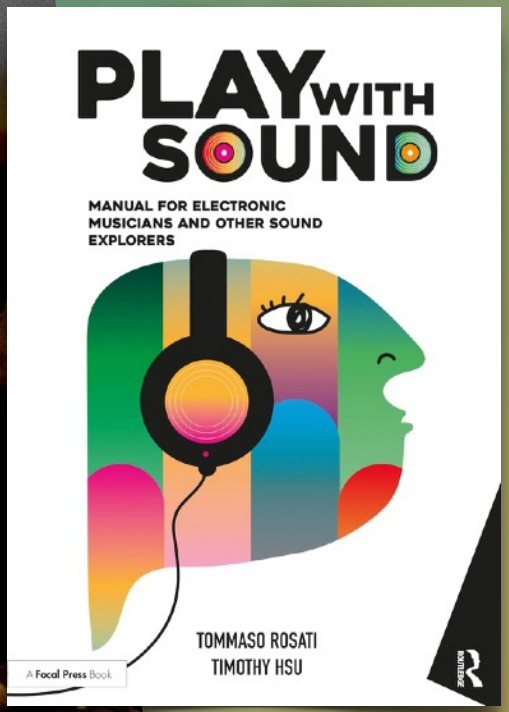
DYNAMIC PROCESSORS

ENVELOPE FOLLOWER
COMPRESSOR
LIMITER
EXPANDER
GATE

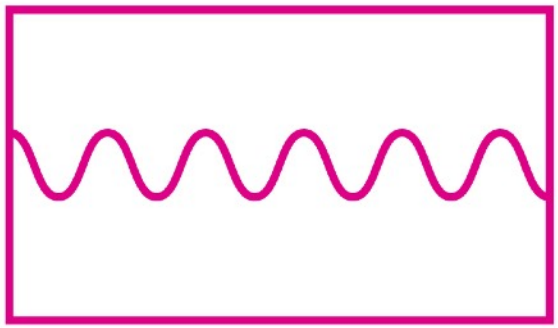
THE BOOK IS NOW AVAILABLE!



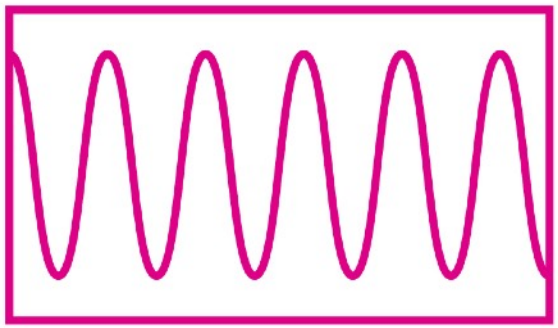
TOMMASO ROSATI
SOUND ART

DYNAMIC PROCESSORS

Dynamic processors operate on and affect the **“amplitude” parameter** of an incoming sound by processing it for technical or creative purposes.



Less amplitude

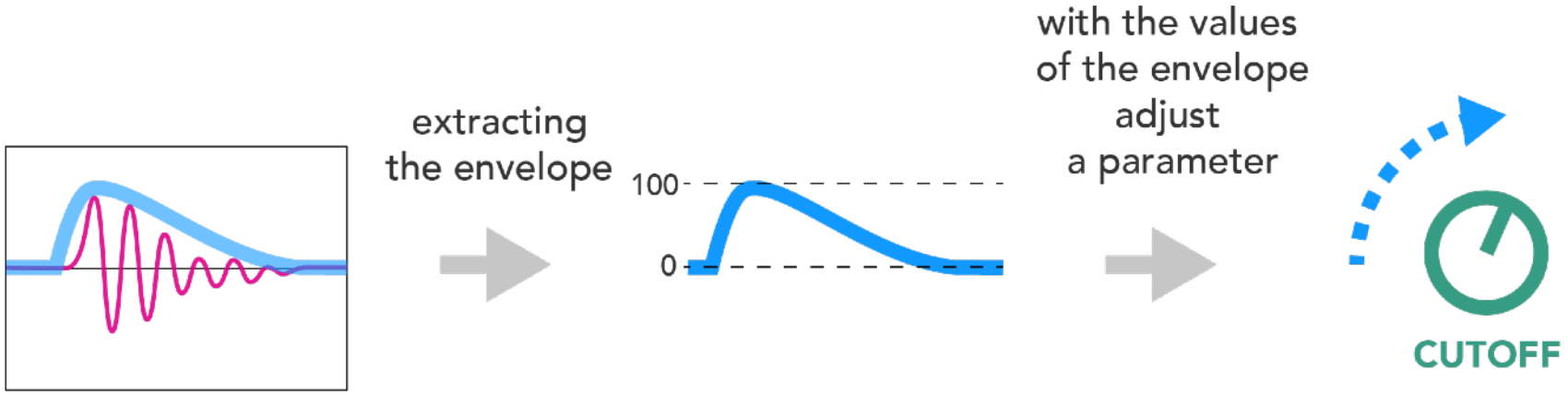


More amplitude

ENVELOPE FOLLOWER

Or peak amplitude follower or envelope detector

The **envelope follower**, or envelope detector, extracts the envelope of an incoming sound by tracking and measuring the overall shape of the signal. This data produces a **control signal** that can then be applied to a parameter of another device.



