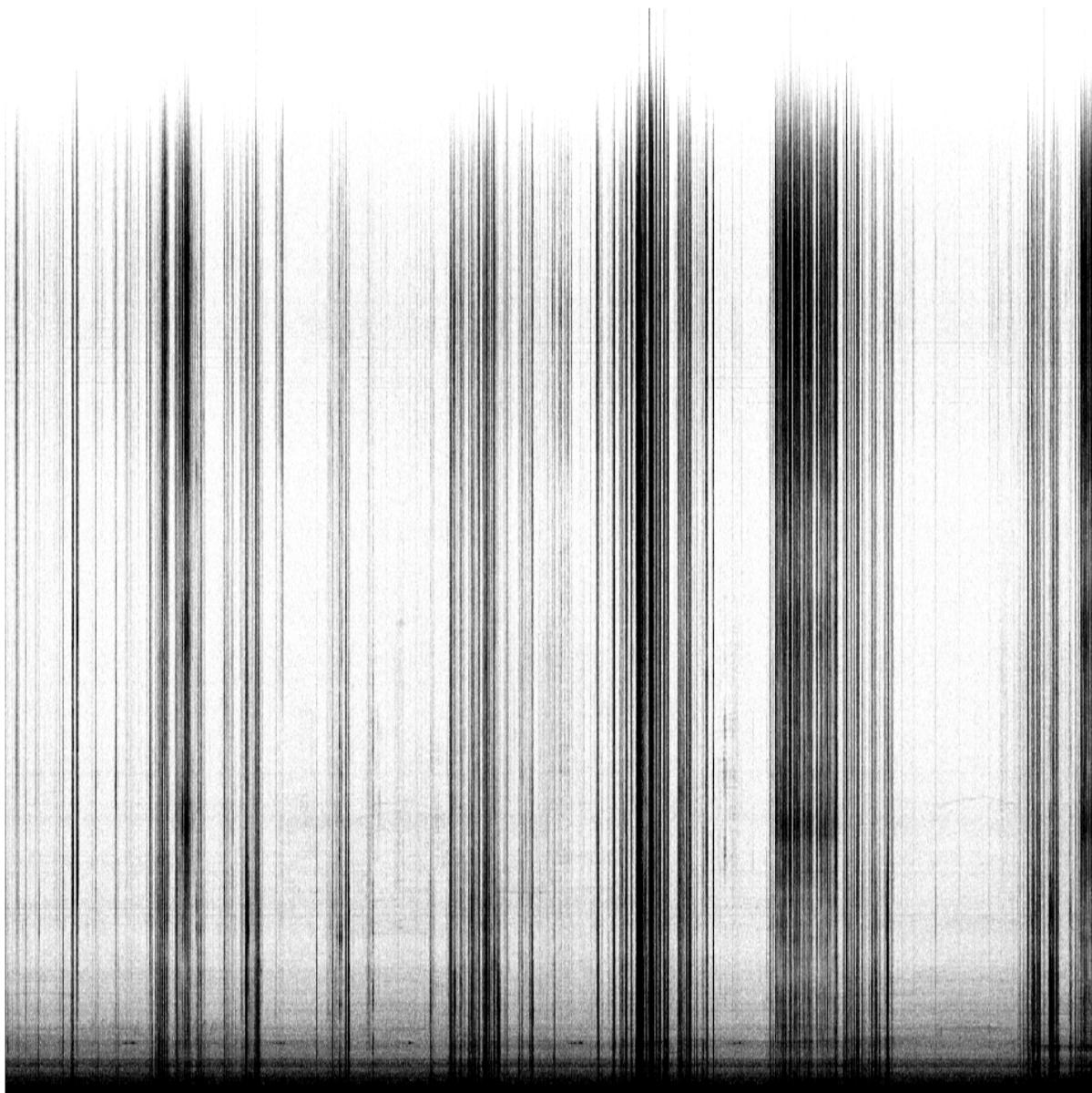


Studio

The Spectrogram Handbook

Personal Studio Visualizations

03



03

Studio.

AUDITORY DISTRACTION MEETS VISUAL COMMUNICATION

RYAN GERADA

GRPH4015-17
003

Preface.

This thesis project was initiated with the intent of studying sound within spaces. It has quickly transformed into a broader study of acoustic ecology, inspired by the works of Walter Murch. I have set out to study the distracting sounds within three selected spaces, all three of these environments range in size and construction assemblies. The studies have been conducted using a portable condenser microphone, each of the selected sounds have been recorded five times. Additionally, this same methodology has been applied to three created sounds, dubbed curated audio for purposes of clarification. These recordings were played and recorded within each of the selected spaces, with the intention of establishing a better baseline comparison of the acoustic qualities of each individual environment. Lastly, five longplay recordings were conducted throughout each of the three environments. The 10 minute longplay recordings are an important part of the study, as it captures the atmosphere of each of the spaces.

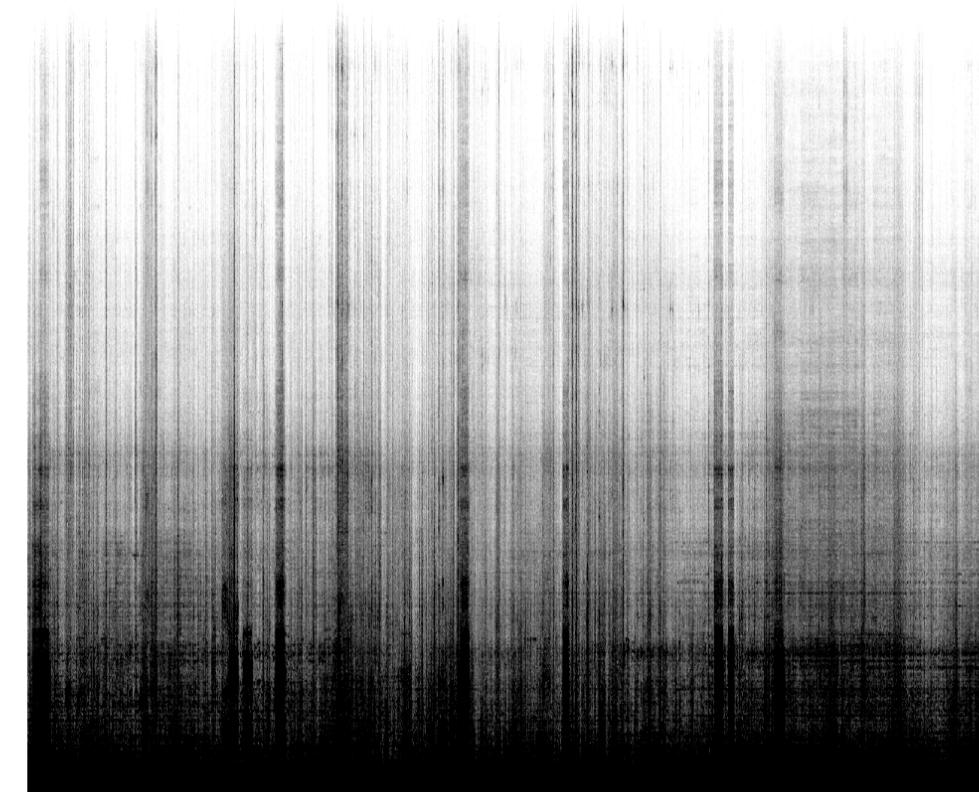
This publication is intended to act as an extension to the Audio Graphic posters on display. You may consider this publication a translator of sorts, its sole purpose is to lower the barrier to entry that has been established with these visualizations. The vernacular used within this manual is intended to educate, and extrapolate on the abstracted imagery you have already been presented with. Insights, comparisons and raw spectrographic visualizations are housed within this book. The content has been generated from my personal studio.

