

DESN 275 Digital Sound - Week 1

Assignments:

1 Audacity Assignments:

• First download a version of Audacity for your operating system at <https://sourceforge.net/projects/audacity/> And copy LAME into the Audacity folder so that you can make MP3 files. See the links on the drbraukmann.com.

• Using the Audacity User Guide and On-Line Manual, become familiar with the following processes: *opening a wave or aiff file, importing an mp3 file, loading a second file into a second or third track, playing stopping or rewinding a sound, selecting a portion of or the file with either the selection tool or the selection menu options for editing, trimming out a portion of a sound file, adding a fade in or fade out, changing the level of the sound up or down (amplify), making the volume rise or fall over sections of the sound, and exporting the sound as an MP3. Also, know how to create white, pink, and brown noise.*

2 • Learn how to use FTP and upload a sound file successfully. (Common software for uploading: *Fetch* on Mac, *Filezilla* for Windows or Mac.)

3 • This is an easy one to get you used to the class system. Using only sound files from our class web site, create an interesting 10-second collage. Save it in your folder as MP3 with the following naming convention: *yourNameWk1As2.mp3* Our FTP site is www.drbraukmann.com The username is **stus1** and the password given in class.

4 • Complete the in-class lab activity. We need rain, thundering seas, and the captain in the background. Create whistling wind (two or three layers of 3 second chirps?) and add creaking wood (door creak slowed down?) from our class website. Save it as an MP3 with the same convention: *yourNameWk1As3.mp3*

5 • Read the supporting information below, and be able to answer the study questions that follow.

Evaluating Headphones

What qualities should a headphone have for someone mixing sound?

- All frequencies produced at an even level
- Comfortable for long sessions
- Able to reproduce detail
- Optional: isolate you from distracting outside sounds.

Generally ear buds add problems because they don't couple with your ears consistently.

What does frequency response tell you about the performance of headphones?

Unlike most speaker manufacturers, headphone designers are not striving for a ruler-flat frequency response: most headphones exhibit a hump of up to 4dB between about 40Hz and 500Hz, to compensate

for the fact that you don't 'feel' the bass frequencies through your body as you do with loudspeakers. At higher frequencies above 1kHz they generally exhibit a gentle roll-off (perhaps 5dB down at 20kHz), to compensate for the fact that the drivers are right against your ear.

This is why a "popular" sounding headphone may have a little extra middle bass response, and not really be as accurate in presenting all the frequencies evenly.

Lecture Notes (and answers to study questions)

Explain sound in terms of compressions and rarefactions.

A single sound wave consists of an increase in pressure (compression) followed by a decrease in pressure (rarefaction).

What, in general, does the thickness of sound absorbing material have to do with the material's ability to absorb all frequencies?

Say you moved around in your room and found a couple spots where certain musical notes, especially bass notes, were either too low to hear, or twice as loud as anywhere else in the room. What is probably going on?

What does a resonator do to a sound?

The resonator (body of a guitar or violin, the shell of a drum, and the throat of a human) determines the timbre of a sound. Also, without the resonator, the sound level might be too low to be useful.

What is pitch? How is it related to frequency?

Pitch and frequency are closely related. Pitch is a terms used by musicians, and is a measurement of sound made by your brain. Both pitch and frequency are given in cycles per second. However you brain does more than just observe frequency. It analyzes the sound in relation to perceptions it has received before, such as the sound being a harmonic interval of a perfect fifth played on a piano.

What frequencies of sound pass through the ear canal most easily? About 1k to 5k Hz

You need your ears to be in great shape if you intend to edit sound. What do you lose if you expose your ears to damagingly loud sounds?

Hearing can become dull or muted. The range of frequencies that can be distinguished can shrink. Persistent ringing, or tinnitus, can develop.

In what ways is the perception of sounds different than the physical properties of those same sounds?

Our ears hear a range of levels that can be represented as from 1 to 1 trillion! However, to make a sound seem twice as loud to us, we must put 10 x the energy into the sound. So our perception of level is not linear. Also we are more sensitive to frequencies

between 1 k and 5k Hz. So those sounds require less physical intensity.

Some Common terms:

Hertz *cycles per second*

Period *the time needed for one cycle*

Ultrasonic

a higher frequency than we can hear

Loudness

*the **perceived** intensity of a sound*

Amplitude (is it different from loudness)

the actual measureable intensity of sound.

Waveform *the shape created if we plot amplitude vs time on a graph*

What is Timbre?

The harmonics in a sound of a particular instrument. This is related to the term overtones on musical notes, and formants in the human voice.

What is noise in a general sense?

Any sound we don't want. It might be static or hiss in electronic circuits, a fan running in the background of a film dialog recording.

What is white noise? What is it based on?

Random bits of frequencies. All frequencies between 20 Hz and 20k Hz are represented. It sounds bright because there are lots of possible frequencies in the higher ranges.

What is pink noise? What is it based on?