COMPRESSOR

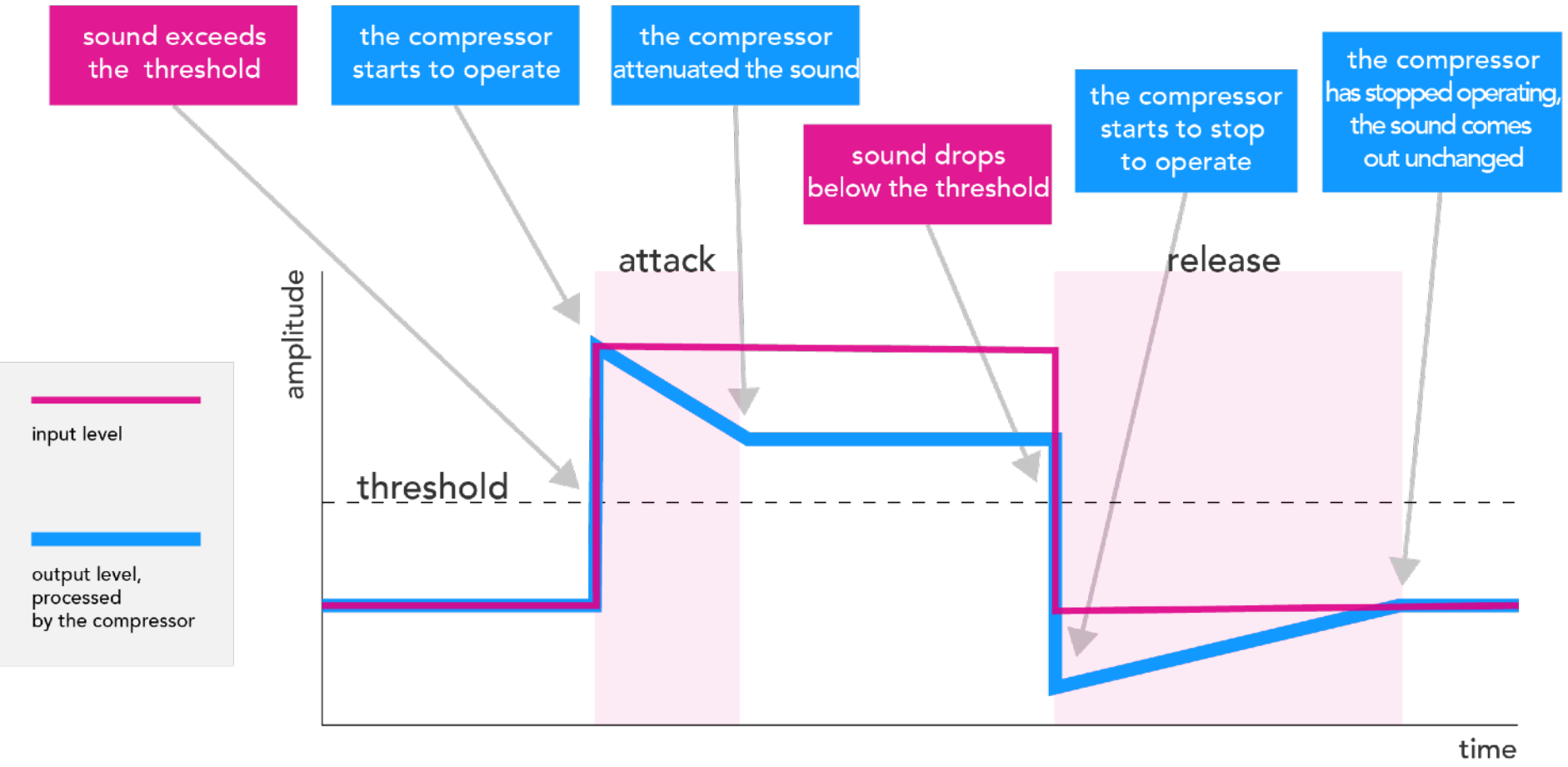
A **compressor** is a device used to reduce the **dynamic range** of a sound.

It operates in two steps:

1) **Measures** the amplitude of the incoming sound

2) **Attenuates** the output amplitude when the waveform exceeds a specified threshold

COMPRESSOR

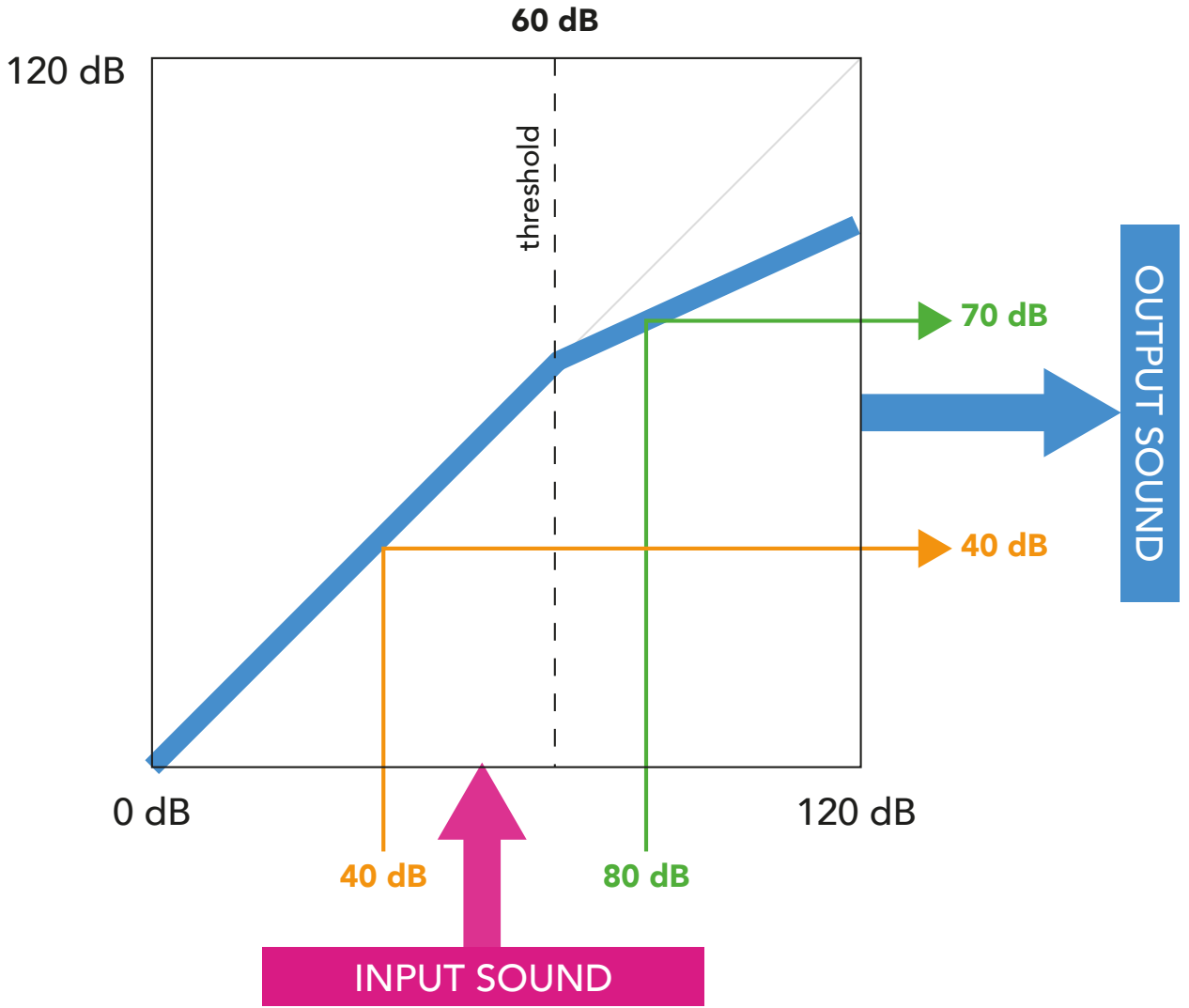

sound exceeds the threshold
the compressor starts to operate
the compressor attenuated the sound
sound drops below the threshold
the compressor starts to stop to operate
the compressor has stopped operating, the sound comes out unchanged
attack
release
amplitude
threshold
time
input level
output level, processed by the compressor

COMPRESSOR

How to read a **transfer function**?

