Interior Architecture

Ohio University College of Fine Arts School of Art+Design

ART 2640, Building Systems of Interior Environments
Fall Semester 2020
Tuesdays & Thursdays 10:30-11:50
Online

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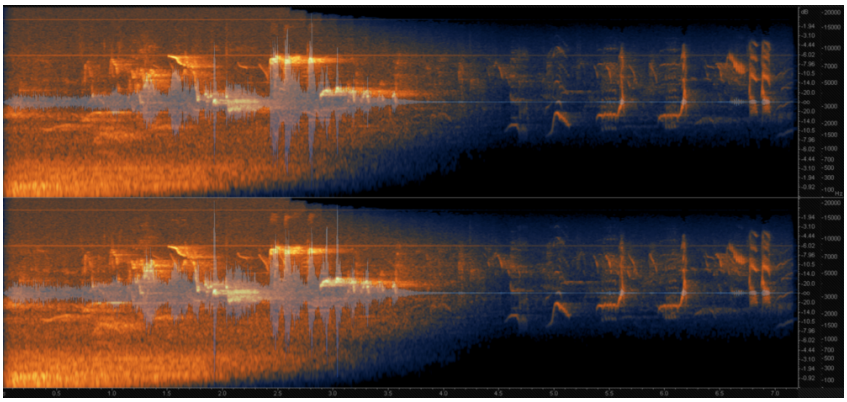

"Soundscape": Acoustics in Interiors

Due: Thursday, October 15, 10:30 am

A soundscape is a sound or combination of sounds that forms or arises from an immersive environment.

The study of soundscape is the subject of acoustic ecology or soundscape ecology.

The idea of soundscape refers to both the natural acoustic environment, consisting of natural sounds, including animal vocalizations, the collective habitat expression of which is now referred to as the biophony, and, for instance, the sounds of weather and other natural elements, now referred to as the geophony; and environmental sounds created by humans, the anthropophony through a sub-set called controlled sound, such as musical composition, sound design, and language, work, and sounds of mechanical origin resulting from use of industrial technology.

Crucially, the term soundscape also includes the listener's perception of sounds heard as an environment: "how that environment is understood by those living within it" and therefore mediates their relations.

The disruption of these acoustic environments results in noise pollution.
Wikipedia

This is to be a report that contains photographs, sketches and clear bullet point statements.
This report is to present an interesting examination of the acoustical properties and your individual, subjective, acoustical experience at two (2) selected locations.

Two (2) Sites to be Studied

1. One **outdoor public** location wherever you are able to get to that is an open, big, safe place.

2. One **indoor residential** location of your choosing wherever you are able to get to: hopefully your own residence.

You are to explore the acoustical characteristics and your perception of the acoustical environment at each of the two selected locations.

Go to the chosen place: spend a minimum of fifteen (15) minutes just listening to the sounds that happen around you at the place.
Spend a few minutes with your eyes closed (if it is safe to do so) just listening to the environment around you.

- List as many of the sounds that you hear as accurately as possible
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- Are the sounds natural, man-made, or a combination of both.

- Identify the location *(precisely where is each)*

- Describe the physical and social characteristics of each location

  (what are the physical elements that make up/define each place; what are the social elements that make up/define each place. what goes on at each place)

- Describe how sound(s) contribute to a sense of 'place' at your locations.

- Describe your experience of the acoustical characteristics of each place *(what does each place 'sound like' overall. what specific sounds do you hear. what sort of response do you have to any or all of the sounds you hear. is the overall 'soundscape' pleasant, annoying, neutral)*

Reference documents (*copy and paste the hyperlink (as it appears on this document) into your web browser if it does not open immediately)*

Noise Control in Buildings

USG: Understanding Acoustics in Architectural Design

Terms You Need To Understand & Reference:

Acoustics:
The science of Sound. Its production, transmission and effects. The branch of physics that treats the phenomena and laws of sounds as it effects people.

Acoustical**:**
The properties of a material to absorb or reflect sound

Acoustical Environment:
The acoustical characteristics of a space or room influenced by the amount of acoustical absorption, or lack of it in the space.

