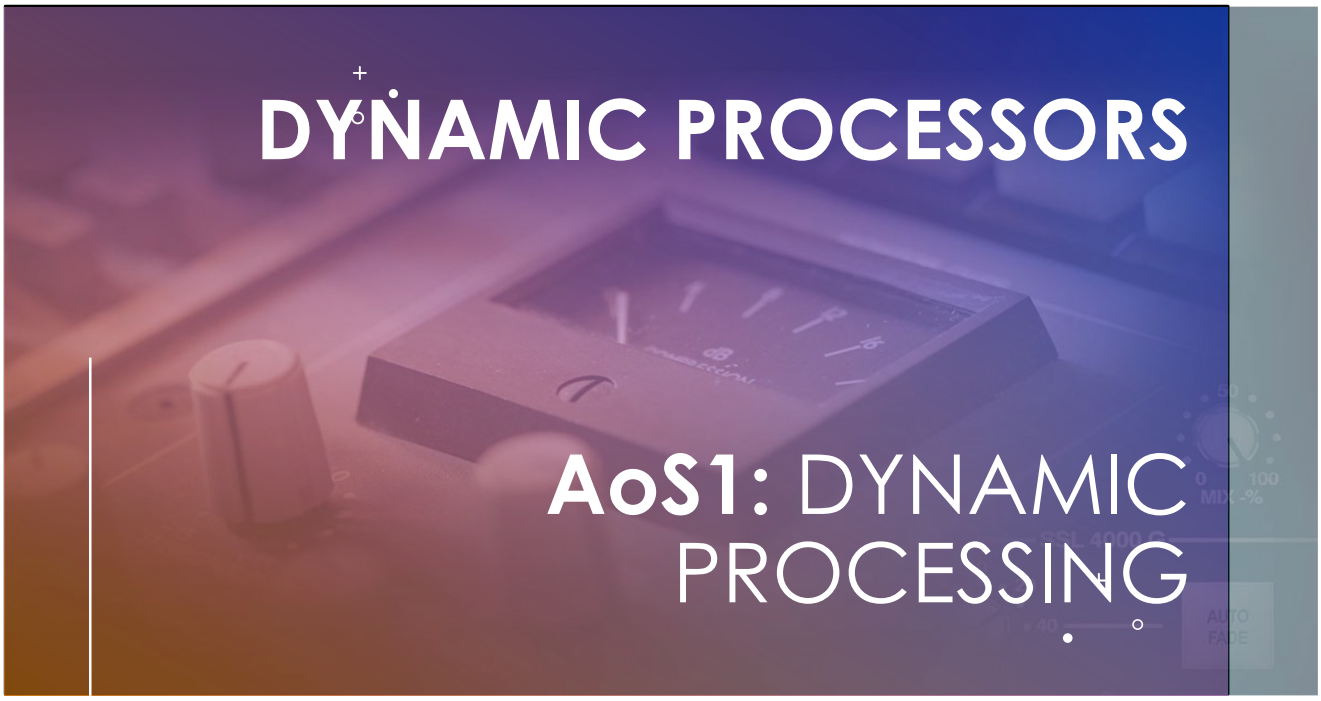

DYNAMIC PROCESSORS
AoS1: DYNAMIC PROCESSING

Types of Dynamic Processors

Compressor

Reduces the dynamic range of a signal

Expander

Expands the dynamic range of a signal

De-Esser

A compressor that works at specific frequencies

Limiter

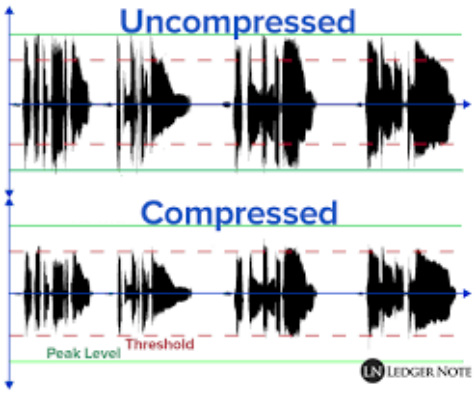
A compressor with extreme settings

Noise Gate

An expander with extreme settings

Compressors

- Sets a **threshold**, above which, the compressor will begin to reduce the volume of the signal
- The amount by which the signal is reduced is determined by the **ratio**
- Once the peaks in the signal have been reduced, **make-up gain** is applied to boost the overall signal



The most basic way of compressing a signal is to 'ride the fader' (manual compression)