Input sound enters at 40 dB, and because it is below the set threshold (60 dB), the compressor outputs the sound at 40 dB, unchanged from the input level

This sound enters at 80 dB, and as it exceeds the set threshold (60 dB), the compressor outputs it at some lower volume, such as 70 dB, based on the parameters.

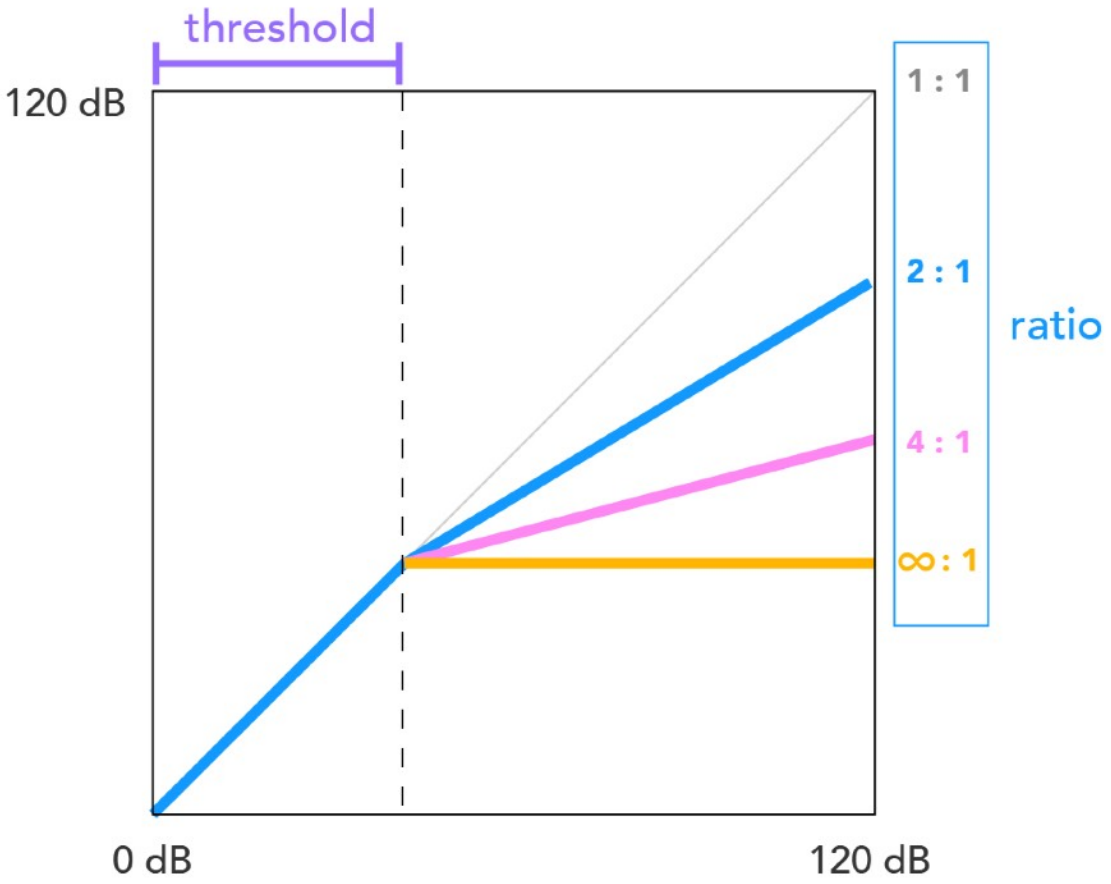


COMPRESSOR

parameters of compressors:

Threshold: The amplitude level, or threshold, above which the compressor kicks in. This level is in the units of **dB**.

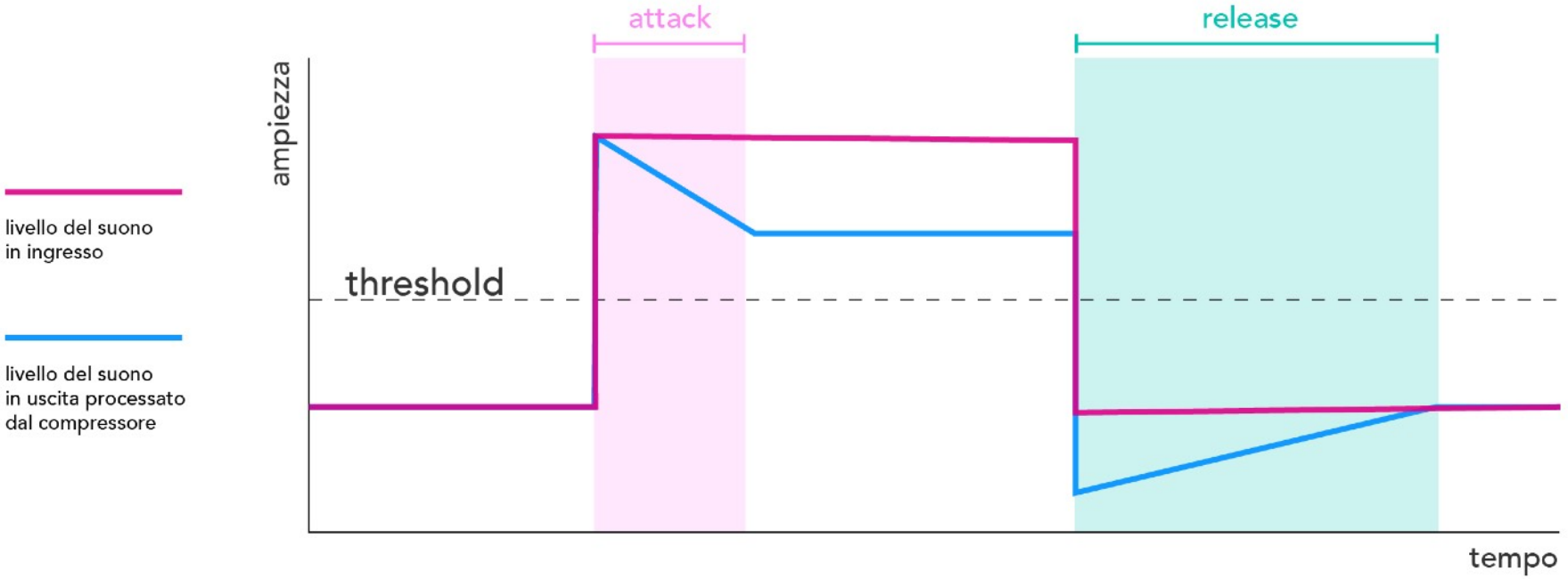
Ratio: The ratio dictates how amplitudes above the threshold are rescaled. This ratio is unitless, as it is a ratio between two numbers, such as 3:1 or 5:1.