Following this preface, the other two installations within this spectrogram handbook series will be showcased. Additionally, there will be a brief crash course on how to properly read and analyze spectrograms. Of course, you are encouraged to draw your own conclusions.

Cafe

The Spectrogram Handbook
Jimmy's Coffee Visualizations

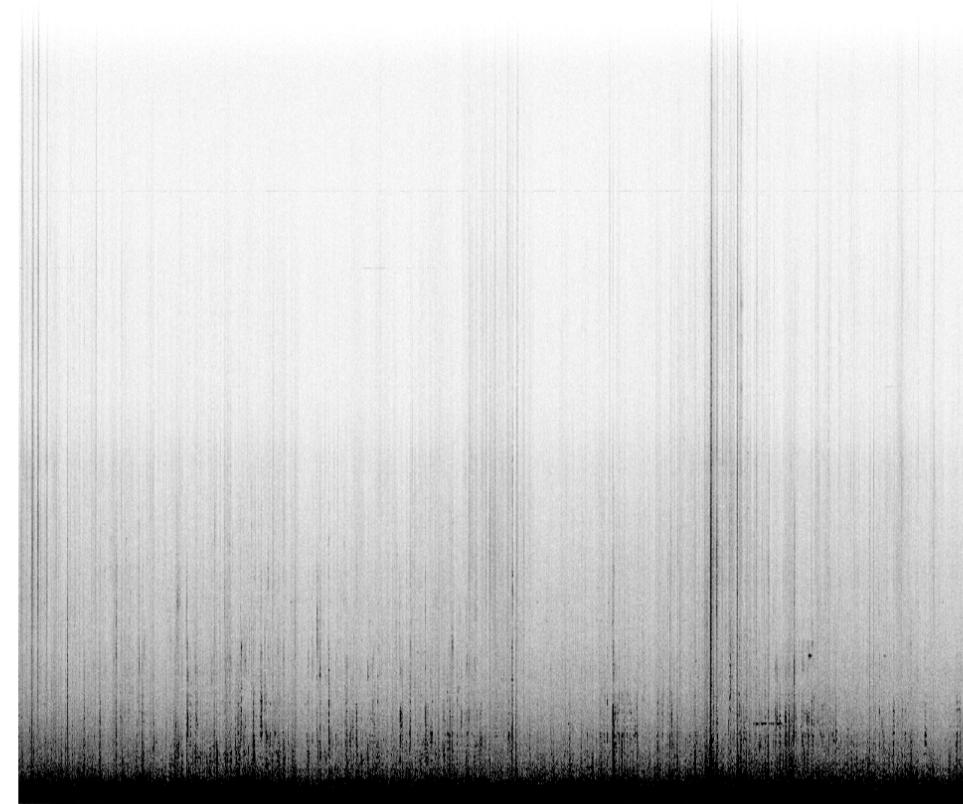
01



Library

The Spectrogram Handbook
Toronto Reference Library Visualizations

02

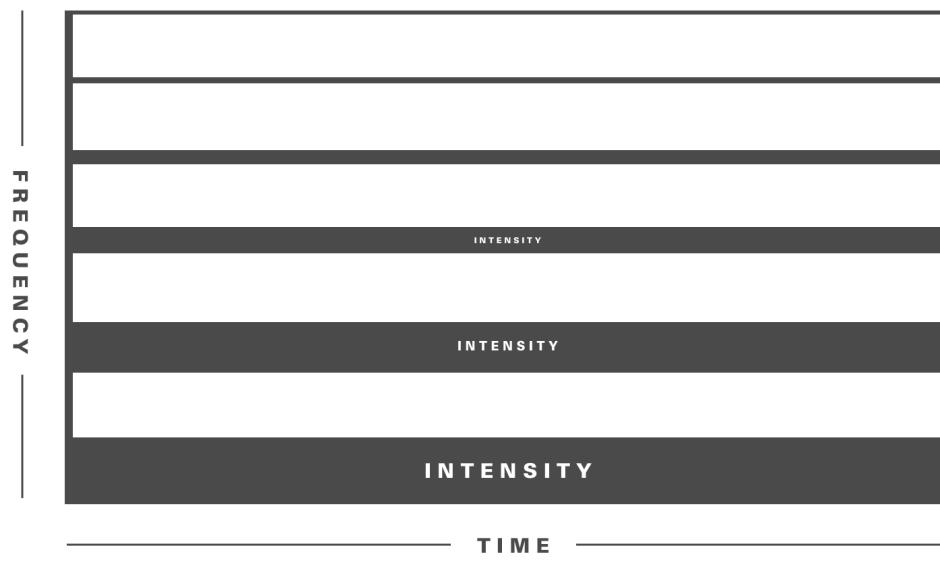


Contents.

ANATOMY OF THE SPECTROGRAM	XII
COMPOSITION BREAKDOWN	XIV
COMPARISONS	01
COME ON IN	11
CURATED SERIES	18
ENVIRONMENTAL INVESTIGATIONS	24

Anatomy of the Spectrogram.

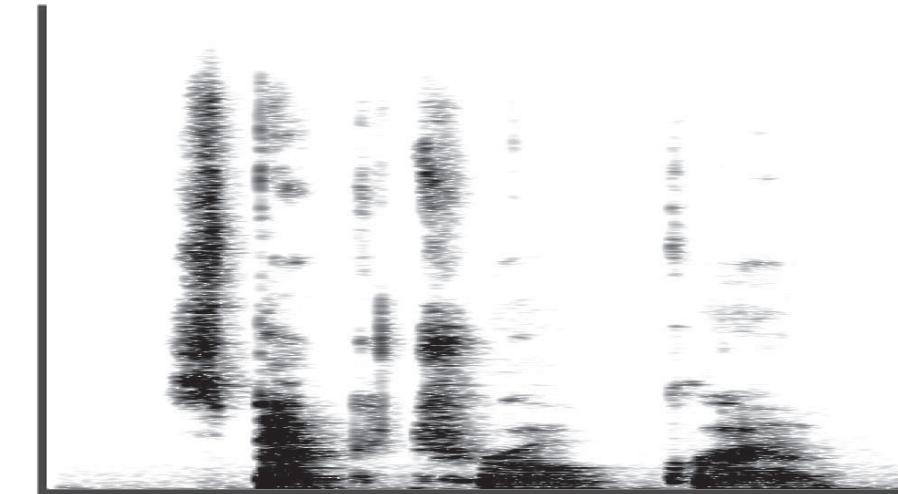
A spectrogram is a picture of sound. A spectrogram shows the frequencies that make up the sound, from low to high, and how they change over time, from left to right. The intensity of the visualization demonstrates the dynamic range of volume, measured in decibels. To the right, you will see a spectrogram visualization of the recorded voice saying "spectrogram".



