Cathedral.

\* The Soundscape: Our Sonic Environment and the Tuning of the World. R. Murray Schafer. Glossary. p. 272

It might not have been that they had lost interest in sound (they were listening to music after all). Maybe they simply lacked interest in, or appreciation for the sound(s) they would have heard had they not been listening to their iPods. The consequence, however, was that they were standing in the nave of St. Vitus, seemingly unaware that they had removed themselves from perhaps the most intimate aspect of the space by not listening to it. Why had they chosen a music other than the music of St. Vitus? This was not an avoidance of sound, but rather, a voluntary superimposition of auditory experience—a deliberate removal from the space of St. Vitus and transportation into iSpace. Where had this desire come from?

[ME]: I visited the Prague Cathedral when I was studying abroad... and there were six or seven people that I saw... who were I looking at the space but listening to their iPods, and I just felt like...

[PO]: (chuckles) what's going on? (chuckles)

[ME]: ...yeah, 'you're missing it', you know? 'You're missing it'.

[PO]: True.

Since the inception of the Industrial Revolution, the growth of this phenomenon has been an inevitable reaction to a steady increase in the levels of noise pollution and a changing of keynote sounds throughout the world, as Schafer writes in 'The Soundscape'. In a section devoted to The Industrial Revolution, Schafer says that this has resulted in lo-fi soundscapes, the ultimate versions of which are ones in which

**SIGNAL-TO-NOISE RATIO (SNR)**

The sound level at the listener's ear, above the background noise level.

If the Signal at listener's ear is 47 decibels and the background Noise level is 45 decibels, the S/NR = +2 dB

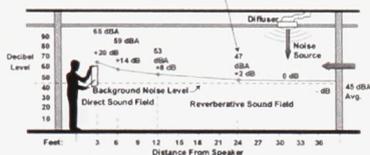
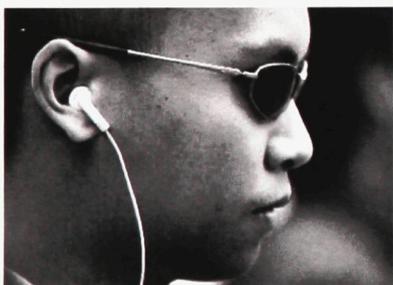


Diagram depicting Signal-to-noise Ratio



New York City Traffic.



Man wearing 'earbud' headphones.

'...the signal-to-noise ratio is one-to-one and it is no longer possible to know what, if anything, is to be listened to.'<sup>1</sup>

The keynote sounds of most major cities, consequently, have been growing less and less individual, and signal-to-noise ratios continue to approach one-to-one, the more mechanized and sonically polluted our world becomes.

What we hear most of within cities are the abundant sounds of traffic<sup>2</sup>, and save for differences such as the types of sirens heard, it is becoming more and more difficult to hear or appreciate their sonic differences. Might this trend help to explain the apparent increased desire of those who live within cities to find ways to tune them out? If society had indeed been searching for a way to tune out, the iPod provided the ideal transport vehicle.

In a New York Times article titled 'The World at Ears' Length', Micheal Bull, who was, at that time at least, the world's leading expert on the social impact of music based stereo devices, is also co-editor of 'The Auditory Culture Reader', and who has studied both the Walkman and the iPod said that the iPod was altering urban life.<sup>3</sup>

"The potential for continual play means you never have to tune in to the environment you're in... you're perpetually tuned out."<sup>4</sup>

The world was told on October 23, 2001 that "With iPod, listening to music will never be the same again" by Steve Jobs, Apple founder and CEO, at its official launch<sup>5</sup>. Since then, we have

1 The Soundscape: Our Sonic Environment and the Tuning of the World. R. Murray Schafer. p. 71

2 Ibid. p. 84

3 The World at Ears' Length. Warren St. John. Article. New York Times. Feb. 15, 2004

4 Ibid.

5 <http://www.apple.com/pr/library/2001/oct/23ipod.html>

seen the increasingly prevalent, and in many cases dangerous, effects of what began as just "1,000 songs in your pocket."<sup>6</sup>

A 2008 TIME article states that approximately 55 million people within America (approximately 30% of the population) had, by that time, caused permanent high frequency hearing damage due to overexposure to music that was listened to too loudly, for too long, too close to the delicate organs of the inner ear. 'Earbuds' are placed much closer to the inner ear than larger headphones which sit on the periphery of the auditory system, and are more dangerous as a result. A more recent study, published in 2010 in the Journal of the American Medical Association, has shown that since the birth of the iPod, there has been a 31% increase in the number of American adolescents with hearing damage due to sustained listening to music. Damage to our hearing has not, however, been the only consequence.

We are so much more reliant on sonic information to navigate our environments than we often acknowledge, or perhaps are even aware of, and closing ourselves off from, or being ignorant of that fact has resulted, in several instances, in injury or death. Advertisements such as the ones shown adjacent, which were released by the New South Wales Police Force in New South Wales, Australia in 2008, depict bodies strewn across



NSW Police Force Pedestrian Awareness Ad Campaign. 2008.

[PO]: Certainly, listening was more acute—maybe—more acute by people who live in, say, a jungle environment, where listening is, you know, very important in survival. I mean, listening is important for survival in the city, as well. Some people who are wearing earbuds, you know, are endangered... They're very endangered and there have been some tragedies..

asphalt, their iPods beside, the cords of 'earbuds' tracing their profiles, clearly



*Distracted Runner Crossing Street.*

hi-fi is an abbreviation for high fidelity, that is, a favorable signal-to-noise ratio. Applied to soundscape studies a hi-fi environment is one in which sounds may be heard clearly without crowding or masking.\*\*

[ME]: *Do you think... the world, in general, has forgotten how to listen?*

[PO]: *Well, I think the world is learning how to listen.*

*linking auditory distractions to fatalities and responding to a growing trend of iSpace related tragedy.*

*In January, 2011, State Senator Carl Kruger, of Brooklyn, New York expressed desire to place a ban on pedestrians using any electronic device while crossing the street.<sup>7</sup>*

*I wonder (is this iWonder?) if the widespread present phenomenon of people desiring to tune out of the real world and into iSpace could have been avoided had there been more sensitivity afforded to thinking about how technological advances would affect sonic environments? Could the soundscapes of our cities have been saved? Could our advancements have been orchestrated in such ways as to maintain hi-fi soundscapes along the way?*

*Perhaps, now that the world soundscape is what it is, instead of asking 'could there have been?' or 'what could have been done?', it will be more important for us to ask, 'can there be?', and 'what can be done?'.*

*Can there be an opportunity now for a revival of the world soundscape? Can the soundscapes of our cities be saved? Can we now become more sensitive to*

*how we affect our sonic world? Can we now orchestrate further advancements in such ways as to move back toward hi-fi?*

*What can be done to affect this change? Is now the time for healing?*

7

*States' Lawmakers Turn Attention to the Dangers of Distracted Pedestrians.* Susan Saulny & Matt Richtel. Article. Originally published in New York Times. January 25, 2011.

# MOVEMENT III

*Still the noise in the mind: that is the first task—  
then everything else will follow in time*

*R. Murray Schafer*

This movement begins with a summary of the entire composition, to this point, and questions whether now is the time for healing within the world, concerning ailing soundscapes and an epidemic of ocularcentric dependency. It then examines [OPENSTRUCTURES], a composition in which the intimate connection between sound and space is demonstrated through a visceral experience involving both music and architecture. Finally, it moves into a proposal for a new S.o.A.L., or *School of Advanced Listening*. The S.o.A.L. aims to act as a catalyst in bringing about a paradigm shift in the way the world thinks about sound. Its intended to function as an acological agent toward the creation of a situation where the music(s) of spaces and places are carefully listened to and appreciated, enhancing the architectural experience in the process.

**A TIME FOR HEALING  
[ OPEN STRUCTURES ]  
BEARING THE S.o.A.L**



*Snow Falling. Bebenhausen, Germany. 1998.*

*I,  
Stood there beguiled...  
Eyelids shut, breathing shallow  
Daring neither to whisper, nor swallow...*

*And,  
First thought it silence, but no!*

*No! No! Silence, it was not  
With pungent joy my heart was fraught  
To hear a music*

*I,  
Now know,  
As symphony of falling snow.*

# A TIME FOR HEALING

Although the world is full of suffering, it is also full of the  
overcoming of it.

- Helen Keller<sup>1</sup>

## THE PANTHER

Rainer Maria Rilke. Trans. by Albert Ernest Flemming.

*His tired gaze—from passing endless bars—  
has turned into a vacant stare which nothing holds.  
To him there seem to be a thousand bars,  
and out beyond these bars exists no world.*

*His supple gait, the smoothness of strong strides  
that gently turn in ever smaller circles  
perform a dance of strength, centered deep within  
a will, stunned, but untamed, indomitable.*

*But sometimes the curtains of his eyelids part,  
the pupils of his eyes dilate as images  
of past encounters enter while through his limbs  
a tension strains in silence  
only to cease to be, to die within his heart.<sup>2</sup>*

Perhaps we are like Rilke's Panther, held captive by the multitudinous bars of our world's resistance to listen, our perceptive capacities limited by the eye's desire for sovereignty. Somewhere though, deep within us, it may be that there is a strong will to listen that refuses to be tamed and need only lie in wait until some strange and beautiful music enters into the space of our containment, into us, dissolves barriers and sets us free.

It has been suggested that there is a potential for music to be all around us, since there can perhaps be music in any sound. The act of listening can be enhanced through practice and can be further appreciated as a result of sound being present everywhere and within everything, including spaces of near silence, which, far from separating us from sound, presents us instead with a potential opportunity to listen to an inner

<sup>1</sup> *Optimism*. Helen Keller. Essay, part I: Optimism Within.

<sup>2</sup> *Rainer Maria Rilke: Selected Poems*. Trans. by Albert Ernest Flemming, p. 110



embedded symphony of self within our eigentones. The notion of sound being inherently tied to space and place, and also to memory and proprioception, has been explored as well as has its innate power. For some (e.g., sound artists, musicians, sound theorists) sound is vitally important. For most however, resulting from an obsession with the eye, it may be that sound continues to be taken for granted. As a consequence of this, the soundscapes of the world continue to descend further into lo-fi status, through the constant machination and technologizing of its multiple environments. This has perhaps been partially responsible for leading to the (apparent) societal desire to tune out the 'real' world of sound and tune into iSpace. Varying definitions of noise have led to noise abatement strategies that do not consider the qualities of sounds being cancelled or preserved, forsaking these considerations for volume calculations alone. The resultant question arises: *Is now the time for healing?* Can we employ some measure of acology in order that we can heal soundscapes, heal listening, cure ocularcentric thinking?

Even in 1977, when Schafer wrote *The Soundscape*, fourteen years prior to birth of the internet<sup>3</sup>, and resultant technological acceleration, which has seen the epidemic of ocularcentric dependency worsen, he sensed that the world needed to focus on listening.

Introducing *The Soundscape*, he writes:

The soundscape of the world is changing. Modern man is beginning to inhabit a world with an acoustic environment radically different from any he has hitherto known. These new sounds, which differ in quality and intensity from those of the past, have alerted many researchers to the dangers of an indiscriminate and imperialistic spread of more and larger sounds into every corner of man's life. Noise pollution is now a world problem. It would seem that the world soundscape has reached an apex of vulgarity in our time, and many experts have predicted universal deafness as the ultimate consequence unless the problem can be brought quickly under control.<sup>4</sup>

3 "internet" Encyclopædia Britannica Online. 2011.