- Turn fader down when level is too high
- Bring fader up when level is too low

- Not ideal as response time between ears and hand isn't fast enough for faster transients
- 'Riding the fader' is still a technique used, by usually in the form of automation

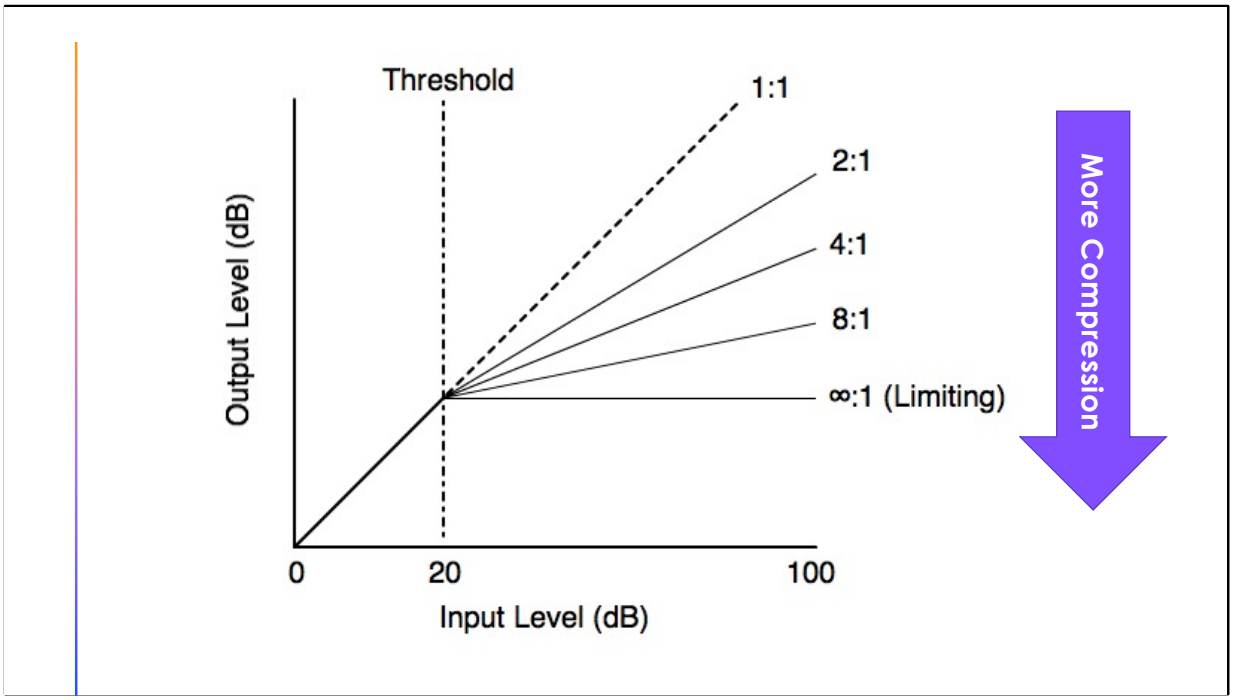
Threshold:

- The volume at which the compressor will begin to compress audio
- Anything with an amplitude lower than this will remain unaffected

Ratio:

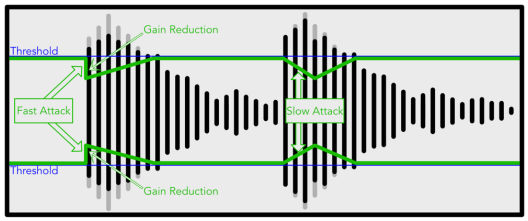
- Input volume: Output volume
- Determines how much the compressor will reduce the signal by