Frequency
Measured top to bottom.
[22k - 0k hertz]

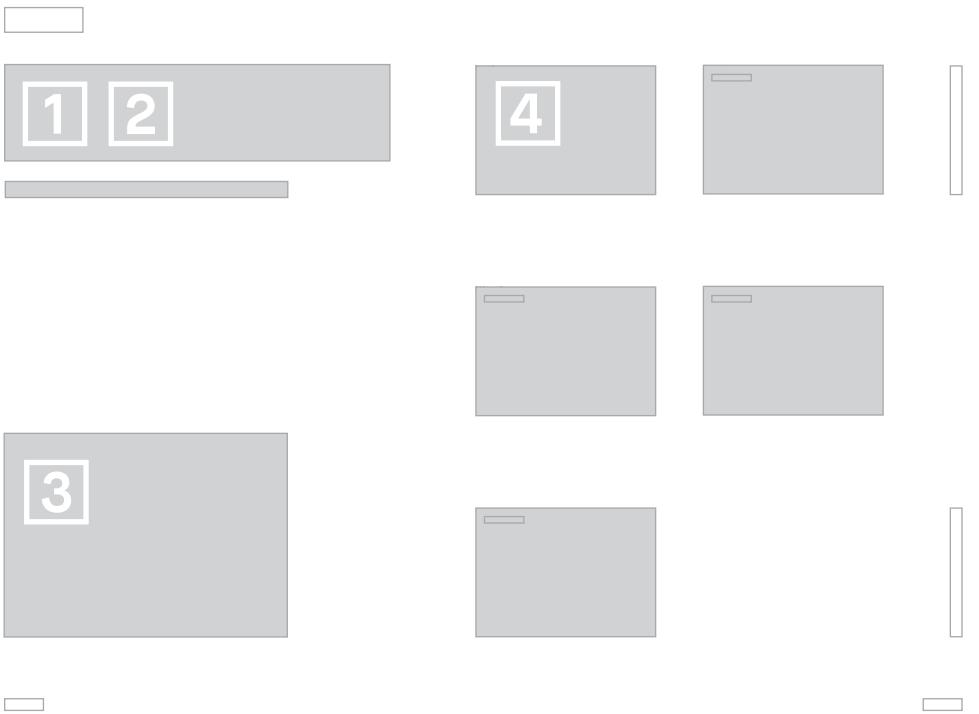
Time
Measured left to right.
[represented in seconds or minutes]

Intensity
Measured in decibels.
[represented by intensity of visual]



Composition Breakdown.

[1-5]



**[1]
AUDIO TITLE**

Title of the audio that is being analyzed.

**[2]
(LUFS) READING**

Loudness units relative to full scale. The LUFS reading provides a quick look at the measured loudness of the five audio files.

**[3]
BODY COPY**

The body copy includes a short description as to what exactly is going on with the sound, and how it pertains to this study.

**[4]
SPECTROGRAMS**

Five recordings were conducted for each sound. These recordings were cropped into ten second soundbytes, and visualized as spectrograms. These visualizations are intended to be compared.

Comparisons & Insights.

The comparison's and insights section will provide a valuable deep dive into the visual implications of these standardized audio recordings. The curated audio was designed to be diverse in its playback through all three instalments. Additionally, the recording conditions were encouraged to accurately represent the environment. The acoustic ecology of spaces was a major study within this body of work, it is within these comparisons that the research comes to life.

Moving forward, the curated audio samples will act as a means of comparison. Firstly, five particular recordings were conducted, using each of the three unique curated audio samples. The curated pad sample was played and recorded for 20 seconds, while both the curated synth and voice were played and recorded for 10 seconds. These five individual recordings have been amalgamated, resulting in a visually dense spectrogram. This has been done for each of the curated audio samples, within each of the individually studied spaces.

This publication will first highlight the combined visualizations with the intent of providing a visual overview of the spaces. Next, each of the curated audio samples, unique to my personal studio will be visualized in the standard format.

It is encouraged to draw your own conclusions on the implications that these spectrograms might have.

Curated Pad (combined)

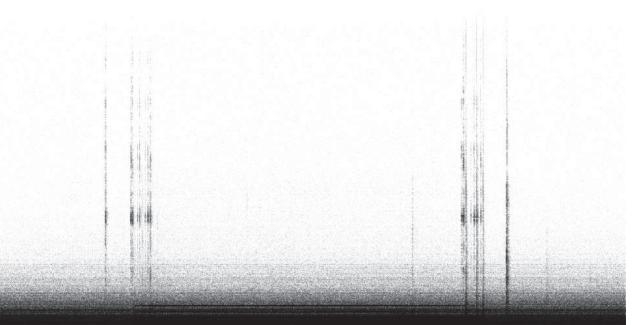
The curated pad spans for 20 seconds within each of the recordings. The audio was created to intentionally swell in two places during playback, while maintaining a discrete audio signature. Distinguishing the curated pad audio sample within the top two visualizations, Jimmy's and the Reference library, becomes quite difficult in comparison to the studio recordings. Extrapolating from these general observations, it is clear that the ambiances of the top two spaces have contributed to a large amount of distortion within the visualizations.

Focusing on Jimmy's visualization, there is a lot of congestion in the low to mid ranges, resulting in the intense blacks that litter the lower half of the spectrogram. Naturally, the bustle of a coffee shop would contribute to a great deal of noise, drowning out the unpronounced audio clip.

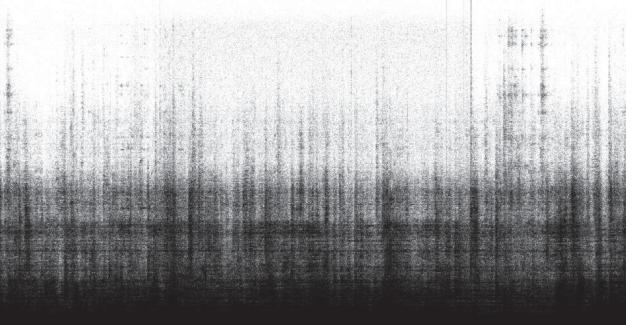
The Reference library finds itself somewhere comfortably in the middle of the other two spaces. It can be concluded by the heavily washed grey background that there was in fact quite a bit of background ambiance within the space, although it has been set into the background of the space for the most part. The peaks of the curated pad reveal themselves in the later portion of the spectrogram, around the 7 second mark. However, without the studio as a point of reference, it would be difficult to distinguish the similarities between the top two spaces.

Finally, the personal studio space reveals hints of the pad sound, however subtle it is, the lack of background noise allowed for a clean recording, later resulting in a clean visualization. The pad can be seen swelling at two points most prominently, with a bit of a low frequency hum plaguing the lower portion of the spectrogram.