4 *The Soundscape: Our Sonic Environment and the Tuning of the World* R. Murray Schafer. 1977, 1994. p. 3

In the late 60s and early 70s, Schafer established the World Soundscape Project at Simon Fraser University, where he was teaching at the time. Set up initially as an educational and research group, the World Soundscape Project has since inspired many to think about and better appreciate sound.



*The World Soundscape Project Group. 1973.*  
(Schafer on the left)

Schafer, recognizing the immense contribution of the Bauhaus, calling it 'The most important revolution in aesthetic education in the twentieth-century...' speculated that the world was in need of a movement, tantamount to that of the Bauhaus, for sonic studies.

An equivalent revolution is now called for among the various fields of sonic studies. This revolution will consist of a unification of those disciplines concerned with the science of sound and those concerned with the art of sound.<sup>5</sup>

He advocates *soundwalks*, which are sonic explorations of the soundscapes of given areas. He writes of using the voice to sympathize with and draw out eigentones of various empty spaces; implementing *ear cleaning* within schools. He believes the modern architect should afford a greater deal of concern to aural design in combination with designing visually. He says that one primary task of the *acoustic designer* should be to consider the preservation of *soundmarks* as fundamental. He also surmises that Western culture needs to move away from the fear of quiet and toward a state of appreciating sounds within 'silent spaces', referring to this state as *positive silence*.<sup>6</sup>

Society's reaction to the growing volume of the city, and increase in unwanted sound(s) has been to implement (so-called) noise abatement laws. The range of noise abatement strategies varies widely around the world, as highlighted by Schafer in a systematic breakdown shown in the chapter of *The Soundscape* devoted to noise, but the common bond shared between them seems to be the notion that sounds, as previously indicated, should be qualified based primarily on decibel levels, as opposed to aesthetic qualities.

This is perhaps the wrong strategy, and parallels, as Patrick Guinan writes in *Toward a More Natural Medicine*, that of contemporary Western medicine, which focuses on masking symptoms as opposed to treating the underlying cause of illnesses, the latter method having been prominent

5            ibid.

6            ibid. p. 213-59

e a r  
c l e a n i n g  
a systematic program for  
training the ears to listen  
more discriminatingly  
to sounds, particularly  
those of the environment.

a c o u s t i c  
d e s i g n  
(according to Schafer) acoustic design at-  
tempts to discover principles by which the  
aesthetic quality of the acoustic environ-  
ment or soundscape may be improved.

s o u n d m a r k  
derived from landmark and referring to a  
community sound which is unique or  
possesses qualities which make it specially  
regarded or noticed by the people in that community

in Hippocratic times when the physician was regarded as an assistant to nature, and which still permeates Eastern doctrines today.<sup>7</sup>

Healing the wounded world of sound, then, perhaps should be considered in different terms than it is currently. Perhaps noise abatement has run its course. Instead, the current situation might call for an implementation of education about sound and about listening in order that in the future, the discriminate ears of attentive listeners can become the instruments through which those sounds desired to be preserved and those to be eliminated in any given soundscape can be decided upon.

Where does architecture feature? Is it not that architecture provides a framework for our existence? Does it not then also frame a large portion of our aural experience?

# [ OPEN STRUCTURES ]

[ OPEN STRUCTURES ] was conceived as a composition of both music and architecture intending to reveal the intimate and indivisible relationship existing between sound and space through providing a visceral, one-to-one experience of both in tandem as they simultaneously and sensorially engage us. It was written for two cellos, two violins, two guitars, one viola, one voice and several open spaces. The musical portion of the composition is comprised of layered repetitive patterns, with a different pattern chosen for each individual instrument. Each instrumental part was written for open strings. An overall polyrhythm was established through rhythmic layering. The natural polyrhythms of the body were a partial inspiration for this choice (e.g. heartbeat rhythm against breathing rhythm against walking rhythm etc.). The architectural portion of the composition was embodied through a careful selection of spaces which were intended to showcase varying spatial and sonic characteristics. The spaces were scored in parallel with the musical score, borrowing musical scoring strategies, as can be seen on the following foldout.

[ OPEN STRUCTURES ] was conceived to be a moving performance, and it moved through these spaces, with cellists, violinists, guitarists, and violist each playing their respective repetitive musical structures. Repetitive structures were chosen in order that there would be a somewhat constant nature to the written music, and it was hoped that instead of focusing on changes within that written music, listeners would focus on how each new space/spatial condition affected the experienced music. The musicians were interspersed throughout the group of listeners in order to bring the listeners directly into the centre of the performance. While the string players and listeners were moving and playing through changing spaces, a soprano vocalist remained fixed within the final



Musical strings can either be played closed or open. To refer to an 'open' string is simply to refer to a string which is in its natural tuning and length without placing an object (e.g. finger) along the string to affect its effective vibratory length. As an example, if you use one hand to bow across a violin, or strum a guitar without using the other to 'close' the strings by pressing down upon them in various places, you will be playing the open strings.



p o l y r h y t h m  
a rhythm which makes use of two or  
more different rhythms simultaneously.



space. Since her position was fixed, she was permitted to construct a dynamic melody articulated through a given pitch collection, which was comprised of tones gathered from the open tunings of each of the other instruments. Her voice was projected out into another space along the path of movement for the other performers and listeners. It was intended that the moving component of the performance would meet with the singer's projected voice at a certain point within the performance and then depart from it again, hopefully leaving listeners curious about the source of the voice, and thus attentively listening in order to attempt to discern its location while they were within that space of meeting. The space within which the singer was performing was closed off to anyone but her until the moving performers arrived and entered the space, along with the listeners, which allowed for a final apotheosis wherein strings and voice were brought together for a while until one by one, each instrument was removed from the overall sound envelope, leaving just the voice to close out the performance with a few carefully selected and articulated tones.

Typically, one space is chosen for a performance and in the case of the concert hall, that space may be altered in various ways in the approach what is considered to be an ideal condition of listening. [ OPEN STRUCTURES ] aimed to highlight the nature of varying spaces and how they affect the experience of sound through allowing them to change during the performance. Perhaps this is another kind of ideal condition, since it allows each space to come forth as an active participant in the overall performance. The singer within a fixed space was a condition set up as a reference to traditional performance and thus as a means of contrast against the dynamic spatial nature of the moving component of [ OPEN STRUCTURES ]. The projection of the singer's voice into a space distinct from the source space was intended to refer to recorded music that can be transported and experienced within any space a listener chooses. [ OPEN STRUCTURES ] was intended to be a precursor to the S.o.A.L.



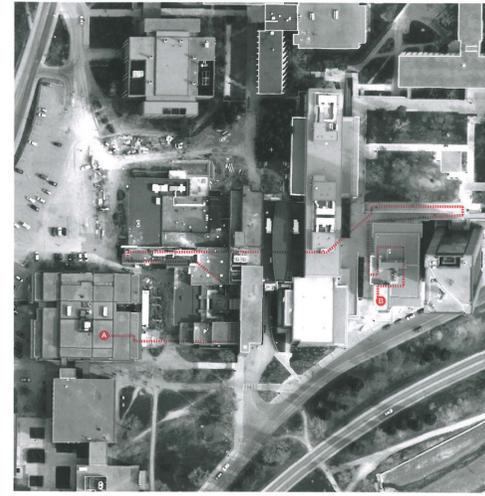
# OPEN STRUCTURES

FOR TWO CELLOS, TWO VIOLINS, TWO GUITARS, ONE VIOLA, ONE VOICE and SEVERAL OPEN SPACES

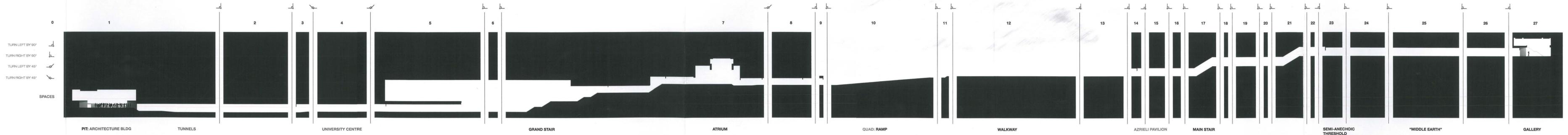
Sound and space are inherently bound to one another. The phenomenological experience of space relies heavily on the sonic dimension of perception. This composition of music and architecture aims to reveal that innate connection through providing a visceral, one-to-one experience of both space and sound / architecture and music as they simultaneously and sensorially engage us. The piece moves through a series of spaces, beginning with the PIT area of the Azrieli School of Architecture & Urbanism at Carleton University, ending in the GALLERY space of the Azrieli Pavilion, encountering TUNNEL spaces, GRAND STAIRWAY, an ATRIUM space within the University Centre, as well as outdoor spaces in and surrounding the University QUAD area, as well as a few other interstitial spaces along the way. Sound waves propagating from the instruments move into the spaces, constantly being shaped by them, returning through reflection back to the performers and listeners. In doing so, they act as messengers, transporting the ghosted aural images of the forms of the spaces, through the ears and into the minds of the listeners. The sound waves also penetrate flesh, vibrating inside of the bodies of the listeners, finding small cavities to further resonate inside of. The relationship that exists between the bodies of sound and space is reciprocal, and when the human body enters into a space, sound acts as an intermediary. To be within space is to be within sound. It is to have the body of flesh, wrapped in the body of sound, wrapped in the body of architecture. We often disregard the aural dimension in our thinking of experience, taking it for granted, being instead caught up in oculocentricity, and by doing so we limit our potential perceptive capacity. By not actively listening to sound (within spaces or otherwise), our aural acuity diminishes. This leads to further dependence on the eye, causing our exclusion from the most intimate dimension of spatial experience. Sound is the vehicle through which architecture is able to enter into us. The written musical components of OPEN STRUCTURES vary in their strategy depending on the relationships of performers to space. The cellists, violinists, guitarists, and violist comprise one portion of the performance as they move through the spaces. The vocalist waits in the final space, singing a solo in fixed position. With respect to the performers who are moving, since their spatial experience is dynamic, their written music is fixed. In contrast, since the vocalist's position is fixed, she is permitted to construct a dynamic vocal solo within a given pitch collection, based on the open strings of the other instruments, for which their parts are written. Within the final space, all performers meet in spotholds, celebrating that space as well as the intrinsic connection of all sounds to all spaces.

boundary  
 pulsing  
 perception(s)  
 song(s)  
 space(s)  
 self  
 auditory  
 vibrator(s)  
 place(s)  
 architecture(s)

time  
 sound(s)  
 (re)sounding  
 structure(s)  
 form(s)  
 resonant  
 reflection(s)  
 aural  
 vibrating  
 music(s)  
 proprioceptive  
 boundaries



Musical score for Cello 1, Cello 2, Violin 1, Violin 2, Guitar 1, Guitar 2, Viola, and Voice. The score is written in a grand staff format with various dynamics (p, mf, f) and articulations (accents, slurs, breath marks). The voice part is a solo with a pitch collection indicated below the staff.