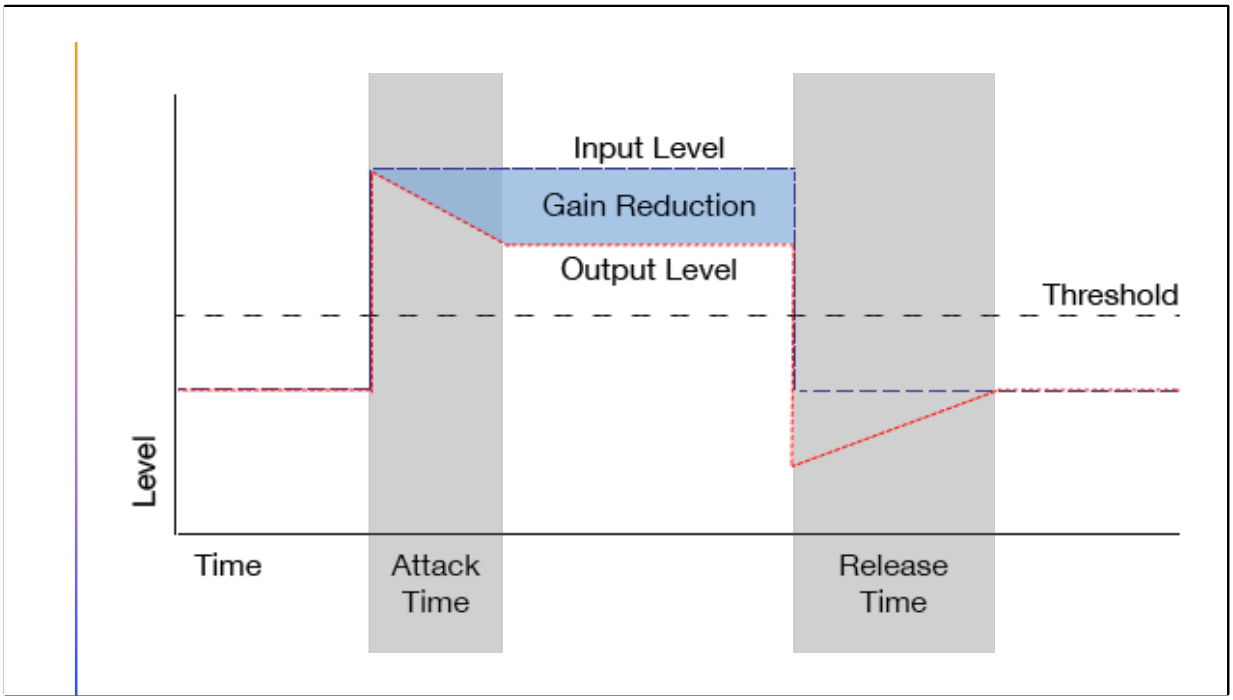
- The higher the ratio, the higher the amplitude reduction
- Ratio of 4:1 = For every 4dB in the original signal, only 1dB is being output


Threshold
1:1
2:1
4:1
8:1
∞:1 (Limiting)
Output Level (dB)
0
20
100
Input Level (dB)
More Compression

Attack and Release

- **Attack time** determines how quickly the compressor reduces the volume of the signal once it is **above** the threshold
- **Release time** determines how quickly the compressor stops acting on the signal once it has fallen back **below** the threshold





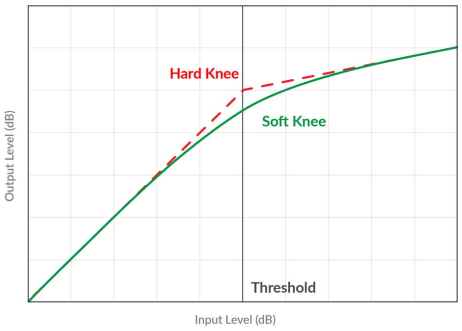
At the beginning of the release phase, the compressor is still acting on the signal