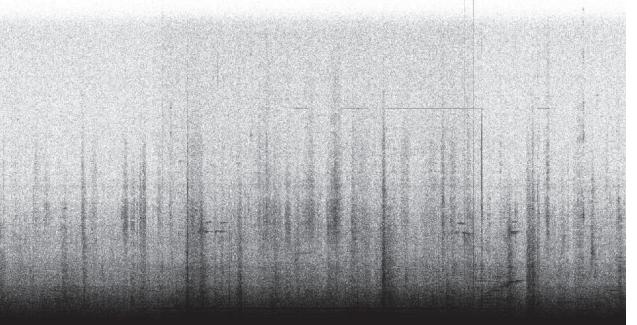
PERSONAL STUDIO



JIMMY'S COFFEE



TORONTO REFERENCE LIBRARY



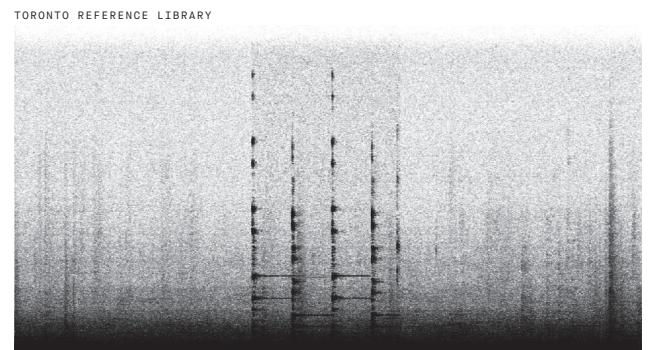
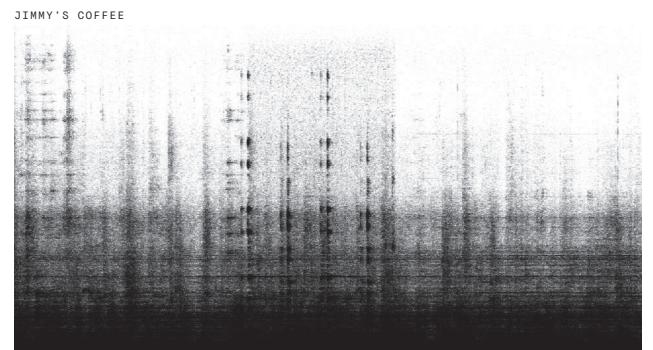
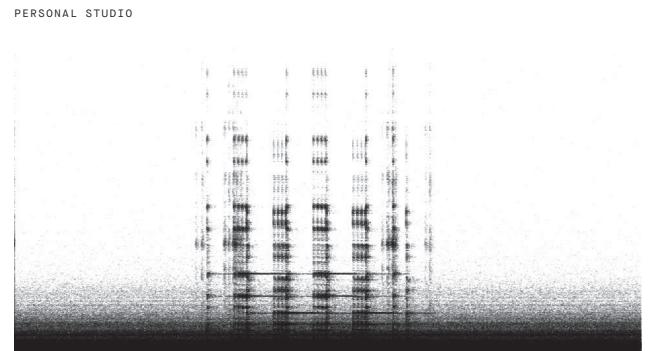
Curated Synth (combined)

The curated synth spans for 10 seconds within each of the recordings. The audio was created to peak sharply, in rapid succession. This arpeggio of sorts was designed to be easily distinguishable, even in crowded, noisy environments. Using the personal studio visualization as a point of reference, the audio leaves a unique signature that punches through the ambiances of all three spaces. This visual can be identified clearly in all three of the visualizations.

Jimmy's visualization falls victim to the crowded acoustics of the space. However, the curated synth audio manages to pierce some of the lower frequencies, resulting in the upper half of the spectrogram revealing the synth. The ambiances of the coffeeshop have dominated the lower portion of the visualization, although the curated synth still peaks through down there because of its varied intensity.

The Reference library hosted the audio quite well. Although the space has been washed in grey, the punctuation of the curated synth audio stands strong within the visualization.

As for the studio space, it provides a strong canvas for the visualization to stand up against. The intricacies of the sound can be clearly seen here as the white background showcases the line work through nearly the entire spectrum of frequencies.



Curated Voice (combined)

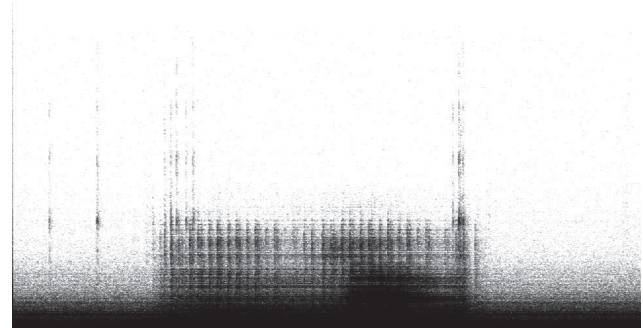
The curated voice spans for 10 seconds within each of the recordings. The audio was created to test the dynamics of the human voice when played back within each of the spaces. The intent with each of these curated sounds was to bring a unique auditory signature to the forefront, the human voice was the last logical fit in the trio. The studio recordings reveal a strong presence in the low to mid range frequencies,

The unique qualities of the curated voice audio are almost completely lost in the ambiances of Jimmy's, it is difficult to visually distinguish the particular peaks or valleys created by the presence of the voice within the space. The intense blacks flood the bottom of the spectrogram, washing away any unique attributes that the voice may have brought to the space.

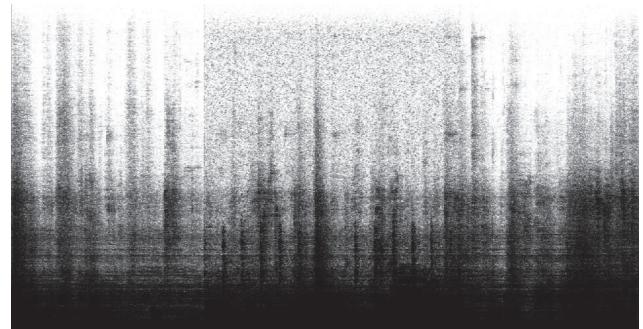
The Reference library provides a strong grey washed background for the voice to sit upon. The ambiances of the library are constant, but not intense enough to destroy the visual properties of the voice.

The personal studio recording dances across the bottom third of the spectrogram, the curated voice is heavily comprised of low to mid range frequencies. The striations within the visualization show a staggering of the voice playback, as if the speaker is not confident in what he is saying.

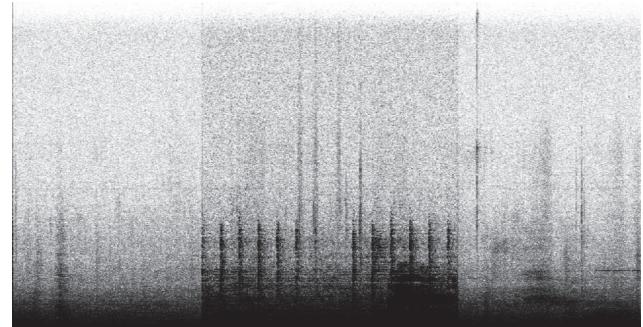
PERSONAL STUDIO



JIMMY'S COFFEE



TORONTO REFERENCE LIBRARY



Conclusion.