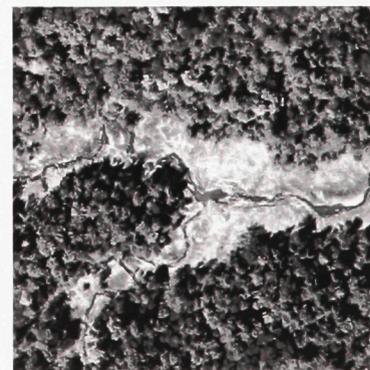
# BEARING THE S.o.A.L

All sound heard at the greatest possible distance produces one and the same effect, a vibration of the universal lyre, just as the intervening atmosphere makes a distant ridge of earth interesting to our eyes by the azure tint it imparts to it. There came to me in this case a melody which the air had strained, and which had conversed with every leaf and needle of the wood, that portion of the sound which the elements had taken up and modulated and echoed from vale to vale. The echo is, to some extent, an original sound, and therein is the magic and charm of it. It is not merely a repetition of what was worth repeating in the bell, but partly the voice of the wood; the same trivial words and notes sung by a wood-nymph.

- Henry David Thoreau, from *Walden*<sup>1</sup>

*Vehicles were not permitted. Once you had come to the outer edge of the forest, you made the rest of the journey on foot. You had to approach from the West, along a designated path. Just prior to entering the forest, you came to an open frame made of concrete. The space inside of the frame was taller, wider, and deeper than that which would normally be occupied by a set of doors, but not by much. This was a threshold symbolizing your transition inward toward the S.o.A.L and the state of active and attentive listening, along with quietude which you were requested to observe once inside. Of course, it would have been possible to pass on either side of the frame, but such act would have been held as violation.*

*Once through the threshold, you followed the path through the forest until you came to the place where you passed by the two streams that joined and ran on together, lovers united, babbling, gurgling, splashing happily along. They carried the wind on their backs, and you could sense the anticipation of leaves that hung on the bank bordering trees, suspended and awaiting that*



gentle lick, the resulting rustle. Of course there were times when it was not so tame. It would come through, rushing, screaming, causing that wild dance of limbs, those long sighs of the forest. Further in, and especially when the air was still, you could hear the quiet conversations of the trees, their whispered histories. As you approached the inner edge of the forest, you could hear the sounds changing, sense that everything was about to open up.

It was nestled there in the meadow, surrounded by layers of birch, maple, poplar, pine. Drawn out along a Southwest Northeast axis, the subsequent volumes were articulated as though they were placed along a line, or perhaps staff paper. There was clearly a visual music present. You could sense that, to be sure, but you also were aware that this was a place of other music(s) and of listening.

I remember seeing it for the first time, and how I could hear faint tones in the distance. I remember wondering if they were coming from where there appeared to be strings stretched between the top of a dome structure and a large, curved, slanted wall which was off of the main axis. This of course was true. I now know this space as the **garden of winds**. Beneath the strings there is an array of open cylinders of varying diameters which are embedded into the ground at their base and rise above it at differing heights. There are spaces to walk between these, when you are in the garden. When the wind blows across their openings, the air inside them dances, and they produce tones. The strings above are Aeolian strings, played by the wind as well, named after the god Aeolus.

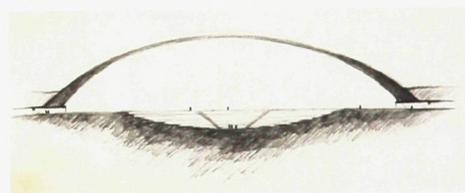
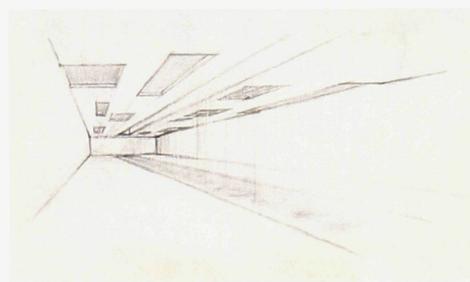
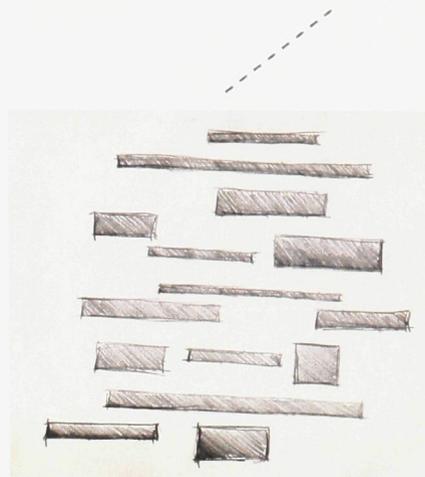
There are two other gardens as well. The second garden of the three is the **garden of falling leaves and falling snow**. I had never the mind, prior to experiencing it firsthand, to imagine such music that was possible from these phenomena! To be able to hear individual snowflakes gently come to rest upon the bed of collective snow, or symphonies of leaves falling around me. They can be surprisingly audible if you are listening well.



The third garden is the **garden of singing ice** which I always try to picture from above for some reason. It is a rather large garden, and contains several shallow pools of water, of varying dimensions. This garden captures a very special natural phenomena during the early stages of Winter. I can recall walking through the garden at that time of year when all conditions are just right, and as crystals of ice begin to form on the surface of the water, they send out their music. Because each pool is a different size, each emits its own unique tones. It might be that only one pool sings in solo, or that many pools sing together in harmony. I hope to someday hear the full choir of collective pools singing together. Perhaps this year...

I would have to say that my favourite inner space is the **rain theatre**. When it rains, the central portion of the roof can be opened in order to allow the rain to come through and fall into an interior pool. At night or in the evening this is particularly nice because all of the lights are turned out except for ones positioned to shine parallel to, and over the water's surface. This allows the disturbances caused by raindrops, articulated on the surface of the water to be caught by reflected and refracted light and carried up to dance and play on the inner surfaces, which are white in order to best capture this. As well, portions of the ceiling are removed, with a different material filling each, as each will respond to rain drops in a unique way, thereby producing unique sounds.

Then there is the **great dome**, which is a large space in which you can have whispered conversations across the distance separating one side from the other, provided you and the other are standing in the right places. This space is also used for group chant. It is truly amazing to hear everyone's collective voice resonate and reverberate within the dome.

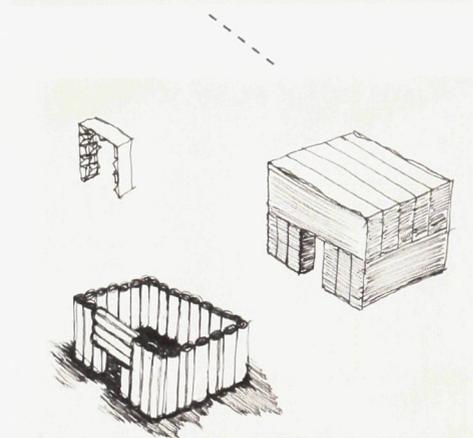
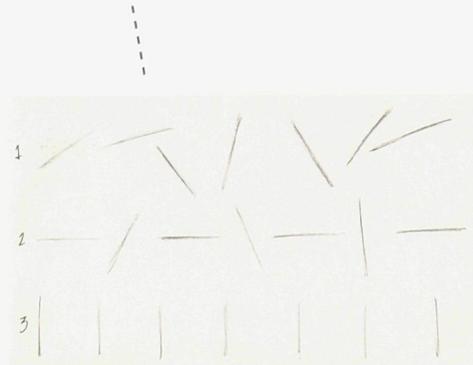
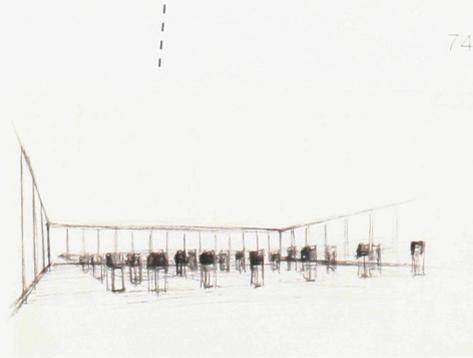


There are many other inner S.o.A.L spaces as well. Among them, there is the **gallery of found sounds** in which we are able to have recordings we have made of interesting sounds we are able to find (which is part what we do to study sound and listening) played inside of any number of small black boxes, which populate the space in a large matrix formation. Each box is secured to a vertical support structure, and has a lid which can be opened just enough to be able to hear the sound(s) emanating from within. I enjoy spending time in this gallery and choreographing the opening and closing of different boxes with other students in order to create musical composition within the gallery space.

There are also various spaces in which we are able to configure materials/forms/surfaces differently and experience how the changes we make affect our spatial and sonic perception and experience is altered as a result. We call these spaces **sonic experimentation theatres**. One time we had access to a large quantity of industrial felt, and since felt absorbs so much sound, we used it to construct a variety of very quiet spaces inside of the theatre. We called them **felt spaces**.

All of the circulation spaces between main interior spaces are semi-anechoic. While sound is still able to reflect from the floor surface, these interstitial spaces are still able to cancel out the majority of reflected sound, allowing for a cleansing of the aural palate between spaces, in order that the unique sonic characteristics of each can be distinguished and listened to. These spaces act as extended **semi-anechoic thresholds**.

We also sleep in **anechoic chambers**. At first this was terrifying! It was foreign and disorienting to hear sounds emanating from inside of your body, and to feel as if the space were collapsing around you, growing ever smaller, but after a while, through conditioning this experience became quite pleasant. It allows you to wake each day with new ears ready to greet an ever present and ever changing world of sound.



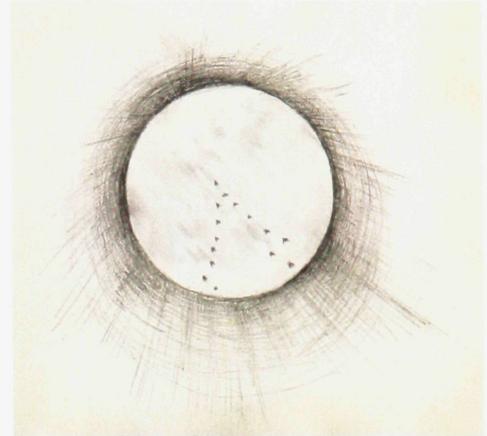
*I must tell you also of an experience I had one time within the **underground cistern**. I was once inside of the cistern in mid Autumn, engaged in active listening, when a flock of geese flew overhead and their calls filled the concrete cylinder and resounded around me. I listened to their approach, their passing over, and continued to listen until the last faint morsel of their sound had travelled with them along their path and had left the space of my perception. Sound resonates within this cistern for over thirty seconds, which allows for quite an interesting sonic experience.*

*I have learned so much within the S.o.A.L. I have found new ways to listen and to appreciate sound as part of my experience and my senses of self, space(s), place(s), and time(s). I imagine that when the time comes for me to return to the world outside of the S.o.A.L, I will find that it is a deaf place—a place that needs the same kind of healing I have found here. I will do my best to pass on what I have learned...*

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The S.o.A.L aims to be a cleansing agent against the constant barrage of sonic pollution within the current urban environment. In a way, students of the S.o.A.L undergo a sort of detoxification as part of their awakening to sound.

