Web Audio Codelab #6

Non-linear Effects

Music 220A Summer 2021
Dynamic Range
Amplitude ➝ Loudness
Decibel (dB)

- A unit of measurement used to express the ratio of one value to another on a logarithmic scale
- A unit for loudness
  - About 2X louder = 10dB
  - About 4X louder = 20dB
Loudness in Music

- Normal piano practice: 60~70dB
- Chamber music (small auditorium): 75~85dB
- Violin: 82~92dB
- Timpani and bass drum: 106dB
- Symphonic music (peak): 120~137dB
- Rock music (peak): 150dB
dBFS (Decibel Full-Scale)

- A unit of measurement in digital systems which have a defined maximum peak level
- 1 bit $\approx 6$ dB
Dynamic Range

- The **difference** between the quietest and loudest volume in a part or piece of music

- Affected by:
  - Resolution (bit depth)
  - Noise Floor
  - Total Harmonic Distortion
Queen: “Seaside Rendez-vous” (1975)

Clipping
Clipping

Original Signal

Clipped Signal
Gain Riding
Gain Control

Original Signal

Limited Signal
Compressor
Compressor

- Envelope Follower
- Gain Computer
  - Transfer Function
  - Parameters: Threshold, Ratio, Knee, Attack, and Release
- Gain Control
Envelope Follower: Attack/Release
Transfer Function
Codelab
Wave Shaping
Wave Shaper

- Transfer Function
  - Works directly upon incoming bipolar signal (i.e. no envelope follower)
  - Based on lookup table or polynomial

- Common use cases: distortion, overdrive, or saturation
  - Also a lot of rooms for creativity!
Transfer Function
Transfer Function
Codelab