

**SOUND &  
SENSATION  
2**



**HEARING**

# Physicality

Sounds are often felt not only in our ears but also in our bodies.

Lower frequencies are often felt in our lower torso, pelvis, thighs and legs.

Middle to higher frequencies can move up the body to our chest, neck and head.

# Physicality

Sound can affect body temperature, blood circulation, heart rate, and breathing.

Sound is also used as a weapon or as a riot control technique.

The sound in your design projects may not be this extreme, but it's always good to be aware of the extremes.

# Hearing Development

Hearing is the first of our five senses that develop in the womb.

Cochlea fully developed by five months.

Hearing continues even in a coma and is the last sense to go before death.

# Hearing Development

Hearing is overshadowed by sight.

This gives the sound designer the opportunity to work “under the radar.”

We have the ability to affect the viewer’s unconscious.

# Sensitivity

Our ears are infinitely more complex than a microphone.

Our ears receive a constant interaction between pitch, intensity and speed.

# Sensitivity

Intensity affects speed (loud tones seem longer).

Pitch affects intensity (high tones seem louder).

Duration affects intensity (a consistently loud tone will appear to grow weaker).

# Sensitivity

Midrange frequencies are naturally favored, so that we can recognize voices in the mix.

At low volumes we hear fewer higher and lower frequencies.

To make a sound seem louder, add mid and high (rather than low) frequencies.

# Masking

**Frequency masking** = louder sounds cover up softer sounds at similar frequency.

**Forward masking** = loud sound will mask a quieter sound that immediately follows.

**Backward masking** = loud follows soft, but we respond to louder sounds more quickly.

**TONE**

# Frequency Perception

Upper frequencies in speech and higher pitched melodies are usually noticed first.

The tiny speakers in telephones are designed to support these higher frequencies.

High frequencies can be pleasant (crackling campfire) or disturbing (fingernails on chalkboard).

# Frequency Perception

Next are low, bass notes; they form the infrastructure upon which higher-pitched sounds take stage.

Low frequencies are less colored by reflection and spatial clues.

Since we can't place the sound source, we tend to live "inside" the low bass.

# Frequency Perception

Midrange sounds are less important for grabbing our attention.

These can be heard at very low volumes, since high and low frequencies drop away.

The human voice sounds boomy and rumbly if amplified too much.

# Loudness

We perceive the loudness of a sound independently from its duration.

The shorter the sound the louder it needs to be for us to recognize it in a sound design.

If you want to make a sound seem louder, you can layer a higher frequency version on top.

# Recognition

The attack of a sound is crucial for recognition.

Acoustic musical instruments need the strike of the note to indicate piano or saxophone.

The human voice needs the percussive hit of the consonants to be understood.

# Recognition

Modifying sounds will affect the listener's ability to understand.

Pitch-shift or slow an explosion or wind, and the sound may still be recognized as explosion or wind.

Modify a musical instrument or human voice, and we can lose the illusion of reality.

# Recognition

There is a limit to how many sounds we can listen to simultaneously.

If the sounds are similar, we may flip back and forth, or look for overall patterns with a lack of detail.

If they are dissimilar, there is a better chance we can follow them simultaneously.

# Habituation

When we no longer pay attention to a common, loud sound in our environment.

Our nervous system gets tired/bored and we unconsciously stop paying attention.

If changes are introduced, we can notice the sound again.

# Habituation

**Adaptation** is when a constant stimulus appears to fade in importance.

**Fatigue** happens when the auditory nerve tires of a particular frequency.

# Habituation

A real violin is more interesting than a synthesized violin because of the human nuances involved in playing it.

Contrast is vital for an effective sound design because we are hard-wired for it.

Keep the audience interested . . . valleys and hills rather than a flat plain.

# Habituation

Habituation is linked to duration.

Over-the-top sound design wears us out.

Good sound design considers the project as a whole, not simply single scenes.

# Quiz 4.2

1. TRUE or FALSE: Hearing is the first of our five senses that develop in the womb.

[gbach@edmc.edu](mailto:gbach@edmc.edu)

# Credits

<http://compound-eye.org/archive/extras/old-timey-radio/>