From varying perspectives, this can be considered to be both a very new and old type of school. Its aim is new, but its style of pedagogy draws more from the monastery than the academic institution. Its acological approach takes the form of teaching for future betterment as opposed to masking for present and temporary relief. There are no degrees, no certifications—only an opportunity for aural awakening. There are no age or experience based restrictions and no set amount of time is required in order to move through the various stages of teaching within the school, which are directed, as are all other elements within the S.o.A.L, toward one central purpose: to teach a higher, or advanced form of listening for the purpose of affecting



eventual changes beyond its borders.

This is a listening that requires practice, attention, patience. It is a transformative type of listening that will forever alter the way any space or environment is experienced thereafter by someone after having gone through the process of learning to hear with renewed ears and listen with renewed minds.

Once students enter the S.o.A.L, they are encouraged to remain there until they have reached the highest level of listening possible within the school, though no one is kept against their will. Students spend the time of their learning in the secluded monastic site, cleansing themselves of the effects of urban sonic pollution which have caused them to 'tune out'. They progress, as they are ready, through a series of stages of advanced listening by engaging with multiple spaces and environments of sound.

They learn to listen to auditory events and phenomena taken for granted (and thus not listened to) in the urban environment—sounds such as those of singing birds, of falling leaves, of falling rain, of falling snow, of creaking trees, of freezing, singing ice, etc. These sounds are grouped into categories comprising the various stages of aural awakening. The highest achievable stage is one in which only the quietest sounds are included, or rather, those sounds which require the most advanced listening in order to perceive. These might be sounds such as that of a single snowflake or feather falling to the ground.

As part of this learning, students of the S.o.A.L are requested to observe a state of quietude, which fosters attentive listening and the development of aural acuity. There are specific daily periods during which this does not apply, in order that students do not forget their voice.

Once students have achieved the highest possible level of advanced listening, they must depart from the S.o.A.L and return to the urban environment, their continuing task

[M]: *So, what is the—what would you say is the most amazing sound you've ever heard?*

[P]: *Oh... (pauses) Hmm... the most amazing sound I've ever heard?... oh... hmm... Well, in a way, hearing a loon, for the first time, you know, was, I think, extraordinary, and I still love that sound.*

there to be educators themselves to others about listening, sound, spatial experiences, soundscape preservation, etc., helping to carry forth the doctrines of the S.o.A.L and participate in the resultant resonant acology.

Where does architecture feature within this acology? Many of the spaces of the S.o.A.L contain or emphasize sounds which can be found in the surrounding natural setting. While this might seem redundant, or even unnecessary, since students are encouraged to spend a significant portion of their time immersed in the natural world, it is an attempt to demonstrate how architecture can be used to frame interesting sonic phenomena, and perhaps more importantly, how interesting naturally occurring sonic phenomena can be harnessed as devices for generating architecture(s). Through the interaction and experience of architectural and natural spaces/environments of the S.o.A.L, students will come to appreciate every new space/environment they encounter with a different type of listening, which will augment each new spatial experience they have once outside of it. Furthermore, as part of their task to be educators, they can advocate for better spatial design within the spaces of the urban environment, outside of the S.o.A.L and also outside of those spaces for which acoustics are already considered, such as performance/sound research spaces.

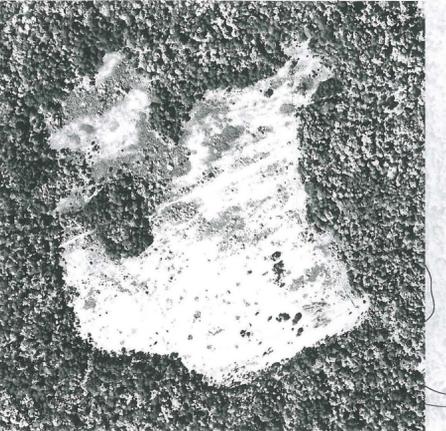
The S.o.A.L is comprised of a forested site with central meadow in the east of Ottawa, near Rockland. Drawing from instrument design, and aiming to use the term *instrument* as a double entendre, the main body of the S.o.A.L is articulated along a line. This linearity allows for the varying forms of the S.o.A.L to be arranged in such a way as to take the form of a composition themselves. The combination of visual aesthetic strategies, and imagined sonic aesthetics allow the S.o.A.L to embody the kind of partnership between the eye and ear—between visual and aural design and consideration(s) that architecture is perhaps currently lacking.



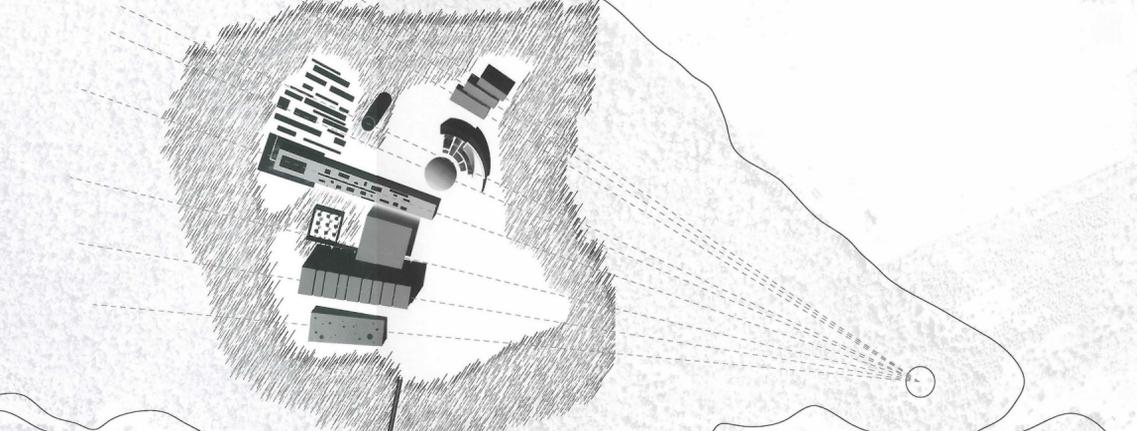
SK 01 SK 02 SK 03 SK 04 SK 05 SK 06 SK 07 SK 08 S.O.A.L. THRESHOLD SK 09 GARDEN OF FALLING LEAVES & FALLING SNOW 01 SK 10 GARDEN OF FALLING LEAVES & FALLING SNOW 02 SK 11 RAIN THEATRE SK 12 GREAT DOME



AERIAL SITE PHOTO LEVEL 02



AERIAL SITE PHOTO LEVEL 03



Scale bar

Verdes were not permitted. Once you had come to the outer edge of the forest, you made the rest of the journey on foot. You had to approach from the West, along a designated path... and prior to entering the forest, you came to an open frame made of concrete. The space inside of the frame was taller, wider, and deeper than that which would normally be occupied by a set of doors, but not by much. This was a **threshold symbolizing your transition inward toward the S.O.A.L.** and the state of the site and otherwise being, along with quietude which you were requested to observe once inside. Of course, it would have been possible to pass on either side of the frame, but such an act would have been held as violation.

Once through the threshold, you followed the path through the forest until you came to the place where you passed by the two streams that joined and ran on together, leaves silent, bubbles gurgling, splashing gently along. They crossed the water and the banks, and you could observe the disposition of leaves that hung on the bank bordering trees, suspended and awaiting that gentle tick, the resulting rattle. Of course there were times when it was not so quiet. It would come through, rattling, screaming, causing that red dance of leaves, those long signs of the forest, further in, and especially when the air was still, you could hear the quiet conversation of the trees, their whispered histories. As you approached the inner edge of the forest, you could hear the sounds changing, sense that everything was about to open up.

It was nestled there in the meadow, surrounded by layers of birch, maple, poplar, pine. Drawn out along a Southwest-Northeast axis, the subsequent volumes were articulated as though they were placed along a line, or perhaps a flat paper. There was clearly a visual music present. You could sense that, to be sure, but you also were aware that this was a place of other musings and of listening.

I remember seeing for the first time, and how I could hear faint tones in the distance. I remember wondering why they were coming from where there appeared to be nothing and nothing between the top of a dome structure and a large, curved, double wall which was off of the main axis. This of course was the **rain theatre**. I now know the space is the **garden of winds**. Beneath the strings there is an array of open cylinders of varying diameters which are embedded into the ground at their base and rise above it at different heights. These are spaces to walk between trees, which you are in the garden. When the wind blows across their openings, the air made them shake, and they produce tones. The strings above are Aeolian strings, played by the wind as well, named after the great Aeolian. The main entrance to the S.O.A.L. is found at the mouth of the garden.

There are two other gardens as well. The second garden of the trees is the **garden of falling leaves and falling snow**. I had never the mind, prior to experiencing it, to imagine such music that was possible from these phenomena. To be able to hear individual snowflakes gently come to rest upon the bed of collective snow, or symphonies of leaves falling around me. They can be surprisingly subtle if you are listening well.

The third garden is the **garden of singing ice** which always try to picture from above for some reason. It is a larger baffle garden, and contains several shallow pools of water of varying dimensions. The garden operates in a very special ritual phenomenon during the early stages of Winter. One would walk through the garden at that time of year when all conditions are just right, and as the crystals of ice begin to form on the surface of the water they extend out their music. Because each pool is different size, each sends its own unique tones. I might be that they are pooling together in memory. I hope to someday have the full choir of collective pools singing together. Perhaps this year.

I would have to say that my favorite in the space is the **rain theatre**. When it rains, the central portion of the roof can be opened in order to allow the rain to come through and fall into an interior pool. At night on the evening the lights are turned out except for those positioned to illuminate the area around the water's surface. This allows the disturbances caused by raindrops, articulated on the surface of the water to be caught by reflected and refracted light and carried up to dance and play on the tree surfaces, which are white in order to best capture the. As well, portions of the ceiling are removed, with a different material being each, each will respond to rain drops in a unique way, thereby producing unique sounds.

Then there is the **great dome**, which is a large space in which you can have whispered conversations across the distance separating one side from the other, provided you and the other are speaking in the right places. The space is also used for group chat. It is truly amazing to hear everyone's collective voice resonate and reverberate within the dome.

There are many other inner S.O.A.L. spaces as well. Among them, there is the **gallery of found sounds** in which we are able to have recordings which we have made of interesting sounds we are able to find which is part what we do to study sound and listening played inside of any number of small black boxes, which populate the space in a large multi-dimensional formation. Each box is connected to a central support structure, and the lid which can be opened just enough to allow the sounds to emanate from within. In any spending time in this gallery and choreographing the opening and closing of different boxes with other students in order to create musical composition within the gallery space.

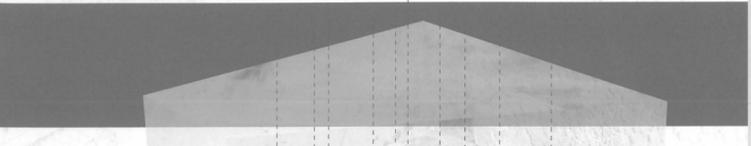
There are also various spaces in which we are able to create a multi-media forms surfaces differently and experience how the changes we make affect our spatial and sonic perception and experience is altered as a result. We call these spaces **sonic experimentation theatres**. One time we had access to a large quantity of Fractalite, and we set it down on a much sound, we used to conduct a variety of very quiet spaces inside of the theatre. We called them flat spaces.