It is clear that there is a wide variance between the visual noise that is depicted within each of the spaces. Jimmy's coffee inherits much of the ambiance that constantly swirls around the coffee shop. The Toronto Reference Library falls somewhere in the middle - it hosts the curated audio quite well, as there is little distortion of the visualization. However, the intricacies within each of the audio samples are sometimes drowned out in the visualization. As for the studio recordings, the lack of ambient noise has provided a strong platform for the audio to sit upon, this comes out clearly within the visualizations.

Ultimately, I am happy with the results of this comparative experiment. I believe the selection of the curated audio works well in its diversity, each of the sounds are unique in their structure, frequency range and theme. The visualizations themselves act as a strong metaphor for each of the spaces, visually, you are able to quickly digest the happenings of the space. The acoustic ecology of each of these environments has been clearly displayed through this series of visualizations.

Combining the 5 recordings have worked well in amplifying the visual intensity of these spectrograms. Although accuracy has been sacrificed in the process, the next pages will display the separated visualizations of each of the recordings taken in my studio.

Come on in.

The studio recordings were the least public of the trio. Of course, having the privacy of my own space would allow for such. The studio space functions as a multipurpose - doubling as a bedroom, it is one of two bedrooms in a downtown apartment. A suitable 15 square foot space serves its purposes well as both a functional studio space as well as a bedroom. The allocation of space is roughly cut down the middle, with the desk and working space occupying the near side of the room, while the bed rests comfortably against the far side of the space. The apartment space itself is quite modular, its exterior walls are constructed out of sturdy concrete. It can be implied then that the floors and roof of the space are also concrete. This plays a major role in how muted the acoustics are. With 8 foot concrete ceilings, and sturdy concrete floors, the recordings capture a crisp, unobstructed sample of sound. Compared to the acoustic properties of the other two spaces, the studio recordings stand out as the cleanest, most defined of the trio.

All of the recordings were taken from inside the working space, although some of the sounds recorded did not directly occur within the space, the microphone was positioned to capture a genuine snapshot of how the sound would interact from within the working space.



SPECOTROGRAM
HANDBOOK



14



15

ENVIRONMENTAL ANALYSIS

COME ON IN



16



17

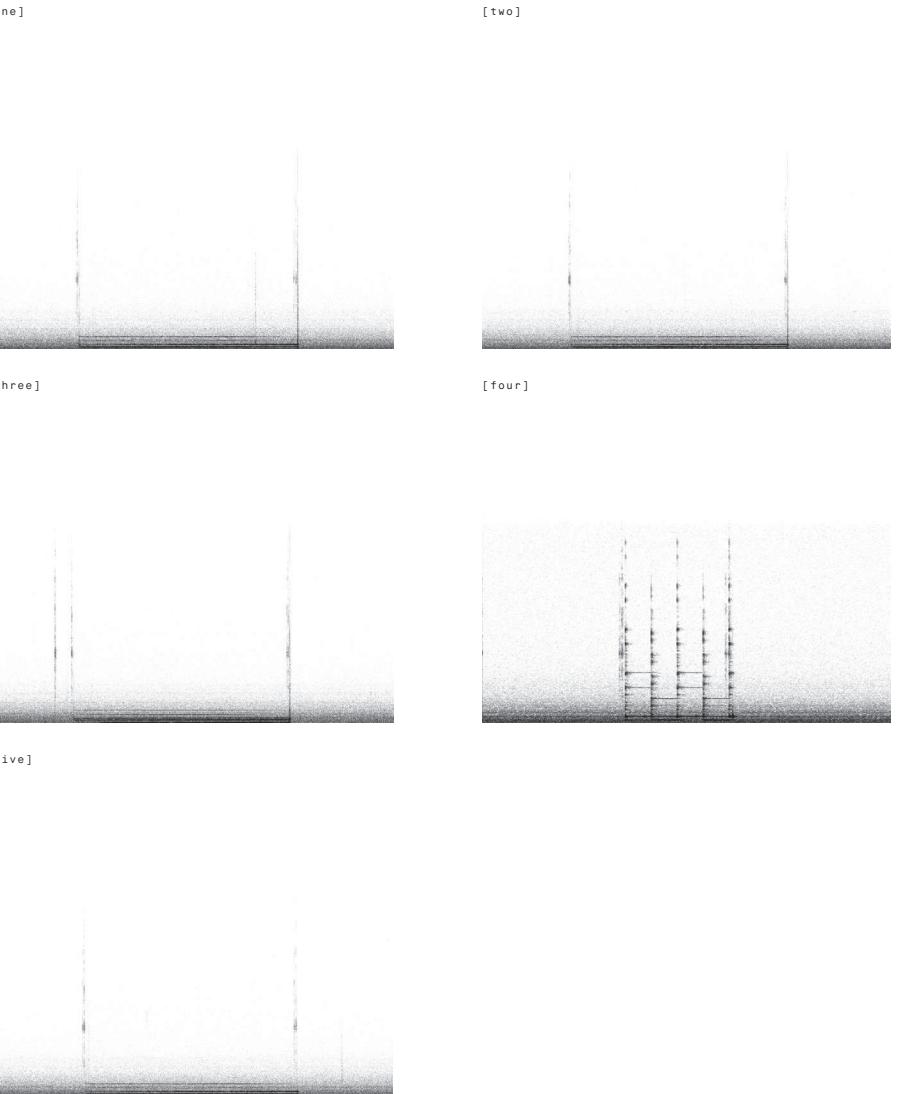
Curated Pad

MOM (MAX): -19.35 (LUFS) at 00:00:07.802
SHORT (MAX): -23.77 (LUFS) at 00:00:09.846

This curated audio clip is 20 seconds.

A long, droning pad gathers momentum as the sound begins to swell as it almost simultaneously fades away.

Recording of the curated audio clips was conducted within the space, using a medium sized speaker to boom the pre-rendered audio into the coffee shop.



Curated Synth

MOM (MAX): -18.50 (LUFS) at 00:00:03.901
SHORT (MAX): -21.53 (LUFS) at 00:00:06.131

This curated audio clip is 10 seconds.

An arpeggio loops for a few seconds, then, it suddenly ends.

Recording of the curated audio clips was conducted within the space, using a medium sized speaker to boom the pre-rendered audio into the coffee shop.

[one]

[two]

[three]

[four]

[five]

Curated Voice

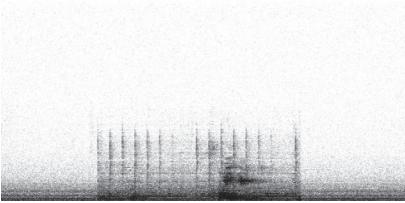
MOM (MAX): -15.84 (LUFS) at 00:00:05.945
SHORT (MAX): -20.90 (LUFS) at 00:00:07.617

This curated audio clip is 10 seconds.