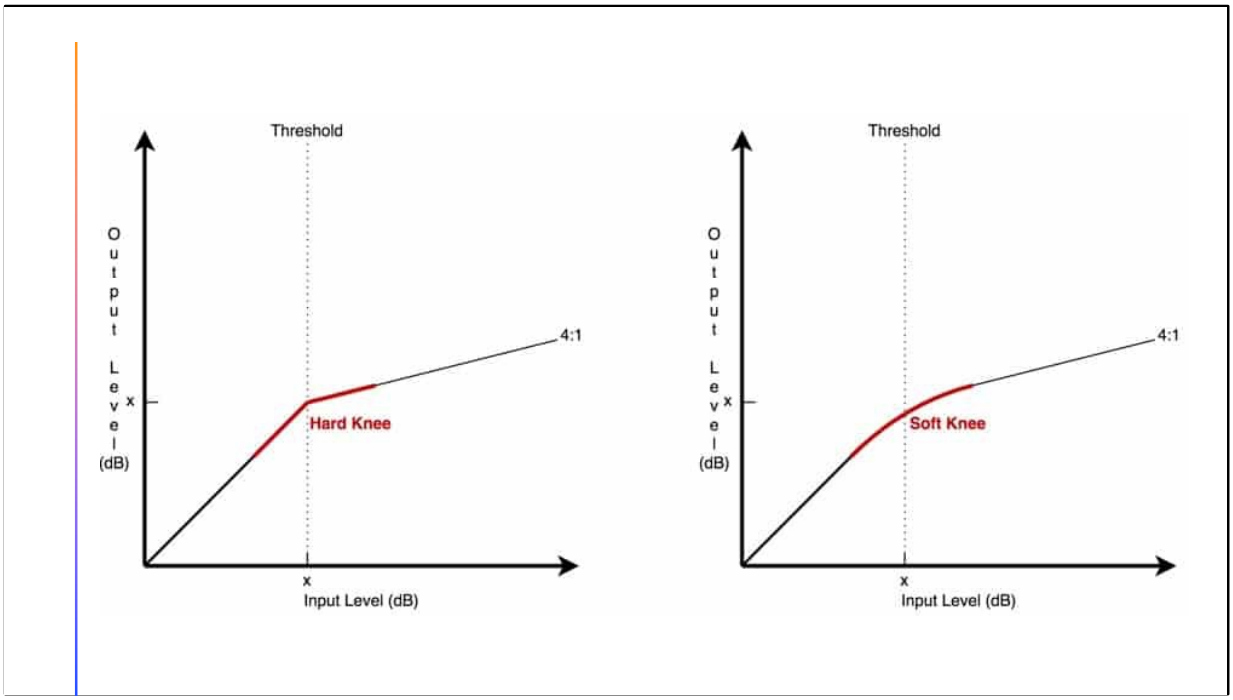
If the release is set too fast, it can create ‘pumping’/’ducking’ effects reminiscent of the effects of sidechaining

Kylie Minogue - Wow

Knee

- The **knee** determines the shape of the **response curve** when the signal crosses the threshold
- A **soft knee compressor** will gradually apply the ratio as the signal approaches the threshold
- A **hard knee compressor** will instantly apply the ratio at the moment the signal crosses the threshold



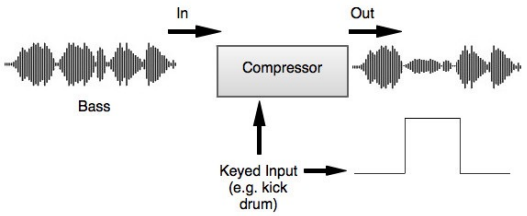

Threshold
Output Level (dB)
x
4:1
Hard Knee
x
Input Level (dB)
Threshold
Output Level (dB)
x
4:1
Soft Knee
x
Input Level (dB)

Compressor Parameters

Term	Definition
Threshold	The volume above which a compressor begins to compress
Ratio	Determines how much the compressor will reduce the signal by once the signal is above the threshold
Make-Up Gain	Increases the overall volume of the signal after compression to compensate for the reduction in volume caused by the compression
Knee	The bend in the response curve when the signal crosses the ratio Soft knee = gradual application of the ratio Hard knee = instant application of the ratio
Attack	How quickly compression is applied once the signal is above the threshold
Release	How long it takes the compressor to stop compressing once the signal has fallen below the threshold