All of the circulation spaces between main interior spaces are semi-anechoic. While sounds will still be able to reflect from the floor surfaces, these inertial spaces are still able to cancel out the majority of reflected sound, allowing for a clearing of the air path between spaces, in order that the unique sonic characteristics of each can be distinguished and listened to. These spaces act as extended **anechoic thresholds**.

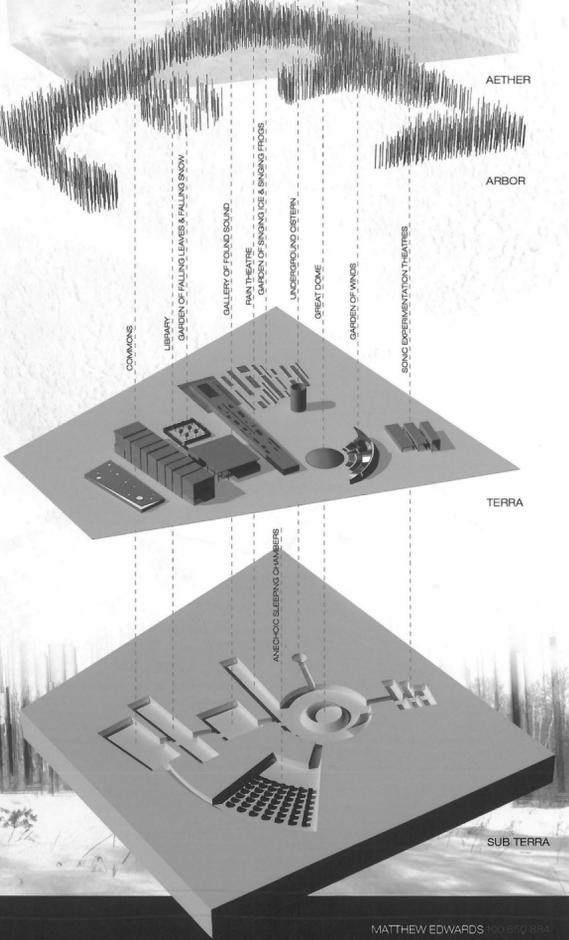
We also sleep in **anechoic chambers**. At first this was terrifying. It was foreign and disorienting to hear sounds emanating from inside of one's body and to feel as the space were collapsing around you, growing ever smaller, but after a while, through conditioning the experience became quite pleasant. It allows us to sleep each day with how each needs to great an ever present world of sound.

I want to you about an experience I had one time within the **underground cinema**, which is another amazing space. I was once inside of the cinema in mid Autumn, engaged in actual listening, when a flock of geese flew overhead and their calls filled the concrete cylinder and resounded around me. I listened to their approach, their passing over, and all the last part of the movie of the sound that blended with them along their path and had left the space of my perception, sound resonating within the cinema for over thirty seconds, which allows for quite an interesting sonic experience.

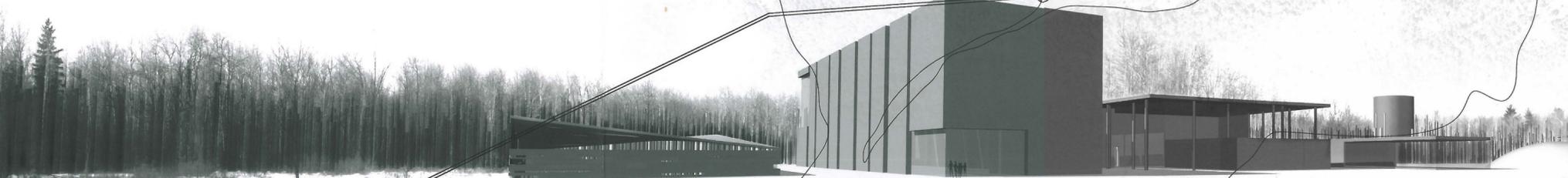
I have learned so much within the S.O.A.L. I have found new ways to listen and to appreciate sound as part of my experience and my sense of self, aesthetically, physically, and simply. I imagine that when the time comes for me to return to the world outside of the S.O.A.L., I will find that it is a flat place—a place that needs the same kind of hearing these four lines. I will get my mind to open on myself I have learned.



SK 12 GREAT DOME



AETHER  
ARBOR  
COMMONS  
LIBRARY  
GARDEN OF FALLING LEAVES & FALLING SNOW  
GALLERY OF FOUND SOUNDS  
RAIN THEATRE  
GARDEN OF SINGING ICE & SINGING POOLS  
UNDERGROUND CINEMA  
GREAT DOME  
GARDEN OF WINDS  
SONIC EXPERIMENTATION THEATRES  
TERRA  
ANECHOIC SLEEPING CHAMBERS  
SUB TERRA



AERIAL SITE PHOTO 01 TERRA SITE PHOTO 01 TERRA SITE PHOTO 02 TERRA SITE PHOTO 03 TERRA SITE PHOTO 04 TERRA SITE PHOTO 05 TERRA SITE PHOTO PANORAMA 06

# S.O.A.L.L.

SCHOOL of ADVANCED LISTENING

MATTHEW EDWARDS ARCHITECTURE

## ***APPENDIXes***

These appendixes open with some examples of my previous work which allowed me to explore some initial observations and assumptions I had made about music/architecture/sound/space. Also included is the semi-anechoic threshold space, which I built as a study mechanism in order to test the concept for the interstitial spaces within the S.o.A.L. This threshold also featured as an important space within [ OPEN STRUCTURES ]. Finally, the unabridged version of my interview with Pauline Oliveros is included.

### **OF OTHER SPACES**

#### **THE LIVING AURAL BODY OF ARCHITECTURAL SPACE**

#### **SEMI-ANECHOIC THRESHOLD**

#### **DEEP LISTENING: AN INTERVIEW WITH PAULINE OLIVEROS**

# OF OTHER SPACES

The title of this piece draws inspiration from Michel Foucault's essay, *Of Other Spaces: Utopias & Heterotopias* (1986). It seemed fitting given that both this piece and the essay deal centrally with the notion of how spaces change over time, and in the case of this piece specifically, how they change sonically and how those changes are linked to the identity of space and place.

Sounds are intimately linked to the identities of places.<sup>1</sup> It is easy to hear the difference between the forest, the city and the ocean shore, but some places have such unique *soundscapes* that they can even be distinguished from within their own larger groups. Take, for instance, the soundscapes of major World cities; Paris has a very different aural fabric from that of Beijing, London or

Washington, D.C.. Certainly the sonic identity of the Amazon Rainforest can be aurally distinguished from that of the Black Forest in southwestern Germany. The process of differentiation grows more difficult as you narrow the parameters, but a keen ear will try to listen for sonic clues allowing it to distinguish West Berlin from East Berlin, or the Congo Rainforest from that of Papua New Guinea, perhaps through a knowledge of native bird species and their calls, or the choruses of cicadas. Or, if not to be able to tell what the differences are exactly, at least to sense that they are present.

Sounds are also intimately and inseparably linked to time. Each sound occurs within a specific frame of time, and once gone, is gone forever. Entire soundscapes may change as the places and spaces they are linked with change. Perhaps the most relevant and dramatic example of this occurred by way of the Industrial Revolution which brought forth the sounds of technology and mechanization.<sup>2</sup>

Recording sound may be our attempt to cheat time. We may believe that if we record a sound we can preserve it, but part of what was in that sound upon its occurrence is taken through the recording process, simply because of the inherent imperfections of the technology used and the distortion (if only minimal) that results<sup>3</sup>. Further distortion occurs when that sound is then *played back*, once again a result of the



Original Poster for "Of Other Spaces".

1 *The Soundscape: Our Sonic Environment and the Tuning of the World*. R. Murray Schafer. 1997.

2 *Ibid.* -p 71-87

3 Sound recording devices use variables such as bit rate and frequency resolution (Hz). Lower resolutions and lower bit rates amount to higher levels of distortion in the recorded sound.

imperfections of the equipment used<sup>4</sup>. Be that as it may, recorded sound can still allow us to revisit soundscapes and sonic events which would otherwise be lost in time, just as photographs, while somewhat distorted, allow us to revisit places we have been. All of this is not to suggest that recording sound is somehow invalid, but to suggest the opposite. In all probability, what is missing in audio recordings and photographs alike is that which highlights the importance and sacred nature of experiencing something firsthand.

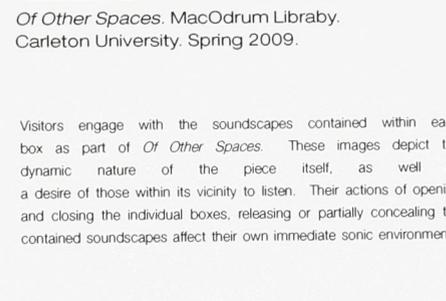
*Of Other Spaces* is a sound art piece which explores relationships between sound, space, place and time. Nine identical black boxes are arranged in a three by three matrix formation. Eight of these contain different prerecorded sonic environments which range from the natural



to the built. The listeners are invited to lift the lids of the boxes in order to allow the soundscapes within to permeate out into the surrounding space(s). The lids themselves have a limited range of motion, so that one has to move closer to the boxes in order to engage with them and listen to the subtleties of each contained soundscape. All sound equipment is concealed, save for a set of headphones, revealed when the ninth box is opened. When a listener puts on the headphones she will hear the sounds of her immediate sonic environment, in real time, contrasting the prerecorded nature of the other soundscapes.

The intent is to arouse the acts of listening and imagination, to potentially touch the space of memory and also to prompt an understanding of the connection existing between sound, space and place. Each of the contained soundscapes shares a relationship with the space in which the entire piece is situated. The soundscape of that space is affected by the sonic presence of the others, and by the listener's dynamic engagement with them. Listening to the immediate soundscape through headphones reinforces this and further alludes to the connection of sound to time and memory through the act of listening itself within that moment.

4 Even the best speakers available still colour sound somewhat due to ohm resistance. Furthermore, some portions of the sonic spectrum might not come through in playback depending on the frequency response rating of the speakers themselves.



*Of Other Spaces*. MacOdrum Library.  
Carleton University. Spring 2009.

Visitors engage with the soundscapes contained within each box as part of *Of Other Spaces*. These images depict the dynamic nature of the piece itself, as well as a desire of those within its vicinity to listen. Their actions of opening and closing the individual boxes, releasing or partially concealing the contained soundscapes affect their own immediate sonic environment.

# THE LIVING AURAL BODY OF ARCHITECTURAL SPACE

83

## A BRIEF INVESTIGATION IN III MOVEMENTS



### MOVEMENT I

I know that spaces have a song.  
It is an almost silent one.  
I will open my ears to see,  
Let this aural body envelop me.

Buildings sing to me. They draw me to them by their song; an almost silent song. It is a song that slowly takes hold of me, becoming more and more a part of the present totality of my experience as I approach them. I let them wrap me up in the auditory warmth of their thresholds as I enter. I am cocooned momentarily before the inevitable metamorphosis which follows. Renewed and reborn, I penetrate and intercede; I move through each new space—and each is a movement within a larger collective symphony. Each step I take within these spaces is marked by a passing of time and accompanied by a constantly dynamic aural fabric. Sound, space, and time—these elements constitute a musical experience.