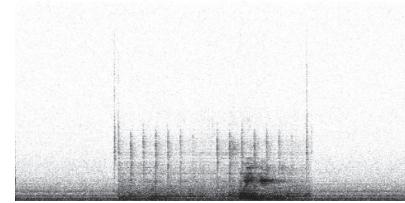
An amalgamation of sampled audio of voices were combined from all three spaces, these voices were anonymous.

Recording of the curated audio clips was conducted within the space, using a medium sized speaker to boom the pre-rendered audio into the coffee shop.

[one]



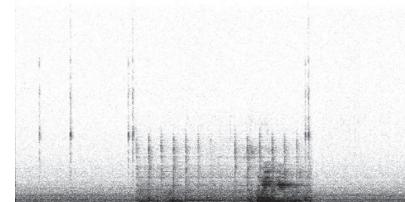
[two]



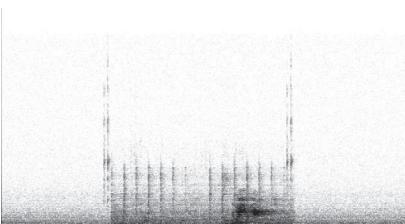
[three]



[four]



[five]



Rustling Chair

MOM (MAX): -19.70 (LUFS) at 00:00:04.273
SHORT (MAX): -22.49 (LUFS) at 00:00:06.502

The rolling of the wheels on the concrete floor, and the creaking of the reclining office chair.

Navigating or getting comfortable, these recordings were captured while I was sitting at my work space within the studio.

These sounds happen frequently, reclining, repositioning, and moving all provoke a distracting shriek out of the chair.

The audio was captured at a close distance, within the studio's workspace.

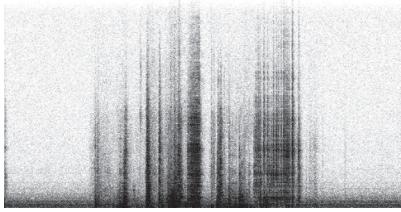
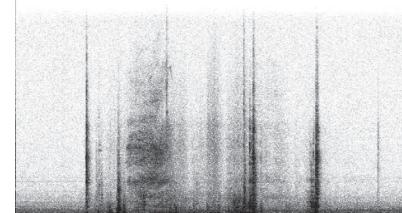
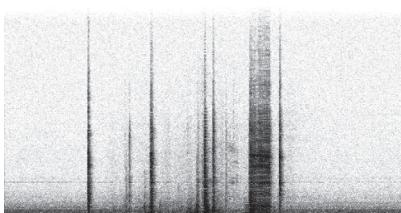
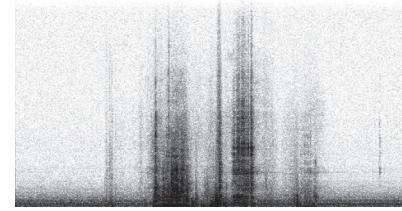
[one]

[three]

[five]

[two]

[four]



Mouse Clicking

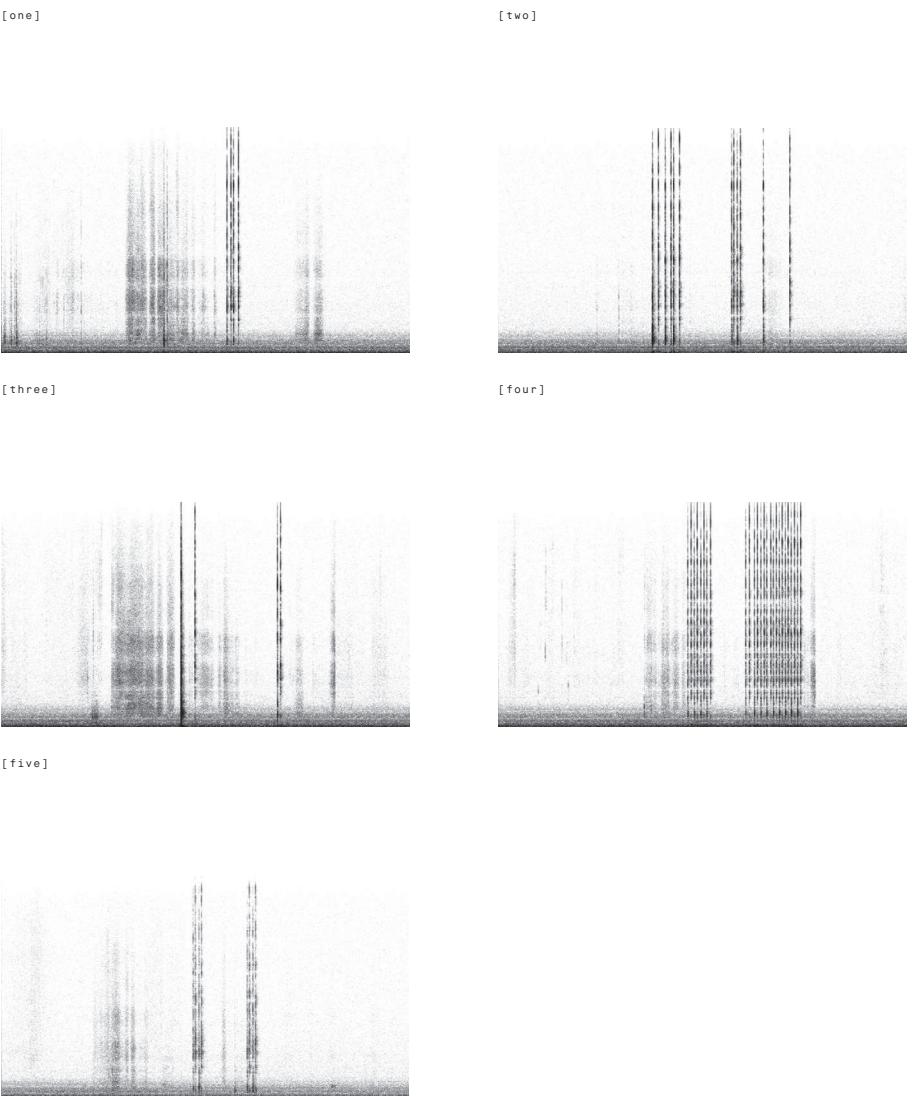
MOM (MAX): -21.92 (LUFS) at 00:00:04.644
SHORT (MAX): -28.71 (LUFS) at 00:00:06.502

Operating my computer mouse.

While working within the studio space, bursts of mouse clicks can be heard blooming from the space.

Although these sounds are frequently produced by me, the bursts of sound can still be a distracting.

The audio was captured at a close distance, within the studio's workspace.



ENVIRONMENTALLY SPECIFIC AUDIO

SPECTROGRAM VISUALIZATIONS

Door Opening

MOM (MAX): -18.52 (LUFS) at 00:00:02.973
SHORT (MAX): -22.68 (LUFS) at 00:00:05.759

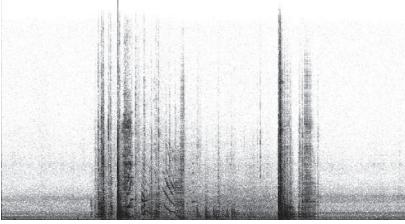
The entrance way into the apartment with the studio space.