COMPRESSOR

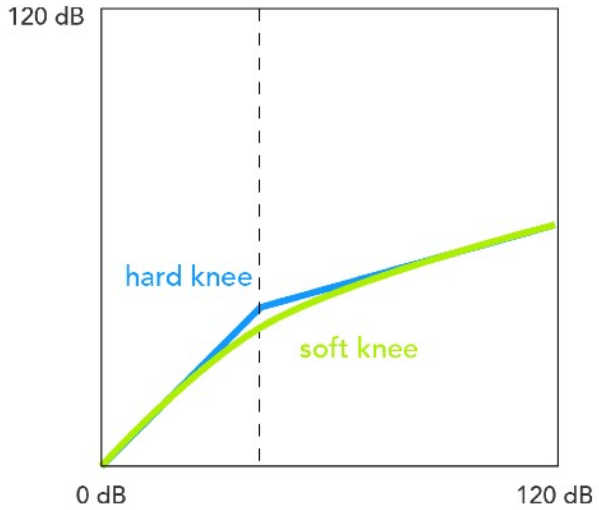
Attack (time): This parameter determines the length of time it takes for the compressor to be fully engaged after the sound exceeds the threshold. This attack time is generally set in milliseconds (**ms**).

Release (time): The length of time it takes the compressor to fully disengage after the sound falls below the threshold is the release time. It is measured in milliseconds (**ms**).

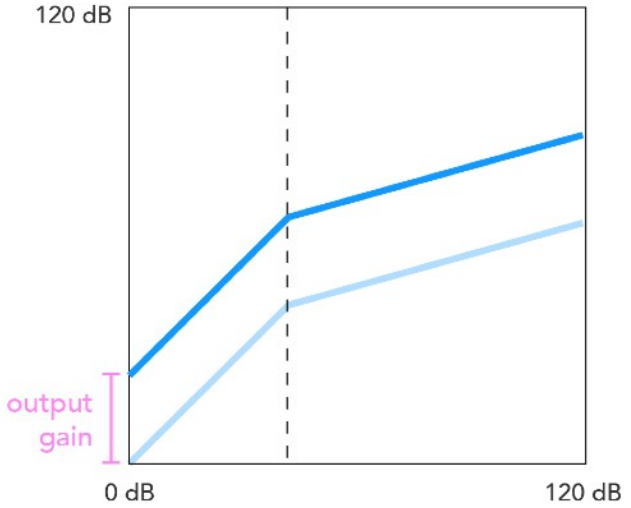


COMPRESSOR

Knee: dictates how sharp the angle of the compressor curve is at the threshold value. It is measured in **dB**.



Output gain or makeup gain: additional amplification to the output sound, measured in **dB**.

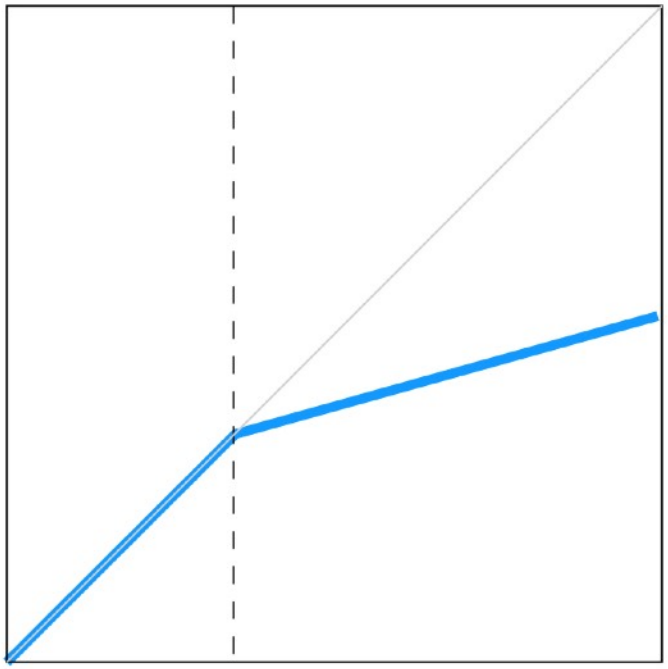


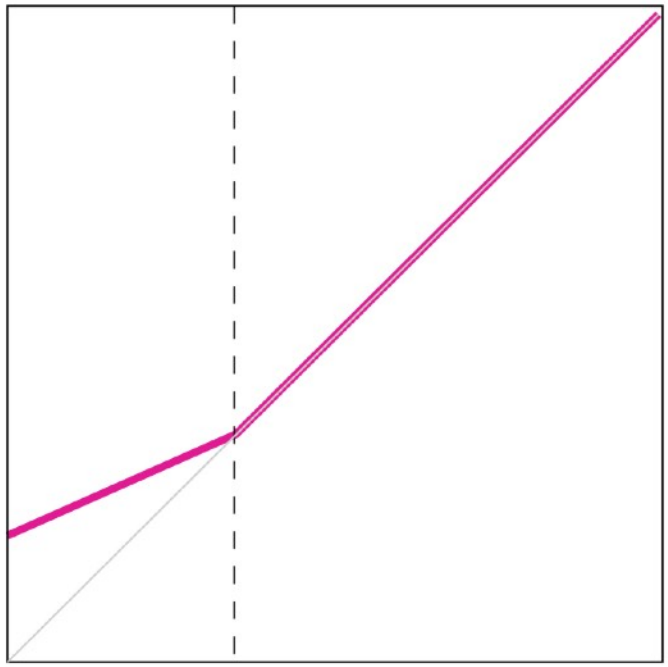
DOWNWARD and UPWARD COMPRESSION

There are two types of compression:

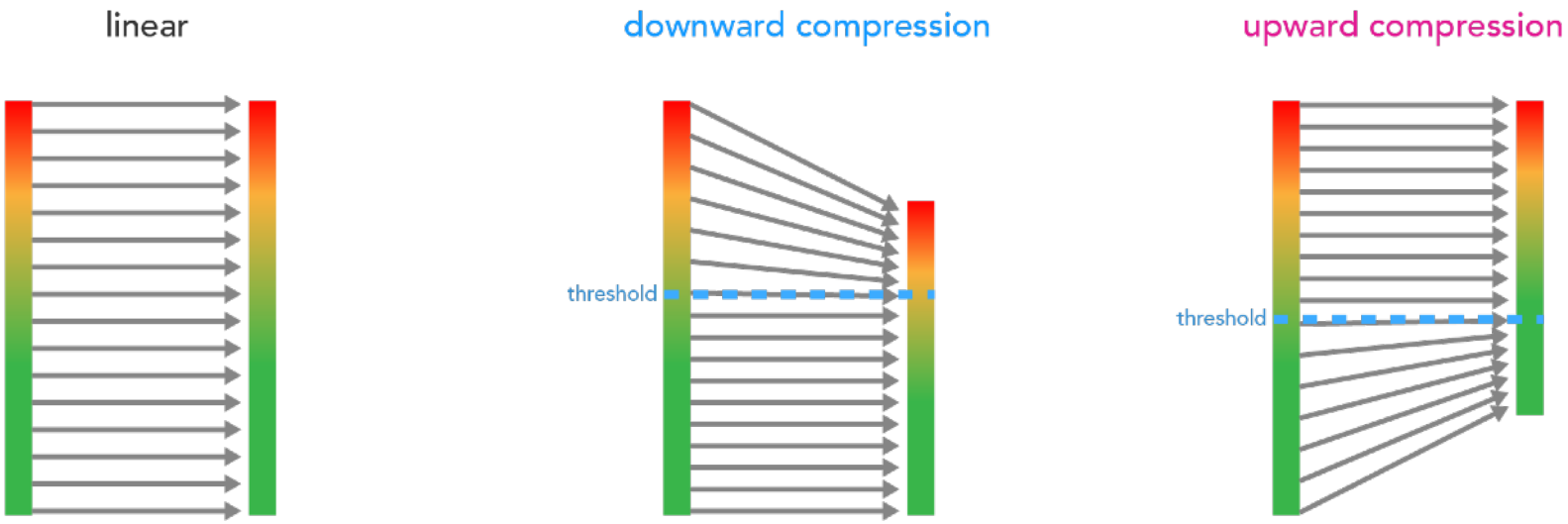
Downward compression: amplitudes above the threshold are acted upon, attenuating them.

Upward compression: the amplitudes below the threshold are acted upon, amplifying them.





DOWNWARD and UPWARD COMPRESSION



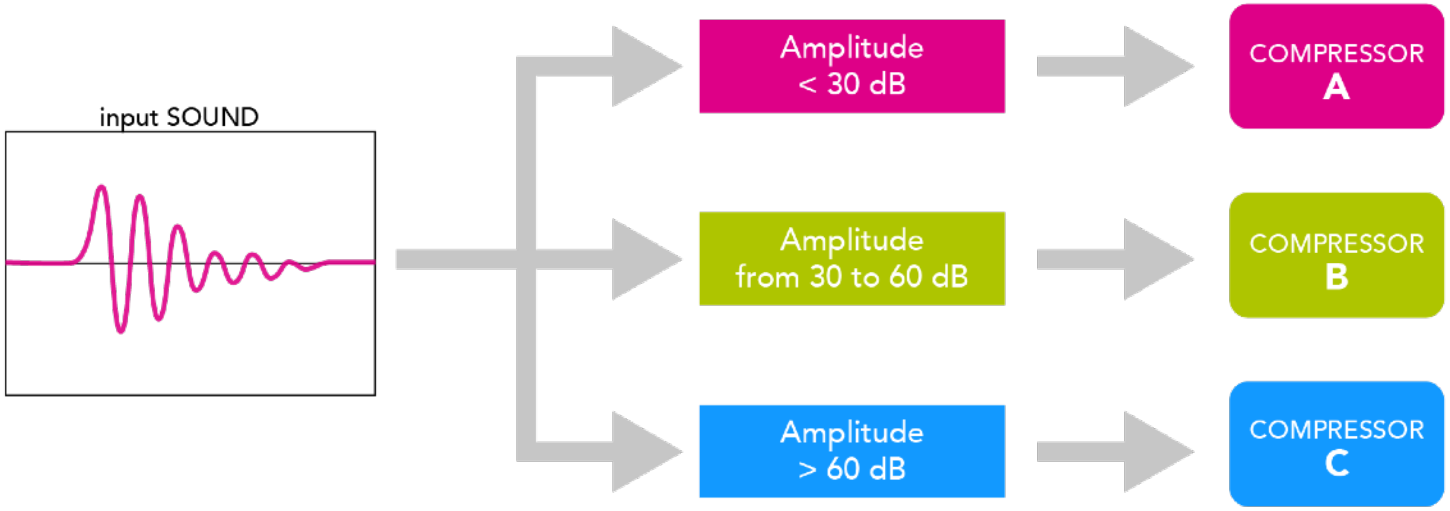
MULTIBAND COMPRESSOR

Multiband Compressors combine different compressors, each of which independently acts on different parts, or “zones,” of the sound.