I realize it's about understanding and capturing the score, the evolving soundtrack. This world is alive and vital. Not frozen at all, in fact. Each new spatial ambience deserves to be listened to and not just heard—not dismissed; deserves not to be missed. Each space is given identity by the way sound plays within it. Boundaries are not limitations but new beginnings; walls not absent, but present as they absorb and reflect; give new shape to the original spheres. Integrated systems drone out subtle tones, and I find myself harmonizing with firsts, thirds, fifths, octaves of my own.

If I am touching a space with my eyes I am touching a corpse, or the form of a body rendered in cold stone. A space cannot reply to my gaze (Pallasmaa 49), but when I reach out with my ears a mutual relationship is made; a union forms as I become part of the living aural body and the space responds to me, sends my sounds back in a more beautiful way. My body reabsorbs these waves, and we sing and copulate together, this space and I. I sense and feel propagations, pulsations, reverberations, resonations, and I am grateful to her for allowing my presence; my participation. Self awareness of my presence presents to me an interesting point of contemplation: if no one is present, does a space still sing? *Esse est percipi* ... remind me of that story about the tree, again, would you?

## MOVEMENT II

I yearned for silence, so I tried  
To search for silence, but I found  
In absence of all outer sounds  
A whole new song was there inside.

I'm not quite sure whether up until this point you have been reading aloud or quietly inside of yourself, or if the latter is true, which voice you've been hearing there. In any case, try to let yourself whisper for a while, and I shall do the same.

Now, let us be silent for a moment. Or, rather, let us approach silence, for its fate is always to be something sought and not found. There can never be true silence because we can never truly separate ourselves from sound. We confuse silence with quietness. Quietness is an atmospheric, sonic condition where there is very little sound, and indeed we can find many quiet spaces and places. Silence, on the other hand, is defined as "the complete absence of any sound or noise" (dictionary.com), and for anyone possessing the ability to hear, this condition cannot exist. If I step into the anechoic chamber, it is perhaps the place in which I should think that I would come nearest to attaining silence. And yet, if I approach silence there, I begin to hear the sounds which are within—within me; the aural body within my body—the sounds and rhythms of the self. It is both the room of death and the room of life for reflection; the killer of ambience, the bearer of conscience. Inside the chamber I am the beating of my heart, the flow of blood through my veins, the inhalations and exhalations of my lungs, the disturbance of my gastronomic system, the process of my digestion, even the formation of my thoughts.

In architectural spaces other than anechoic chambers, ambience is of central importance. If I am in a space, isolated, and make no sounds myself, what remains is ambience. Each space offers a unique ambience, since ambience is born in its purest form of the unique qualities of a space. Listening to the pure ambience of a space can invoke tranquility, which is "the most essential auditory experience created by architecture" (Pallasmaa, 51). When other sounds not born of me are present within a space, they compose in conjunction with the pure ambience of the space itself, what we have named the background.

A background does not have to be a forgotten ground; a forgotten or ignored field of sound—waiting and wanting to be explored, to be traversed, or better still, harvested and its contents ingested. Aural agriculture: a harvesting of ear food—sustenance through resonance. Every sound is relevant. Every sound is important. The apple should not believe it can trump the potato here (surely, it must mean something to be called *pomme de terre*?). How much time is required for one to find appreciation for sounds present in the vibrant sonic canvas of the background? I've heard that 4'33" is enough .

### MOVEMENT III

Where does instrument end,  
And architecture begin?  
Is this my living room  
Or the inside of a violin?

Hard to say, really. Perhaps scale is the issue: can instruments really be this big, or we this small? If we could be permitted to enter into the chamber of a violin, would we recognize it as such at all?

Once, I stepped into a Gothic Cathedral. I heard monks chanting and as their voices emanated, they travelled up into the vaulted spaces above me and were reflected back. I could hear, simultaneously, the sound of their voices as it left their bodies as well as the reflected memory of the sound they had made a moment before. I understood that it was in that both finite and infinite space between sending and receiving again that they searched for God, and I felt the immensity of that space.

Once, I stepped into the forest. I heard the sound of birds singing to each other from the tops of the trees and the way the trees themselves responded with their gentle sighs and rustlings in the spaces of absence of birdsong. I could hear the trees whisper their ancient stories to me, though I could not understand what they were saying, and I felt as though "history is not enough" to let us know "the temporal dimensions of the forest" (Bachelard 188). I sensed the way the tree canopies absorbed sounds from outside the forest, and through the stillness which was created, I felt the tranquility of that place.

Once, I stepped into the chamber of a conch shell. I sensed an emptiness and a fullness at the same time, as though everything and nothing existed simultaneously there. I felt sound spiraling around me. I thought it was the sound of the entire ocean, and I felt the paradox of the intimacy and the vastness of that space.

Once, I stepped out onto the flattened desert. There were no surfaces around me but the ground beneath me. I spoke to the openness, listening intently for any response, but none came to me. I yelled, I screamed, and still there was nothing. I called out to the sand beneath my feet, but it only absorbed my hopeless plea, and I felt the barren loneliness of that place.

Once, I stepped into my own body. I heard my own voice speaking to me. I heard it resonate inside of my chest and oral cavity—heard and felt sound simultaneously vibrating inside of and reflecting from the surfaces of my bones. I could feel sound passing through my flesh. I realized that perhaps it is not so much the voice itself, but rather the body from which the voice emanates that we hear (LaBelle 123)—that we detect, not simply the sound itself, but the space within which the sound resonates. There, inside my body, I felt the nature of the aural body that lives within any space.

Now, are we listening?

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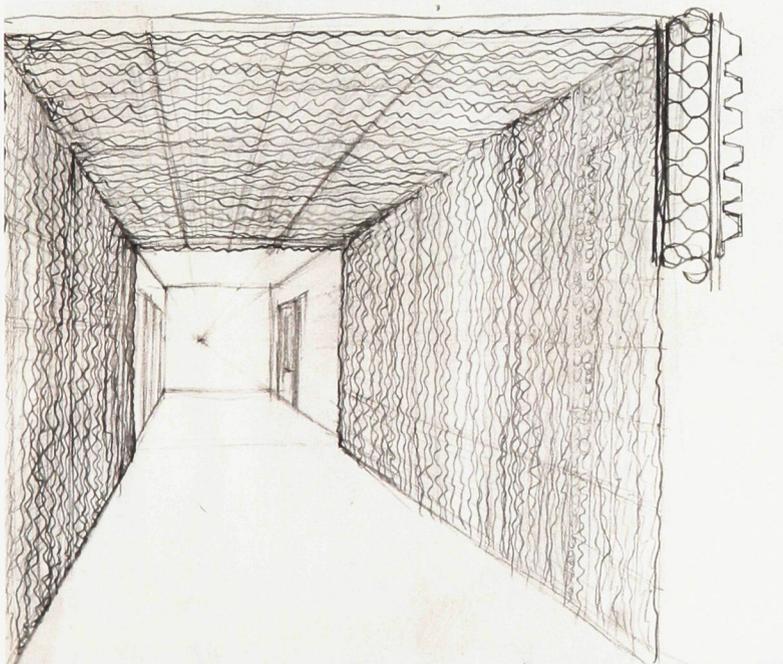
# SEMI-ANECHOIC THRESHOLD

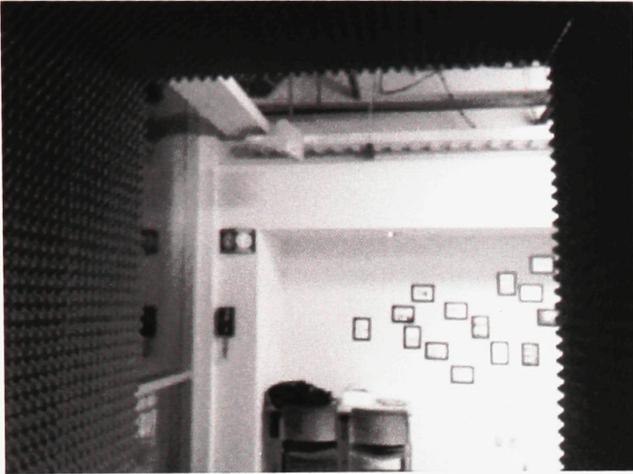
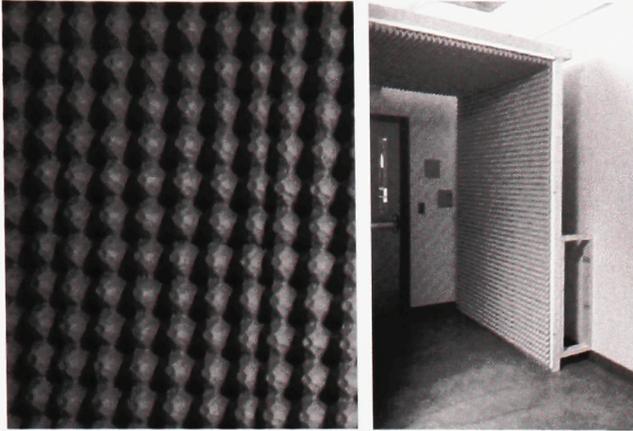
This was undertaken as a study in order to be able to experience, on a one-to-one scale, a sonic phenomenon that I wished to implement within my design of the S.o.A.L. While in actuality, much more sophisticated materials would be used to realize this kind of space, I used egg cartons, since their shape allows them to be an efficient semi-anechoic surface while remaining cost effective.

Sound still reflects from the floor as well as the surfaces beyond the threshold, but the desired effect of the sensation of sound diminishing, due to a much decreased level of sonic reflection is present.

In addition to egg cartons, special sound absorbing rock fiber insulation was used within the 2x4 wood frame, in order to help limit sound transmission through the walls of the threshold.

Acting as an interstitial space between the main stairwell of the Azrieli Pavilion at Carleton University and the 4th floor area (affectionately referred to as 'Middle Earth') the semi-anechoic threshold operates as an aural palate cleanser, in the same way similar threshold spaces are intended to function within the S.o.A.L. It also featured prominently within the performance of [ OPEN STRUCTURES ].





## DEEP LISTENING: AN INTERVIEW WITH PAULINE OLIVEROS



Pauline Oliveros. Credits: Gisela Gampert & Pietr Kers.

Pauline Oliveros is an American musician and composer who has been a central figure in the struggle (of many who care about sound) to cultivate a widespread aural awareness. Her contributions have included: as a writer, various books and other texts which investigate listening and sonic focus; as a musician, countless compositions and performances; as a philosopher, (perhaps her most influential contribution) her philosophy of *Deep Listening*.

She founded the *Deep Listening Institute* in 1985 (originally named *The Pauline Oliveros Foundation* until she coined the term *Deep Listening* in 1988) which features annual listening based retreats to various places around the world as well as programs focused on apprenticeship and certification. She also formed *The Deep Listening Band* which performs and records in resonant/reverberant spaces including (but not limited to) cave spaces, cathedrals, and underground cisterns.

In addition, her founding of *The Deep Listening Institute* and her continuing work with it have become a major source of inspiration for me, as a musician and listener, but also in terms of my concept for the S.o.A.L.. We talk about *Deep Listening*, noise, silence, sound(s) and space(s), the danger of iPods, her creation of an Adaptive Use Musical Instrument, and finally, discuss how the S.o.A.L. can potentially help to heal a World that hasn't yet learned how to listen.