Heard from the confines of the studio, the creaking of the opening and closing door intrude on the silence of the space.

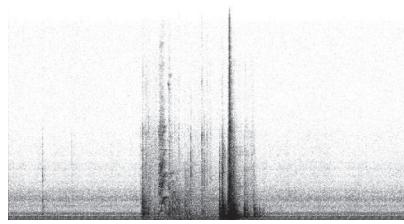
Guests opening the door, or my roommate returning home from work often pull me away from my train of thought.

The audio was recorded at a distance, from within the studio's workspace.

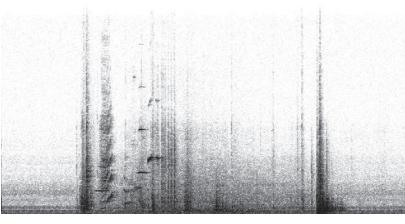
[one]



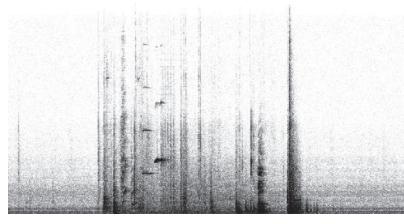
[two]



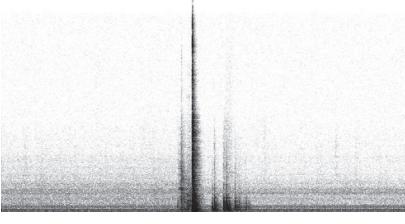
[three]



[four]



[five]



Fan

MOM (MAX): -22.74 (LUFS) at 00:00:05.573
SHORT (MAX): -24.29 (LUFS) at 00:00:06.131

The fan that provides the general circulation of air within the space.

The clicking of the inner workings spark to life as the fan's thermostat initiates it's request. The fan functions on the opposite side of the wall separating the studio space from the rest of the apartment.

The fan frequently turns on to maintain the temperature, the operating sound drowns out into the background. However, the initial spark to initiate the system is pierces the acoustics of the space.

The audio was captured at a medium distance, from within the studio's workspace.

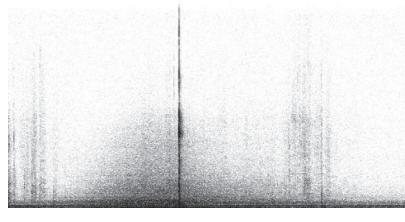
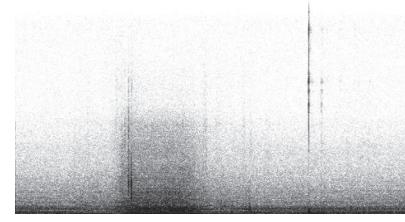
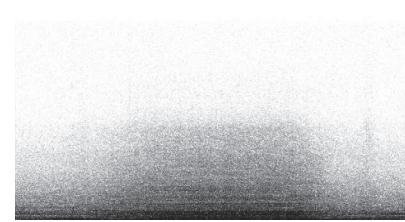
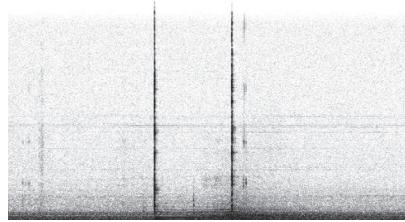
[one]

[three]

[five]

[two]

[four]



Footsteps

MOM (MAX): -18.42 (LUFS) at 00:00:05.016
SHORT (MAX): -23.94 (LUFS) at 00:00:05.945

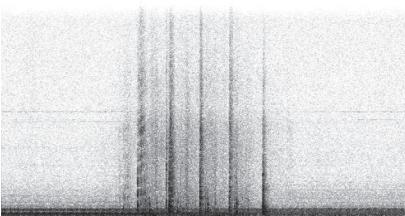
Living with me is my roommate, which at the worst of times brings with him a lot of commotion.

These recordings are of his footsteps from around the house as I work within the studio.

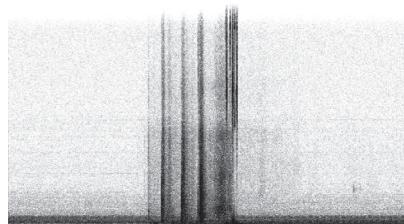
Movement within the main hall of the apartment is frequent, the footsteps can be easily heard from the confines of the studio. The break in the silence proves to be reliably distracting.

The audio was captured at a distance, within the studio's workspace.

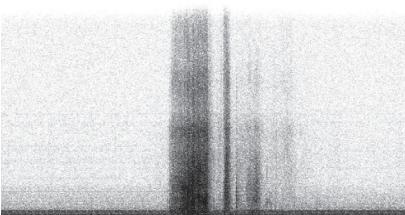
[one]



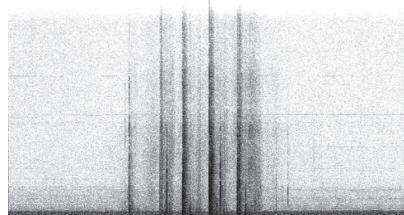
[two]



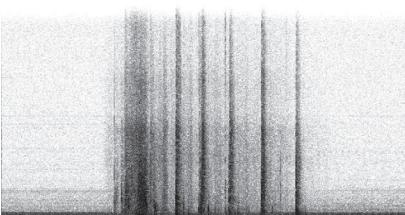
[three]



[four]



[five]