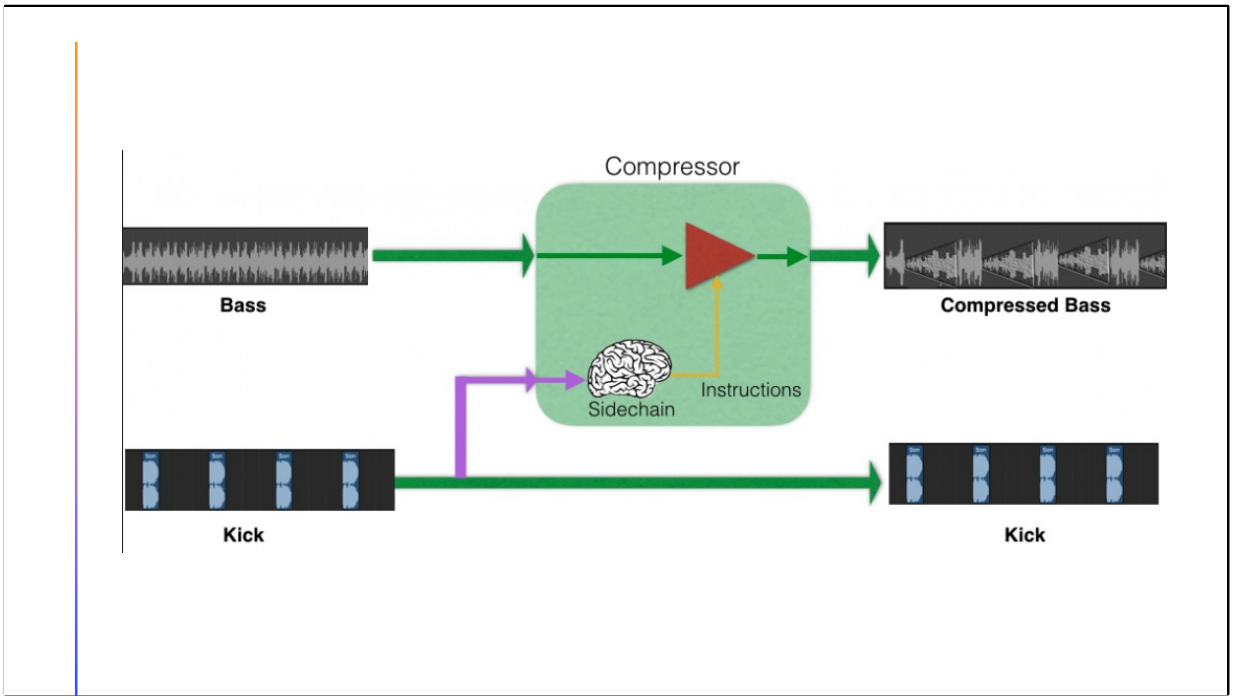
Sidechain Compression

- The compressor on one track is **triggered** by a signal on another track
- Creates a 'pumping' effect where the compressed track will 'duck' in time with the **trigger signal**



If the level of the trigger signal is above the threshold, the affected track will be compressed

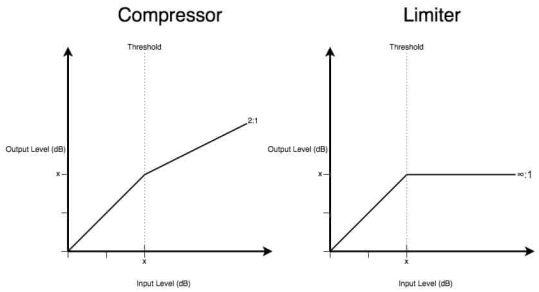
If the level of the trigger signal is below the threshold, the affected track will not change in level



Daft Punk – One More Time

Limiting

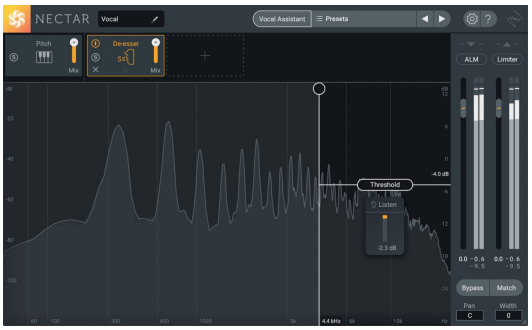
- A compressor with a **high ratio**
- Used to prevent signals from **distorting/clipping** and to control **peaks** a compressor may have missed



Ratio will be set as close to ∞:1 as possible (theoretically) around 20:1 in practice (brick wall limiting)

De-Essers

- Used to control frequencies where **sibilance** is prominent
  - 5kHz-10kHz
- By reducing these specific frequencies they reduce sibilance heard