- [ME]: *So, you've had a career that spans more than sixty years, as a composer, performer, author and philosopher, and I'm sure that we could focus on any one small aspect of your career and it would make for an extremely interesting interview, but I wanted to focus in on one particular contribution of yours. So to begin (and I know you've done this already once today, but) can you tell me about Deep Listening?*
- [PO]: Yes, well, like I say, the brief definition of Deep Listening is experiencing heightened or expanded awareness of sound and silence... and sounding. So, it's exploring attention—exploring and distinguishing the difference between hearing and listening, which I explained today. Hearing is our... taking in sound waves continually and involuntarily. Listening is interpreting the sound waves that come, and that's in the brain, it's not in the ear. The ear is the transmitter and the brain is the interpreter. So understanding that difference, and deepening the understanding of it, is a lifetime practice, I would say.
- [ME]: *And, so the Deep Listening Institute was established in 1985...*
- [PO]: Right, it was called The Pauline Oliveros Foundation at the beginning, and then in 2005 the name was changed to Deep Listening Institute to reflect the practice.
- [ME]: *And you coined that term, Deep Listening, around, what was it nineteen...*
- [PO]: (interjects) Yes, 1988.
- [ME]: *Okay. And, what has been the greatest achievement of the Deep Listening Institute, in your opinion, since the time of its inception?*
- [PO]: Oh. Well, I think probably the development of the Deep Listening practice, which extends to all the programs. And, particularly now with the (pauses) Adaptive Use Musical Instrument project that we're doing. This is expanding rapidly now, and is affecting and helping people.
- [ME]: *Yeah, can you talk a little bit more about that?*
- [PO]: Well, basically, I was having a conversation with a friend of mine who is an Occupational Therapist, and musician, who has been working at Abilities First, which is a school for students with disabilities ranging from cerebral palsy to Down syndrome, cognitive development, and so on. And she had created a drum class for the school—it's a school of about fifty students—and she wanted everyone to be able to take part in it. And some, of course, were impaired in such ways that they needed technology to be able to participate, and so, through listening... (pauses) in this conversation, then I managed to get a small grant for the Deep Listening Institute and I organized a team from... colleagues at the Rensselaer Polytechnic Institute and our Deep Listening staff went to observe and find out what was needed. And then we saw that... Leif Miller, my friend showed us the technology that they were using was old analog technology—switches—which for instance... students who couldn't who couldn't move limbs voluntarily would trip the switch with their heads, you know,

because they had some control over head movement. So that was very easily translated into digital form, so we created, what we call the Adaptive Use Musical Instrument, short for—the acronym is A.U.M.I.. So, right away, one of my senior students at Rensselaer programmed the camera tracking program. It's a very simple one, actually, but it has very large implications, for participation, so we're now referring to this as improvisation across abilities, and typically when you solve something for a person with very limited abilities, then you open up, for everyone. It's like having wheelchair access with a handicap ramp. You know, once you have that then everyone can use it (chuckles) and it's wonderful! I use them all the time, wheeling my equipment around (laughs)... but, this is sort of like that—it's a camera tracking program—we sat the students who couldn't move limbs or digits in front of it, and there was... the prototype had a vertical line on the screen. If you moved your head, or your nose, past it, with a—we put a virtual marker on the nose—if you moved that vertical line, then you got a sound. And, so then it was elaborated to having a horizontal crossbar that made four sounds available. And, these students took to it immediately, and were immediately able to make sounds, which was very moving, and it was a very very, you know, defining moment. And, so there was also a virtual keyboard—you could move your head along the keyboard and play a melody.

[ME]: *So, it kind of highlights, that even in the realm of disabilities, there's music there that deserves to be heard, and that, the true instrument is not the physical tool, it's something that...*

[PO]: (interjects)...something within the person...

[ME]: *...something that comes from inside.*

[PO]: It's an inner need and an inner possibility. And so it's just, opening the door for that exploration, so...

[ME]: *I think it's marvellous, and it's such a wonderful idea and something that I think the World will benefit from.*

[PO]: Well, it already is, and we've put the software interface online, and you can go to our website at [deeplistening.org](http://deeplistening.org), and download it, for free, and it will stay free. We're not going to charge anybody for it. So far there have been about 375 downloads, around the World. And so it's—for instance—it's in use in Santiago, Chile. A Music Therapist there downloaded it and he uses it with spinal injury and brain trauma patients with great effect. So what we consider is that we have a participatory action research project going where everyone who participates in the project, including the user is a researcher, and is informing the project for further development, so it will continue to evolve, out from there.

[ME]: *It's nice to think of the idea of sound acting as a healing mechanism, and actually one of the things that I'm dealing with—I'll get to my Thesis project in a bit—but one of the fundamental ideas is the notion of acology, which is the science of remedies, and so I'm using the notion of listening, and understanding that connection between listening to space to kind of act as an acological agent and to kind of heal. So it's nice to hear about another area where sound is being used as a healing mechanism and I'm sure that, you know, when people with severe disabilities*

*are able to express themselves in that way, in a musical way, and to know that they can still create their own sound messages, that must be very...*

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[PO]: (interjects)... liberating... it's empowering... we have a concert coming up, March 31st, at Renssalaer, where we're also doing adaptive use work, because of me (chuckles) but we have this concert, and we have four artists who all have a different disability. The first one, who was the former chairman of our Arts department, is now a colleague, but he lost hearing in one ear, and so his piece is called Mono, since he's no longer hearing in stereo, he's hearing mono, but he describes as he uses his laptop for the music and speaks the narrative of what happened, how it sounded, and so forth, and that's his piece. The second piece is Christine Sun Kim, she's a—she was deaf at birth—she's a sound artist, so she's using sound in her art, to make it visible. Then there is David Whalen who is quadriplegic and has developed an interface that he can use with his mouth, and he's better with a computer mouse than any of us can be because he has more axes to work with, with the device that he made, and so he can play music with it and he also does incredible digital art, and so he's going to do a digital painting while our ensemble plays with him. Then, the last one is Clara who lost her tongue to cancer. She had to learn how to speak all over again. She's doing a—she's a video artist—and she's videotaped her walking, and as she walks she's articulating the phonemes that she needs to do, and then toward the end of her piece is a kind of narrative about things. But it's a very wonderful piece, so I worked with her to learn about throat singing, and so...

[ME]: *Great. Well, I'm sure it promises to be an amazing event.*

[PO]: It will be an amazing concert... wonderful.

[ME]: *Now, you also are part of a band, and it's called The Deep Listening Band, and I understand that you perform mostly in resonant spaces, so I wanted to ask you: what is the most amazing space that you've ever performed in?*

[PO]: Well, I think that, the Cistern, in 1988, in Washington State—it used to be the water tank, for the Army there at Fort Worden. 160 million gallons of water, 16 feet in diameter. It's reinforced concrete, 14 feet high and it has a 45 second reverberation time, so when you play, in there, the direct sound and the reflected sound is so close that it's very difficult to tell which is which. So that's pretty remarkable, and that's where we made the recording called Deep Listening. And that's in fact where I put those two words together for the first time.

[ME]: *Oh, so it's very memorable then.*

[PO]: So Deep Listening was born in a deep space (chuckles).

[ME]: *Have you ever heard of—it's in Montreal...*

[PO]: Yes, the Silo...

[ME]: *Yes, it's called Silo #5.*

[PO]: Yeah, I know the Silo...

- [ME]: *Have you ever sent any of your work through the Internet?*
- [PO]: I haven't. I haven't done it yet, but I do know about it. I've known about it, for a very long time, I just haven't gotten to it (chuckles).
- [ME]: *Well, I just, with your interest in electronic music, I thought that maybe that would be something...*
- [PO]: (interjects) I'm glad you reminded me of it, because I'd like to get my students involved in working with it.
- [ME]: *Mm-hmm.*
- [PO]: Yeah.
- [ME]: *Okay. I guess that kind of leads into the next question, maybe—are there any spaces that you haven't been able to perform in yet, but that you'd really like to?*
- [PO]: Mm. Well, if I were—if I had the energy, and the youth—I would probably like to go on a World Tour of spaces, you know, and play in them. I can't think of a space that I'm yearning to play in at the moment, but I have played in a lot of different places (laughs). Caves, and cisterns, and, you know, beautiful concert halls... unusual places. It's sort of serendipitous how these things come about. But I'm very interested.
- [ME]: *And so then, how—to you—how important is—first of all—space to sound, and then, sound to space?*
- [PO]: Both are equally important, and the thing that The Deep Listening Band always does—and myself, as a soloist, or playing with anybody, or, as we did today—is to listen to the space... (pauses) primarily to open up to what it is—how is it—what is it saying? You know, what is it—how is it speaking to me? You know, and if I... if I put something in the space, like a sound, I want to know how and what it's going to reflect.
- [ME]: *How the space is responding to you...*
- [PO]: (nods) How it's responding—what is the response? You know, and so that's always going on.
- [ME]: *Yeah, because it's kind of a symbiotic relationship right? Because when we make a sound, or if a sound occurs, in space, then that sound—let's say it comes from us—it leaves us, and moves out into the space, and it actually takes the form of the space. It's shaped by the space and then sent back to us, and then of course, it enters our ears, which, in turn, allows it to enter our mind, but also just physically, the vibratory forces of sound enter into our body and resonate through us in that way, so... (pauses) it's like, our body is wrapped in the body of sound is wrapped in the body of architecture.*
- [PO]: Yes... that's right. I do feel that—agree with that.
- [ME]: *So, what is the—what would you say is the most amazing sound you've ever heard?*

- [PO]: Oh... (pauses) Hmm... the most amazing sound I've ever heard?.. oh... hmm.... Well, in a way, hearing a loon, for the first time, you know, was, I think, extraordinary, and I still love that sound.
- [ME]: *That's actually one of my favourite sounds too. I spend a lot of time in the summertime at my cottage, and I kayak out into the middle of the...*
- [PO]: (interjects)... Oh! Beautiful...
- [ME]: *...to the middle of the lake before the sun comes up and one time last summer I was—I got out there and I didn't realize it until—and there was a bit of fog on the lake—and as the sun came up I could see around thirty...*
- [PO]: ...thirty of them...
- [ME]: *Thirty loons. And I—so I started calling to them—my Mom taught me how to call—I'm not as good anymore, because once I hit puberty...*
- [PO]: ...you lost your higher range, yeah (smiles)...
- [ME]: *Yeah (chuckles) but it was really amazing. A lot of them would respond, and it was just an amazing sensation.*
- [PO]: Yeah, it's very extraordinary, I think.
- [ME]: *So, one of the interesting things that I'm dealing with, is the boundary between what constitutes music, and what constitutes noise, and so I'm wondering, do you believe in noise anymore?*
- [PE]: (laughs!)
- [ME]: *In other words, where does music begin and where does it end? Or, does it?*
- [PO]: Well, for me, I mean, just, every day is a new day of listening... (chuckles). There are times when the threshold is different, and something—and some sound—that comes in may be interpreted as noise because it annoys me or knocks me off my focus or something. Or I have narrowed down—I am narrowed in my attention—to the point that I can't open enough to accept the sound.
- [ME]: *The sounds that want to be focusing on?*
- [PO]: (nods)
- [ME]: *Right.*
- [PO]: But, basically, yes there's still—here is noise—the definition is unwanted sound.
- [ME]: *Exactly. That's why I was wondering if there are any sounds that are unwanted, to you, because—and, my sonic journey is still in its infancy, but—I'm noticing more and more that the boundaries of what I believe constitute music have expanded to the point that I hear music in almost everything.*