Typing, Keyboard

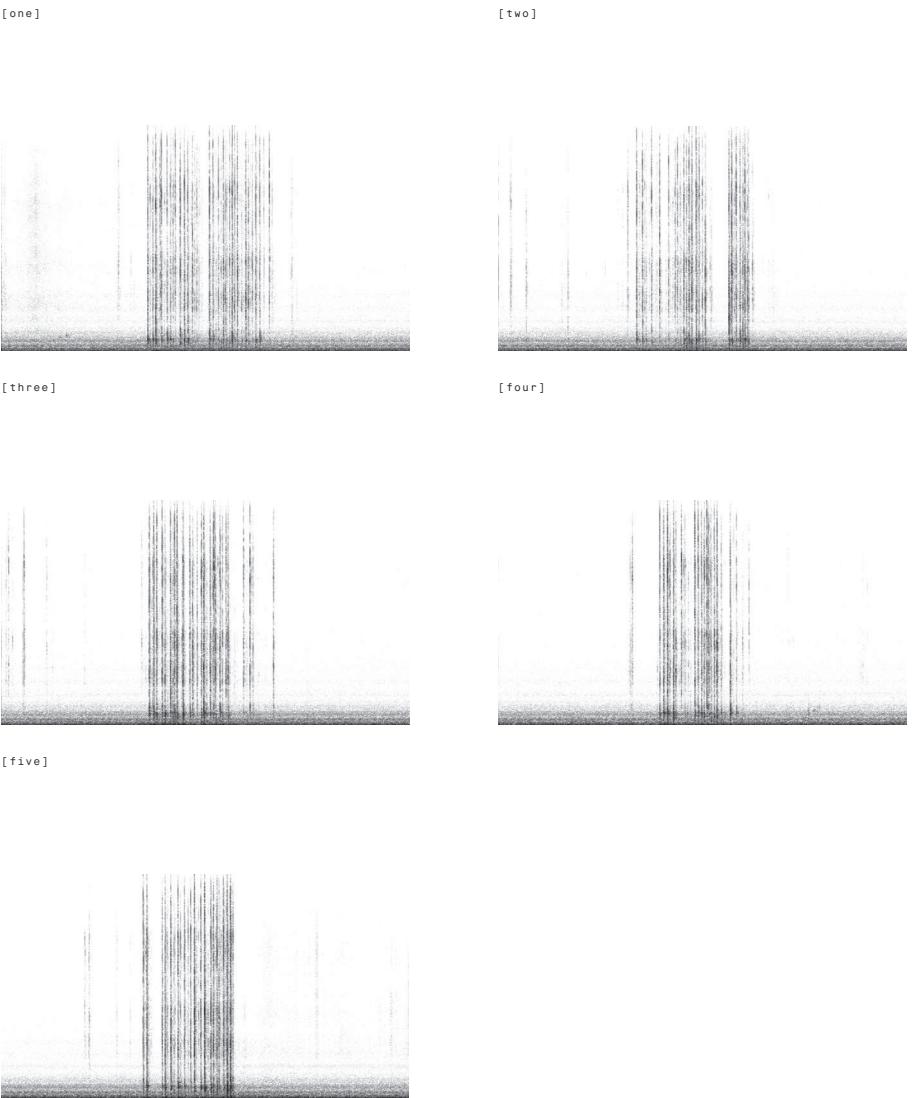
MOM (MAX): -31.38 (LUFS) at 00:00:05.759
SHORT (MAX): -33.48 (LUFS) at 00:00:06.316

The clattering of the keyboard's keys.

The typing can be heard bursting from the keyboard while work is underway.

Similar to the mouse clicks, this sound is frequently created by me. the clattering of the keyboard can lead to loosing your train of thought.

The audio was captured at a close distance, within the studio's workspace.



Miscellaneous Bang

MOM (MAX): -7.72 (LUFS) at 00:00:04.087
SHORT (MAX): -13.50 (LUFS) at 00:00:06.316

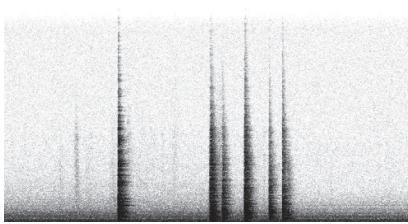
The banging of an object or objects.

These recordings have been sourced from around the space, for example, the clattering of pots or pans from the kitchen often intrude on a quiet working session within the studio space.

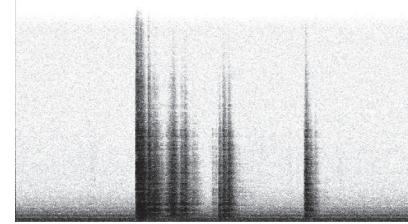
These sounds occur frequently around the apartment, they can be clearly heard from within the studio space. Their randomness distracts you from your work, as you curiously ponder the source of the sound.

The audio was captured at a distance, within the studio's workspace.

[one]



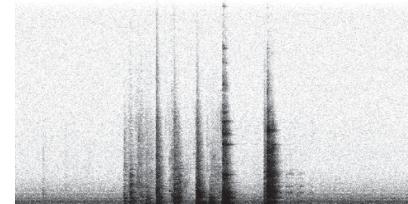
[two]



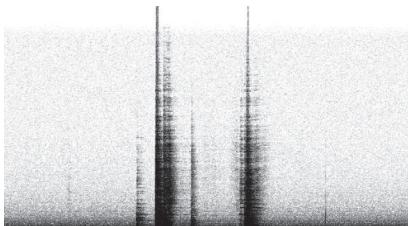
[three]



[four]



[five]



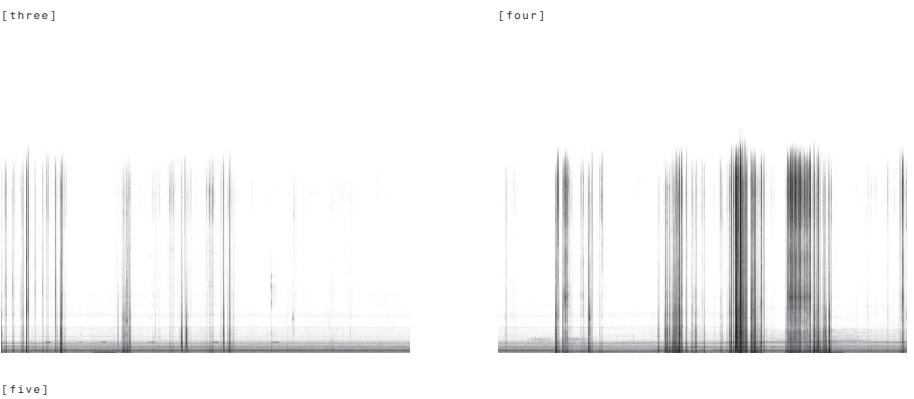
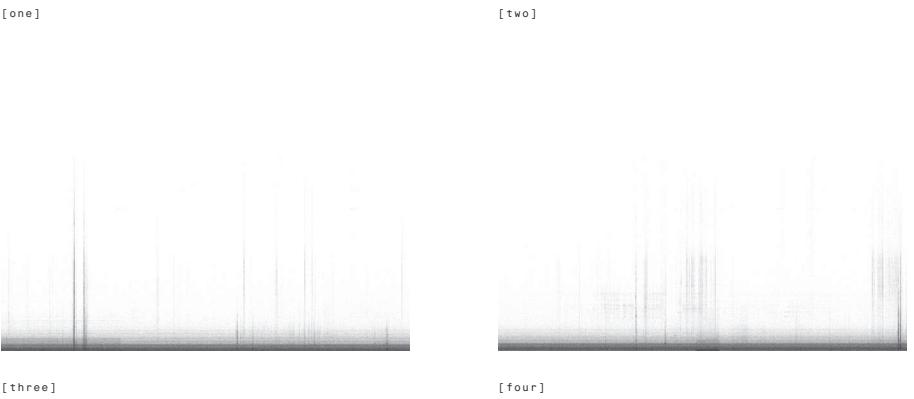
Longplay

MOM (MAX): -3.57 (LUFS) at 00:05:52.387
SHORT (MAX): -9.34 (LUFS) at 00:05:54.987

The longplay recording is 10 minutes.

The longplays curiously capture the ambiance of the environments.

All 5 recordings take place in different locations from around the coffee shop.



ENVIRONMENTALLY SPECIFIC AUDIO

SPECTROGRAM VISUALIZATIONS