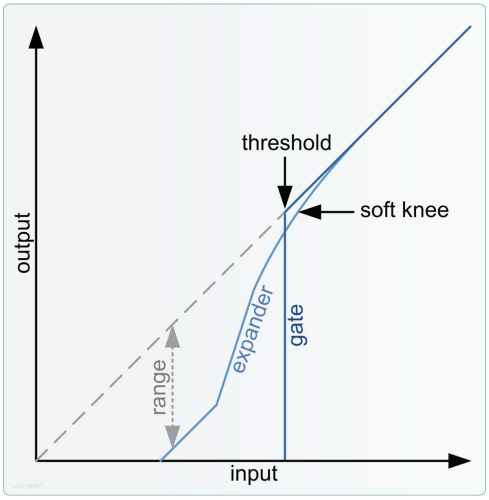


Sibilant sounds like ‘ss’ can stick out in a recording and be distracting

George Michael – Cowboys and Angels

Expansion and Gating

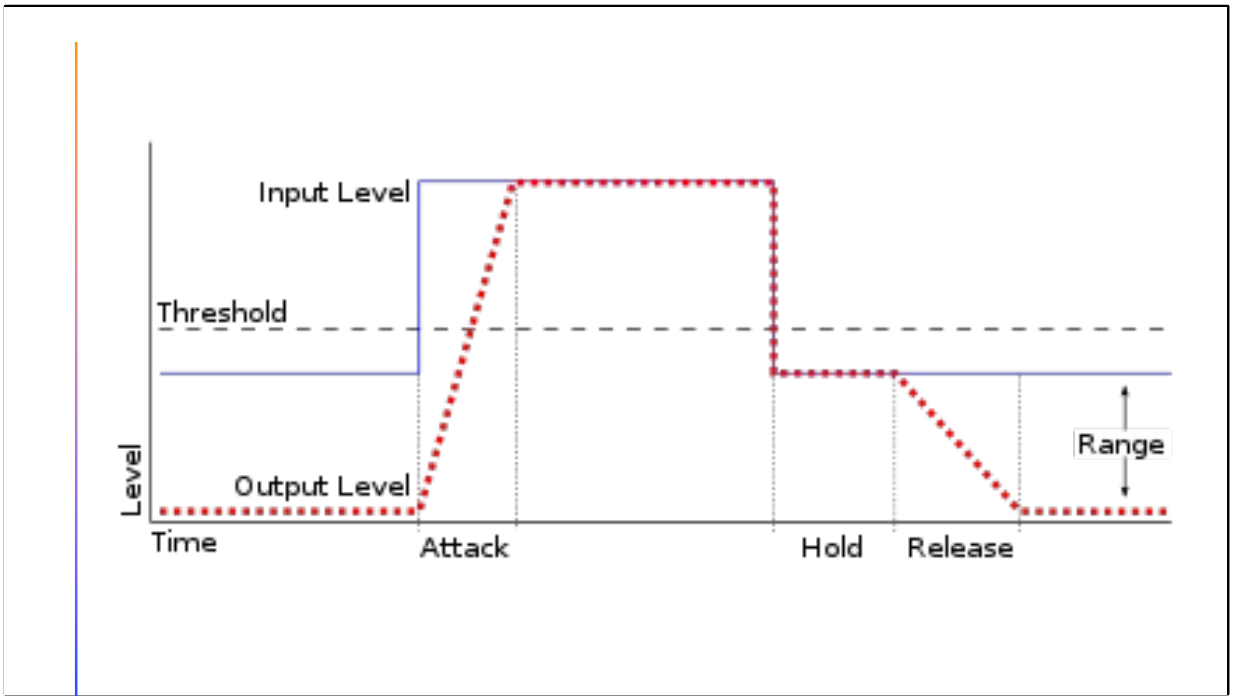
- Expanders **reduce** the level of signals **below** a set threshold
- Noise Gates are **extreme expanders**
  - They have a high ratio that allows them to reduce any signal below the threshold to silence



Expanders work in the opposite way to compressors

- They increase the dynamic range rather than reduce it
- Most commonly used as noise reducers
  - Threshold is set for the quietest sections of the music so that background noise is reduced
  - Audio above the threshold is unaffected

Noise gates are used to remove background noise (Open gate = unaltered signal, closed gate = reduced signal)



Can also be used in conjunction with a sidechain (called a 'keyed gate')

The gate will only open (allow sound through) when the level of the sidechain signal is above the threshold

- Used in electronic dance music to create choppy synth notes that play in time with the rhythm parts

Expander Parameters

Term	Definition
Threshold	The volume below which an expander reduces the level of a signal In a noise gate, the gate will open when the signal exceeds this level
Reduction/Range	The amount of volume the signal is reduced by A noise gate will completely silence the volume
Attack	The amount of time it takes for a noise gate to open once the signal exceeds the threshold
Hold	The amount of time the gate stays open for after the signal drops below the threshold level
Release	The amount of time it takes for the gate to close once the signal has dropped below the threshold and the hold time has passed

The compressor is like your mother

THRESHOLD: The level she asks you to turn the music down

RATIO : How much you turn down the volume after she shouts at you.

ATTACK : How fast you react.

RELEASE : How fast you turn the volume back up as soon as she closes the door.

Compressor Parameters

Term	Definition
Threshold	
Ratio	
Make-Up Gain	
Knee	
Attack	
Release	

Expander Parameters

Term	Definition
Threshold	
Reduction/Range	
Attack	
Hold	
Release	