The zones can be based on the following:

1) On amplitudes

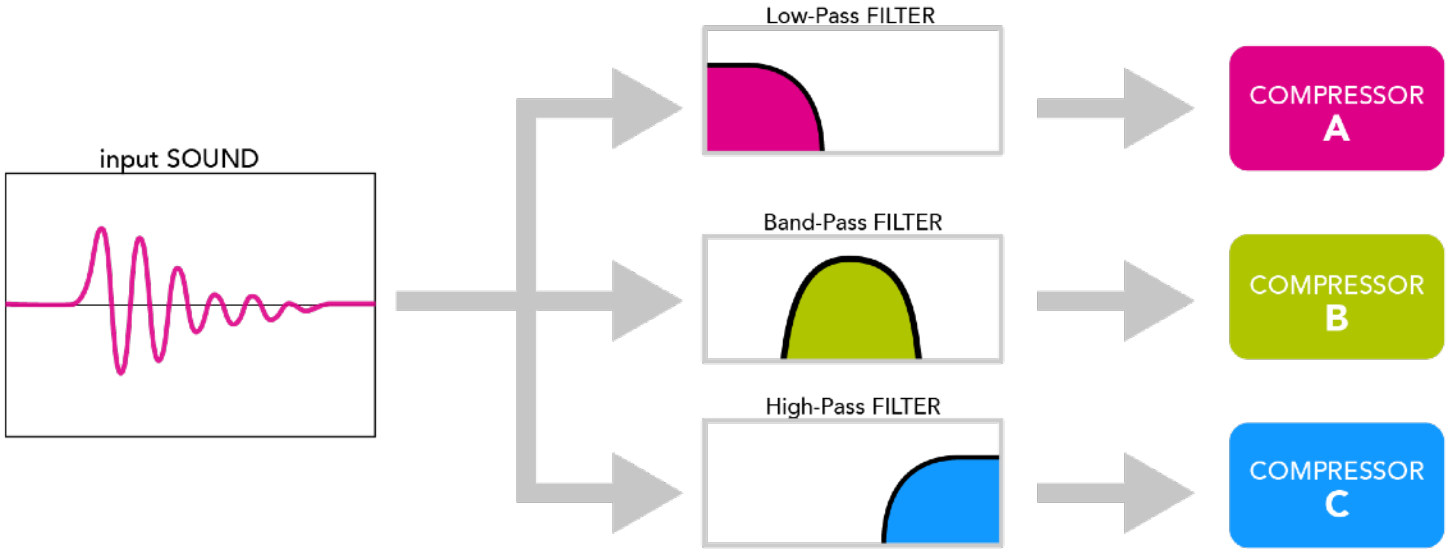
The different sub-compressors work on specific amplitude ranges.



MULTIBAND COMPRESSOR

2) On frequencies

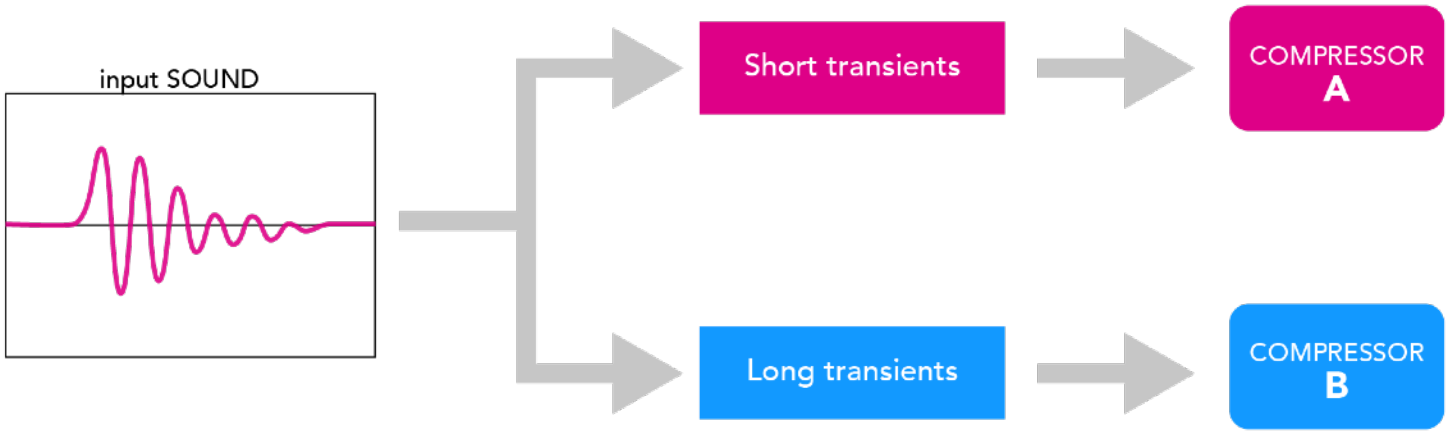
The different compressors are applied to different frequency bands. You then put one or more crossover filters before each sub-compressor.



MULTIBAND COMPRESSOR

3) On transients

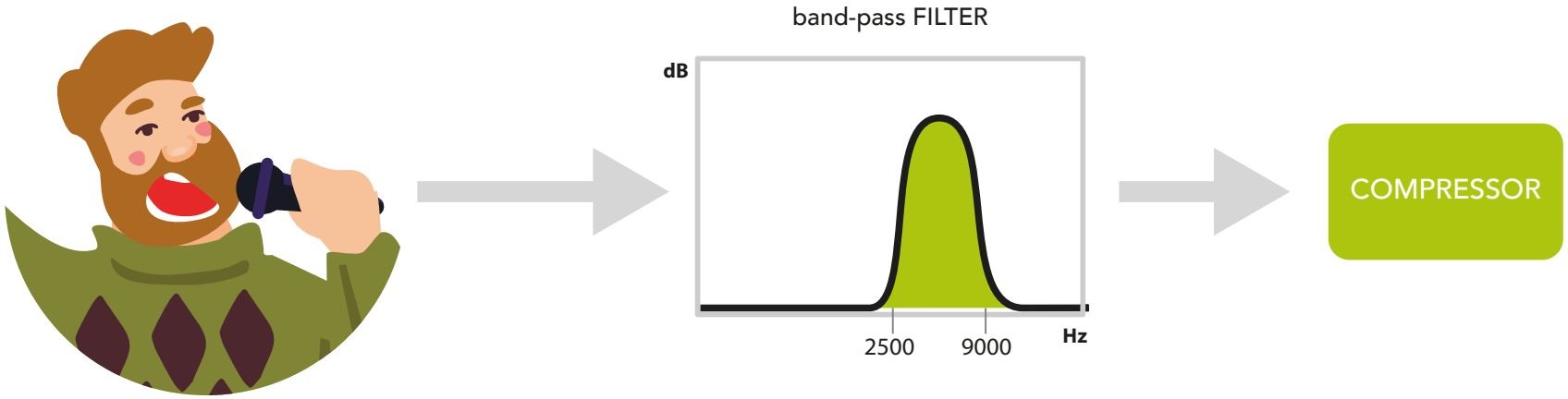
The different compressors are applied for different temporal bands of transients (attacks).



