Commercial no sound

courtesy Bobby Schimmel
Commercial with sound
Thai Communication Provider True Move
John Corigliano

- Pulitzer Prize
- Academy Award-The Red Violin
- Greatest living US composer
From “Altered States”
From “Altered States”
To use sound properly, and fully realize its power, we need to do the following:

- (1) listen
- (2) understand basics of sound and hearing
- (3) understand sound's fundamental effects on human communication
- (4) understand the recording/playback process
- (5) know what is good sound
I. LISTENING

◆ For most people, sound is background only.
◆ To the sound designer/producer, sound is everything.
What is good listening

- a. paying attention to all sounds
- b. perceiving the sounds
Pay Attention To

◆ Foreground
◆ Background
◆ characteristics
  ◆ pitch, loudness, timbre, attack, decay, duration, tempo, rhythm.
  ◆ location
◆ source
◆ https://www.msu.edu/course/tc/243/Listening%20exercise.html
II. WHAT IS SOUND

- Sound Wave
- vibration of air molecules
- compression + rarefaction = one cycle
- travels 1,075 feet per second in air
- cycles = frequency
Sound Waves

- A = air at equilibrium -- no sound
- B = compressions + rarefactions --- sound wave
- C = sine wave representation of sound
  - A -- amplitude
  - $\lambda$ -- wavelength
Sound Waves

Sound frequency + amplitude

sounds higher frequency (more waves/sec)

sounds Louder amplitude (bigger waves)
Sound and Hearing

- Human hearing is binaural
- Mono emanates from a single point source
- Stereo emanates from two point sources
- Surround emanates from multiple sources
Stereo

- Provides
  - sense of space, openness
  - positioning
  - sound movement

- Requires
  - 2 different channels R + L
  - more than one mic in field (or stereo mic)
Mono Example

Mono mix L + R
Stereo example

Stereo Mix
L & R Different
spatial sense
reverberation
Inglorious Basterds - Tarantino
Stereo Sound - spacial impression
Inglorious Basterds

- Tarantino--we don’t think of sound
- his films are “out there”
- Soundscape is perfectly executed
- it is not “out there”
- environmental sounds, “ambience”
- fall, phone dial, phone talk, capture chaos, voices, “bugs” clicking, dialogue, audience murmurs, head butt, truck sounds, dialogue, brakes, dog barking

- compare with “Kill Bill”
Frequency/Pitch--high and low

- hertz (Hz)
- Kilohertz
- 20-20,000 hertz human range
Octaves

- tonal ratio of 2:1
- i.e., 20 to 40 hz = one octave
- human range about ten octaves
FREQUENCY RANGES

❖ 1. Low Bass 20-80 hz--1st 2 octaves
❖ lowest notes--power and fullness
❖ too much-- muddy sound
FREQUENCY RANGES

- 2. Upper Bass 80-320 hz--3rd and 4th octaves
- most rhythm and support instruments (drums, piano, etc)
- provide balance in music
- too much -- boomy
- too little-- thin
FREQUENCY RANGES

◆ 3. Mid range 320--2560 hz--5, 6, 7 th octaves
◆ intensity--contains fundamental and rich lower harmonics of most sources
◆ too much mid can be annoying and fatiguing
FREQUENCY RANGES

- 4. Upper Midrange 2560-5120--8th octave--our most sensitive range
- 2560-3500--intelligibility of speech
- above 3500--definition, clarity, realism
- presence range--5,000 hz
FREQUENCY RANGES

- 5. Treble 5120-20,000 hz--9 and 10th octaves
- 2% total output of sound, many can't hear above 16,000
- brilliance and sparkle
What can you hear?

5120hz
Frequency

◆ Sound is rarely single tone
◆ Fundamental
  ◆ main frequency of the note
◆ Overtones (partials, harmonics)
  ● source of timbre
◆ http://www.acoustics.salford.ac.uk/feschools/waves/standing_waves.php
Frequency and Loudness

- human ear not equally responsive to all frequencies
- ear insensitive to low frequencies at low volume
  - loudness control on stereo
Frequency and Loudness

20 hz
Poor Sound Example
Filtered
EQUALIZATION
EQUALIZATION
Amplitude and Loudness 1

- intensity of vibration
- measured in dB-SPL (sound pressure level)
- range for humans 0 (threshold of hearing) to 120 (pain) and beyond
<table>
<thead>
<tr>
<th>Loudness Level</th>
<th>Index</th>
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<tr>
<td>0--threshold</td>
<td>1</td>
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<tr>
<td>20 quiet living room</td>
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<td>40 subdued conversation</td>
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<td>150 permanent hearing damage</td>
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<td>180 rocket engine</td>
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</table>
Amplitude and Loudness 2

- dBm
  - levels of electrical power (in milliwatts)
  - signal strength
  - Right side is in decibels
  - 0 dB is maximum w/out distortion
  - left side is % of maximum modulation
  - if signal too low--noise introduced
  - signal too high--distortion
  - Can have very high dB-SPL and still good levels--
  - must monitor
**Inverse Square Law of Sound**

- Sound intensity varies inversely with the square of the distance between the sound source and the microphone
- \( I = \frac{1}{r^2} \) (\( r \) = distance)
- Double the distance
  - \( \frac{1}{4} \) the intensity
- Halve the distance
  - \( 4 \times \) the intensity
- Get the mic as close as possible
- Moving a mic a little makes a lot of difference
Phase

- time relationship between 2 or more sound waves at a given point in cycle
- in phase, increase amplitude
- out of phase, decrease amplitude--cancellation
- microphone and speaker placement
- polarity
Phase diagram

In phase + 180° out of phase = Constructive interference

Destructive interference
Phase example-Polarity switched

Mono mix L + R
Sound Envelope

◆ changes in loudness over time
  • attack
  • internal dynamics
  • decay