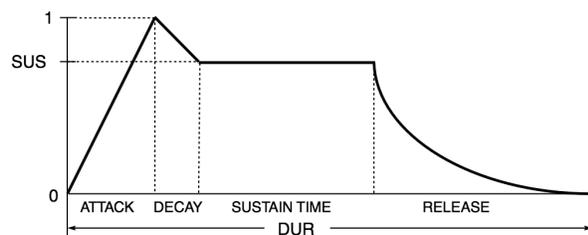
Random bits of frequencies. The frequencies are represented proportionally by octaves between 20 Hz and 20k Hz. It sounds lower or warmer because there are proportionately more low frequencies represented; because there are proportionately more octaves the lower you go!

Which sounds brighter: pink or white noise?

White noise.

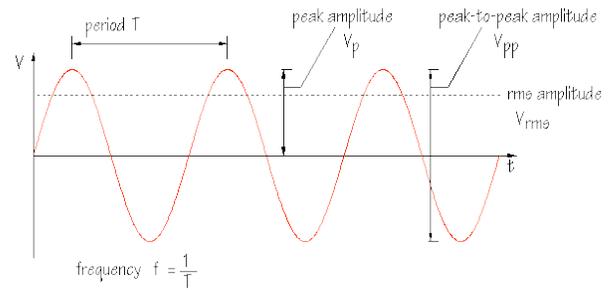
Which represents human hearing best: pink or white noise? *Pink noise.*

What is an amplitude envelope? (be able to sketch one)



What is meant by attack decay sustain release?

What do the horizontal and vertical axes on a waveform represent?



If we get to it this week...

Where should monitor speakers not be placed?

Why does it make sense to measure sound intensity in **decibels**, considering it is some logarithmic math thing that sounds kind of complicated?

How many dB do you think would represent the difference between a quiet media background sound and a very loud one?

If you want sound 1 to seem to be twice as far away from the listener as sound 2, how much quieter should sound 1 be in dB?

Lecture study questions

Explain sound frequency using the term "cycles."

How is "pitch" related to frequency?

What are Hertz (Hz)?

What is the speed of sound?

What do overtones look like on a waveform?

Why do we compare waveforms to sine waves?

What is a periodic waveform? A complex periodic waveform?

What is the relationship between wavelength and frequency?

What is the general range of human hearing (that is for those people who have not worked in construction, have not owned a big car stereo, and have not attended rock concerts or trap shoots without earplugs)?

In typical musical tones, what % of the total sound heard is represented by the fundamental tone? (50%)

What do dogs hear that you can't hear?

What is the fundamental frequency range of a typical male voice (baritone)? *110-425 Hz* Of a typical female voice (contralto)? *200-700 Hz* Of a bass guitar or double bass? *40-200 Hz* Of a piano? *28-4100 Hz* Of an alto saxophone? *125-900 Hz*

If you were preparing sound for a scene in a subway, would you mostly want to create the effect of reflection, scattering, or absorption?

Vocabulary from Class. Be able to explain and use these terms.

Interference of sound waves, beats

In phase, out of phase

Surface Effects including Reflection,

Absorption, Diffraction,

Standing Waves

Explain why sound sources that are either in-phase or out of phase change the amplitude of the sound. Could you draw a diagram to illustrate?

What are the characteristics of a good mixing / listening room?

What is a sound's "envelope"?

What are the four parts of a sound envelope?
(“Always Deliver the Spokesman Review”)

What is pink noise? What is white noise?

What frequency range is *easiest* for humans to hear?

Why is that frequency range (above) important for sound editors to know?

Study Questions from Web Reading – The links to the web resources needed to answer these questions are found at drbraukmann.com. NOTE, you may not have to read the *entire* article, just the sections that correspond to the study questions below...

Room Acoustics for Home Audio

When are reflected sounds in a listening room *good*?

When are reflected sounds in a listening room bad?

What are recommended ways to minimize the bad reflections in a room?

Explain standing waves. How do they happen?

What kinds of rooms have the worst standing waves?

Which is better: a flat ceiling or a sloped ceiling?

What is flutter echo?

What reduces flutter echo?

How do movie theaters avoid flutter echo?

Explain sound diffusion. What for instance might cause sound to be diffused?

How can you use a real mirror to help you find spots on your walls where sound absorbers would work the best?

What are the two main categories of room acoustic problems?

1. Reflections of mid-range and high frequencies from hard surfaces; and 2. peaks and troughs in the room's low-frequency response caused by the room's dimensions (standing waves), parallel walls, and the reflectivity of the walls at low frequencies.

What is the problem with "acoustic mirror" surfaces?

What does a *diffuser* do to the sound?

Acoustics/Basic Room Acoustic Treatments

What are three things that can happen to sound when it strikes a surface like a wall?

What are "standing waves"?

What kinds of rooms have the worst standing waves?

What can you do to reduce standing waves in your room?