DE-ESSER

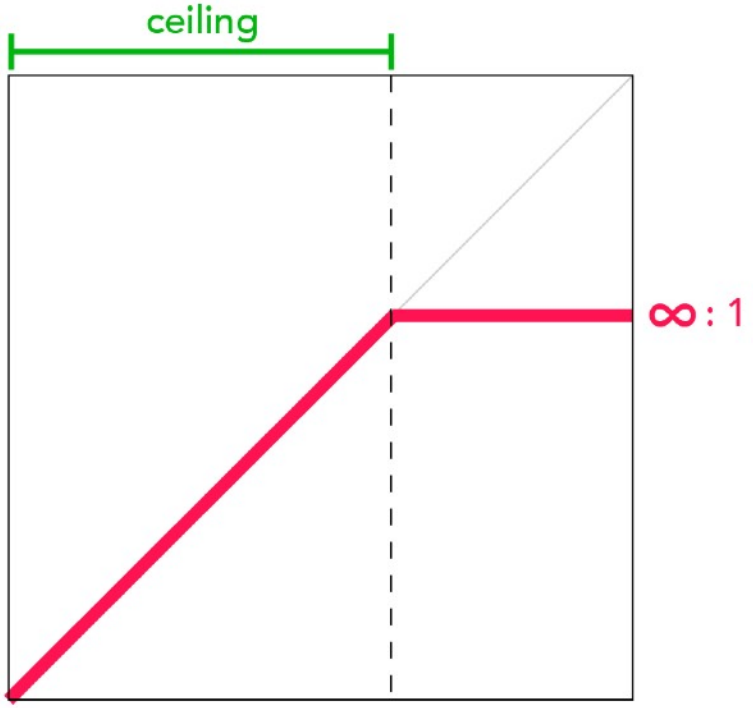
Multiband Compressor

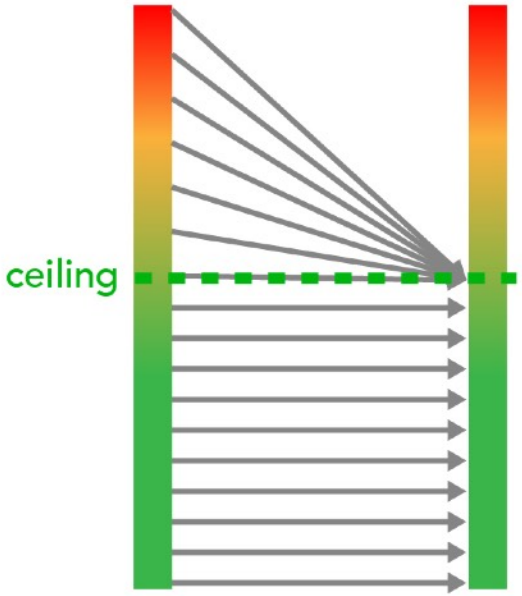
The **De-esser** is a special type of multiband compressor that attenuates sibilant “S’s” in recorded vocals. It acts ONLY on the frequency band where the “S’s” are located: between 2,500 Hz and 9,000 Hz.



LIMITER

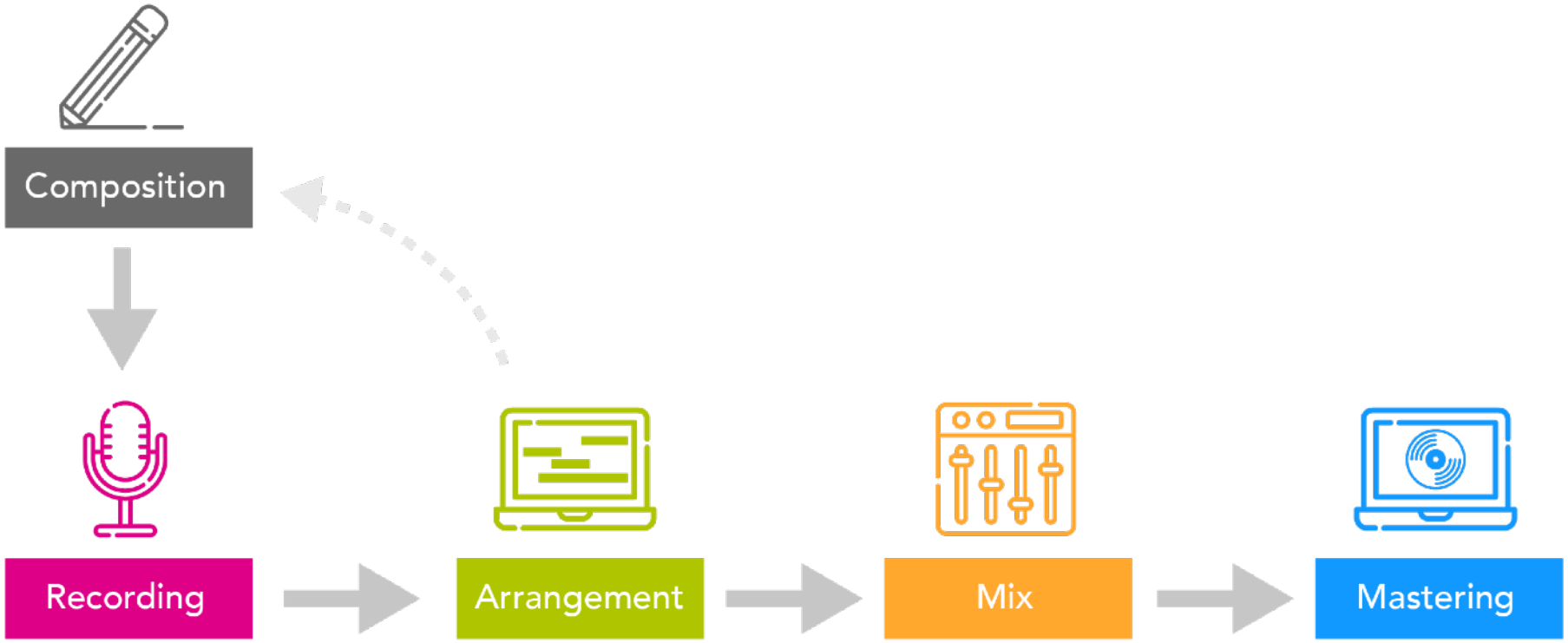
A **Limiter** is a special compressor that prevents amplitudes above the threshold from passing through. To do this, the compressor ratio needs to be ∞ : 1 in theory. Practically though, limiter ratios are usually >20:1.
The threshold in a limiter is called the **Ceiling**.