- [PO]: Yeah. I do too. More and more (chuckles).
- [ME]: *And, this next question, it's one that I've asked a lot of people—just for my own interest—and you mentioned before that there is this idea that—at least in Western culture—there's a dominance of the eye, and most people that I ask this question to—well—the question is, if you had to choose between blindness or deafness—which is a terrible choice—but if you had to choose, which would you choose?*
- [PO]: Well, I guess I would—well—blindness.
- [ME]: *Yeah, and that's how I feel as well, but the majority of people, I'd say... (pauses) they say that they would choose deafness because, I mean, maybe they've never thought about it, and the moment that that option hits them—that choice hits them—they think "oh, God I couldn't live without my eyes". But certainly, for me as well, I would choose blindness, because there's so much that you can see, just by listening.*
- [PO]: Yes, that's right. And also, by proprioceptive sense.
- [ME]: *Do you think then, that the World, in general, has forgotten how to listen?*
- [PO]: Well I think the World is learning how to listen. Certainly, listening was more acute—maybe—more acute by people who live in, say, a jungle environment, where listening is, you know, very important in survival. I mean, listening is important for survival in the city, as well. Some people who are wearing earbuds, you know, are, endangered.
- [ME]: *Absolutely.*
- [PO]: They're very endangered and there have been some tragedies.
- [ME]: *Just trying to do something like cross the street.*
- [PO]: Yeah. Exactly. And the same thing with the cell phone, walking into the intersection without apprehending what's going on, you know?
- [ME]: *Yeah, there's actually a portion of my Thesis that focuses on that. It's called iSpace: the iPod and...*
- [PO]: Yeah, right...
- [ME]: *...and it focuses on the effect that that's having on the world of listening and sound.*
- [PO]: Right.
- [ME]: *I visited the Prague Cathedral when I was studying abroad for a semester, and there were six or seven people that I saw during my time in there who were looking at the space but listening to their iPods, and I just felt like...*
- [PO]: (chuckles) "what's going on?" (chuckles)

- [ME]: ...yeah, "you're missing it" you know? "You're missing it"
- [PO]: True.
- [ME]: So, one of the reasons that I'm so happy to have this chance to interview you is because the concept that I came up with for my Thesis, as sort of an architectural embodiment of what I wanted to work with was the design of a School of Advanced Listening...
- [PO]: Ohh, nice!
- [ME]: ...the acronym for which is S.o.A.L...
- [PO]: Mmmm! (chuckles) That's great.
- [ME]: ...and I know that that aligns with what you've been able to do, and you've been able to realize The Deep Listening Institute already, so you're miles ahead of me. (chuckles)
- [PO]: Well, not necessarily, I mean, I think a School of Advanced Listening sounds really wonderful. Yeah, that's... (pauses) that's a great idea.
- [ME]: Can it—I'm approaching it as if that can be an acological solution to, what I thought before was kind of a—this Universal deafness. But now that you say that maybe we're beginning to—we're learning how to listen—it's not necessarily that we're deaf, it's just that we...
- [PO]: ...we're—yeah, there is deafness.
- [ME]: There is deafness?
- [PO]: There is deafness that has to be overcome, but people are deaf in different ways. As I was saying, you know, nobody knows how you're experiencing what I'm saying at this moment.
- [ME]: Right, it's such an internal process. Was this—was something similar to that something that you felt when you were thinking of founding The Deep Listening Institute?
- [PO]: Well I was basing it on what I needed as an artist—a composer. What kind of platform did I need? And how would that translate to other people? So that was the initial thing. Because I was part of an experimental music community. We always had to create our own... (pauses) space. The first one was the San Francisco Tape Music Center, in the sixties, and there's a book now, San Francisco Tape Music Center: 1960s Counter-Culture and the Avant-Garde and it describes, you know, what we did. That was a place for us to be together and to do things, which we did, and it's now very historical. And the same thing with this Deep Listening Institute, I think, that, in the future it will have a meaning to many people it doesn't have now...not yet.
- [ME]: Right. Last question for you—first, thank you so much for this—through Deep Listening, have you come to understand the concept of silence in a new way? Is there such a thing as silence? Or is silence more like a canvas for Deep Listening—what we consider silence.

[PO]: Well, silence first of all, technically is not possible. And, you know I mean, zero vibrations means zero anything. Zero death (chuckles). So, the best we can do is have quiet. So, I mean, that is very important, I think, to understand that.

[ME]: *Evelyn Glennie said in her documentary Touch the Sound that "the opposite of..."—what was it?—"the opposite of sound was not silence, but was probably closer to death."*

[PO]: Mm-hmm. Yeah... that's my understanding (chuckles)

[ME]: *And, certainly, I mean, Cage felt something similar as well with the development of 4'33"...*

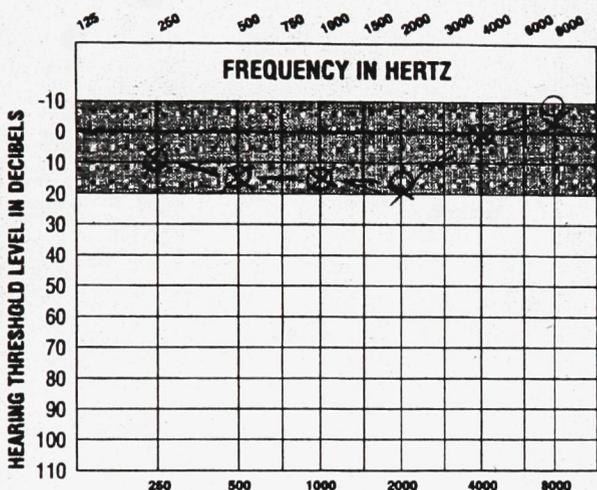
[PO]: Yeah. Yeah... well, he knew that people weren't listening.

# Davidson

## Hearing Aid Centres

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 Contact \_\_\_\_\_ Examiner R. Davidson



Quick SIN 05 05 dB SUR loss

Tympanometry

Rt	A	SC=1.1	ECU=1.7
Lt	A	SC=1.1	ECU=1.9

Reflexes Ipsi

	500	1000	2000	4000
Rt	100	95	105	90
Lt	80	95	105	90

PREVIOUS HEARING AID USE \_\_\_\_\_

CASE HISTORY Father - Industry - No hearing  
↳ Musician

Some difficulties in noisy environments.

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Hearing Thresholds are within normal limits bilaterally. Group Ins. \_\_\_\_\_  
Tymps + Reflexes show normal middle ear Function. Group No. \_\_\_\_\_  
Quick SIN shows normal performance in Noise.

David Cox M.Sc. Audiology [ ]  
 Francine Larochelle M.Sc. Audiology [ ]  
 Robbie Davidson M.Sc. Audiology [X] -

# glossary\_

ACOLOGY_		<i>materia medica</i> ; the study and application of remedies.
ACOUSTICS_	adj.	[1] relating to sound or the sense of hearing  (of building materials) used for soundproofing or modifying sound (of a device or system) utilizing sound energy in its operation. (of an explosive mine or other weapon) able to be set off by sound waves.
	noun	[1] the properties or qualities of a room or building that determine how sound is transmitted in it. [2] the branch of physics concerned with the properties of sound.
ACOUSTEMOLOGY_		A term comprised through the combination of acoustics and epistemology; the study of the relationship between the sonic dimension of perception and knowledge of the 'self'.
ACUITY_		sharpness or keenness of thought, vision, or hearing.
ANECHOIC_		free from echo; <i>an anechoic chamber</i>
ANECHOIC CHAMBER_		a room designed to cancel out up to 99.8% of all sonic reflections through advanced tectonics and materiality.
ARCHITECTURE_		[1] the art or practice of designing and constructing buildings. [2] the complex or carefully designed structure of something.
ATONAL_		In music, the absence of functional harmony as a primary structural event.
AUDITION_		<i>archaic</i> . the power of hearing or listening.
DEEP LISTENING_		a term coined by Pauline Oliveros in the late 1980s involving the experience of heightened or expanded awareness of sound, silence, and sounding.
EIGENTONE_		[1] a "self" tone. [2] the tone constituted by the inherent resonant frequencies of a given space or system without the influence of added sound.
EPISTEMOLOGY_		The theory of knowledge, especially with regard to its methods, validity, and scope, and the distinction between justified belief and opinion.
HEARING_	noun	[1] the faculty of perceiving sounds. [2] the range within which sounds may be heard; earshot.

iSPACE_		A virtual space created and influenced by sound(s) and music(s) which are removed from the actual surrounding auditory environment and listened to by way of a stereo audio device, such as an iPod.
KEYNOTE (SOUNDS)_		[1] music. the central tone outlining tonality of a particular composition or piece of music; [2] soundscape studies. the sounds which are heard by a particular society frequently enough to form an auditory backdrop against which other sounds are perceived.
LISTENING_	verb	giving one's attention to sound.
MUSIC_		[1] vocal or instrumental sounds (or both) combined in such a way as to produce beauty of form , harmony, and expression of emotion. [2] a sound perceived as being pleasingly harmonious. [3] any sound or combination of sounds which are desired to be interpreted as such.
MUSIQUE CONCRÈTE_		A musical movement started in the 1950s by Pierre Shaeffer & Pierre Henry which utilized found sounds combined electronically to form music
OCULARCENTRIC(ity)_		[1] (relating to) a tendency to ascribe particular primacy to vision above other senses.  [2] a granted authority of the eye and of the sense of vision.
PHENOMENOLOGY_		The science of phenomena as distinct from that of the nature of being. An approach that concentrates on the study of consciousness and the objects of direct experience.
POLYPHONY_		The style of simultaneously combining a number of parts, each forming an individual melody and harmonizing with each other.
POST MODERNISM_		A cultural and intellectual trend of the twentieth and twenty-first centuries characterized by emphasis on the ideas of the decentered-ness of meaning, the value and autonomy of the local and the particular, the infinite possibilities of the human existence, and the coexistence, in a kind of collage or pastiche, of different cultures, perspectives, time periods, and ways of thinking.
PROPRIOCEPTIVE_		Relating to stimuli that are produced and perceived within an organism, especially those connected with the position and movement of the body.
S.o.A.L_		Acronym for School of Advanced Listening.
SOUND_		Vibrations that travel through the air or another medium and can be heard when they reach a person's or animal's ear.

SOUNDSCAPE\_

Soundscape is a term which was coined by Canadian author and acoustic ecologist R. Murray Schafer in *The Soundscape: Our Sonic Environment and the Tuning of the World*. Schafer said that a soundscape must consist of three elements: keynote sounds, sound signals, and soundmarks.

SOUNDMARK\_

[1] derived from landmark and referring to a community sound which is unique or possesses qualities which make it specially regarded or noticed by the people in that community.

UNFOREHEARD\_

The aural equivalent of unforeseen; pertaining to those sonic events which occur but which have not previously been predicted.

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