Anechoic -
Literally "without echo"

Architectural Acoustics:
The control of noise in a building space to adequately support the communications function within the space and its effect on the occupants. The qualities of the building materials used determine its character with respect to distinct hearing.
Deals with sound in rooms and building to make them quiet – or to provide improved conditions for listening and understanding speech or music.

Absorption:
The properties of a material composition to convert sound energy into heat thereby reducing the amount of energy that can be reflected. Acoustic absorbers improve room acoustics by

removing sound reflections and therefore reducing the background noise and the reverberation time.

Attenuation:

The reduction of sound energy as a function of distance traveled. (See also Inverse Square Law).

Ambient Noise/Sound:

Noise level in a space from all sources such as HVAC or extraneous sounds from outside the space. Masking sound or low-level background music can contribute to ambient level of sound or noise.

Background Noise:

The sum total of all noise generated from all direct and reflected sound sources in a space that can represent an interface to good listening and speech intelligibility. (Hearing impaired persons are especially victimized by background noise).

Reverberation & reverberation time:

Reverberation time is a measure of the decay of acoustic energy within a room once the source is discontinued. It is defined as the time it takes the sound level to go from 60 dB to 0 dB (which is defined as the lower threshold of hearing)
For good speech intelligibility, the reverberation time in a typical interior room should be less than 1.0 second.
Sound after it is ended at the source will continue to reflect off surfaces until the sound wave loses energy by absorption to eventually die out.

Decibels:

The measure of sound intensity (loudness to our ears)
On the decibel scale, the smallest audible sound which is near total silence is 0 dB.

A sound 10 times more powerful is 10 dB.
A sound 1,000,000 times more powerful than near total silence is 60 dB – normal conversation sound.

<u>Some common sounds and their decibel ratings:</u>

- *Near total silence – 0 dB*
- *A low whisper – 15 dB*
- *Normal conversation – 60 dB*
- *A motorbike – 100 dB*
- *A rock concert or a jet engine – 120 dB*

<u>Perception of Increases in Decibel Level</u>

- *1 dB – Imperceptible Change*

- *3 dB – Barely Perceptible Change*
- *5 dB – Clearly Noticeable Change*
- *10 dB – About Twice as Loud*
- *20 dB – About Four Times as Loud*

Echo:

Reflected sound producing a distinct repetition of the original sound. Echo in mountains is distinct by reason of distance of travel after original signal has ceased.

Noise:

Unwanted sound that is annoying or interferes with listening. Not all noise needs to be excessively loud to represent an annoyance or interference.

Noise Reduction (NR):

The amount of noise that is reduced through the introduction of sound absorbing materials. The level (in decibels) of sound reduced on a logarithmic basis.

Noise Reduction Coefficient (NRC):

The NRC of an acoustical material is the arithmetic average to the nearest multiple of 0.05 of its absorption coefficients at 4 one third octave bands with center frequencies of 250, 500, 1000, 2000 Hertz.

Sabin:

A measure of sound absorption of a surface. One sabin is equal to 1 square foot of open window. Sabins are calculated by multiplying the absorption coefficient of a material multiplied by its area.

Sound Level:

A subjective measure of sound expressed in decibels as a comparison corresponding to familiar sounds experienced in a variety of situations.

Sound Transmission Class (STC):

A single number rating for describing sound transmission loss of a wall or partition.
A rating system designed to facilitate comparison of the sound transmission characteristics of various architectural materials and constructions.

It provides a quick indication of the performance of a partition or material for certain common sound insulation problems.

Speech intelligibility:

A measure of sound clarity that indicates the ease of understanding speech. It is a complex function of psychoacoustics, signal-to-noise ratio of the sound source, and direct-to-reverberant energy within the listening environment.

Transmission:

The propagation of sound through a medium or barrier, 'sound transmission.'

Vibration:

A force which oscillates about some specified reference point. Vibration is commonly expressed in terms of frequency such as cycles per second (cps)