LIMITER

It is used particularly in the **mastering** process

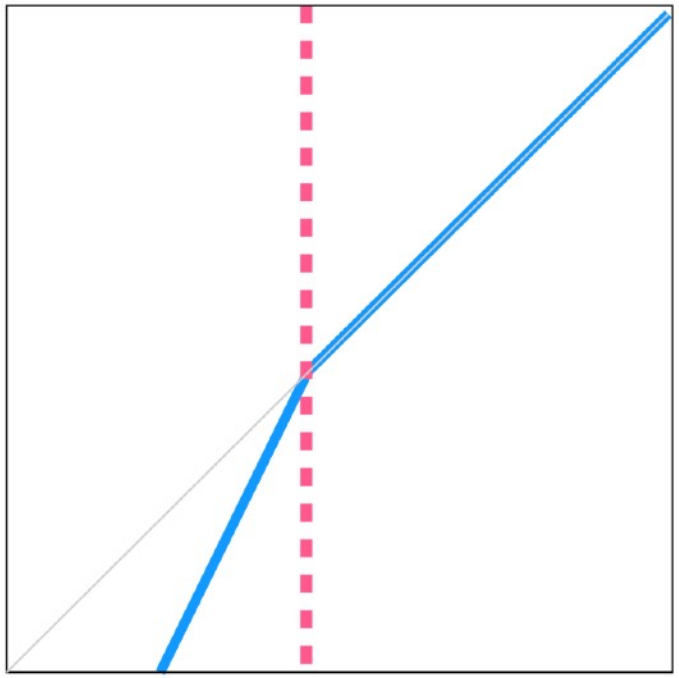


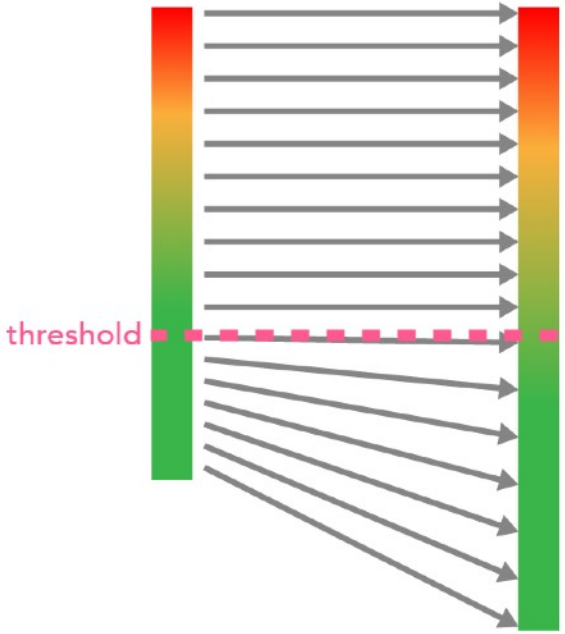
EXPANDER

Downward e Upward expander

The **Expander** is a sort of reverse compressor because it increases the dynamic range of audio. Whereas in compression, sounds above the threshold are attenuated, with the expander, sounds below the threshold have a reduction in amplitude.

Downward expansion affects quieter sounds.



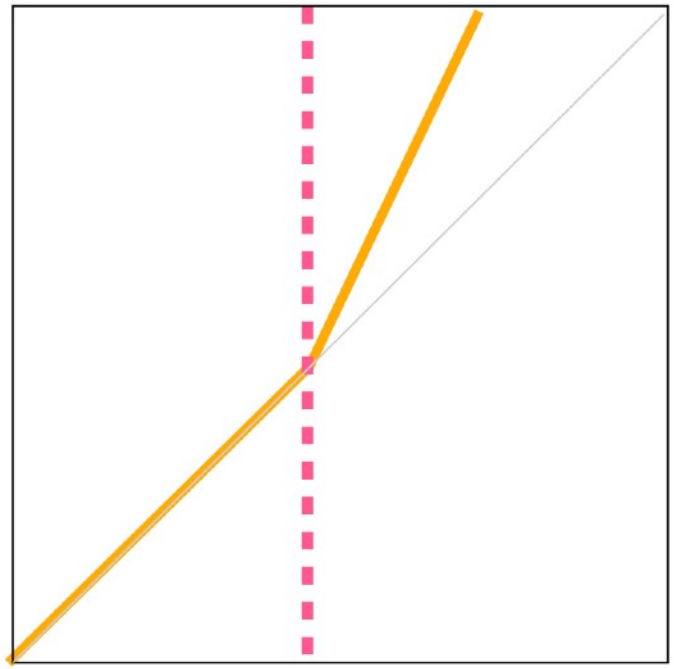


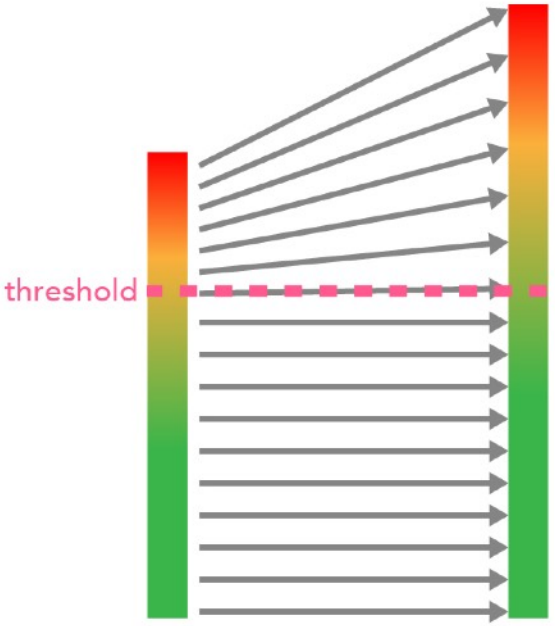
EXPANDER

Downward e Upward expander

Some expanders act on the louder sounds.

This is **upward expansion**.

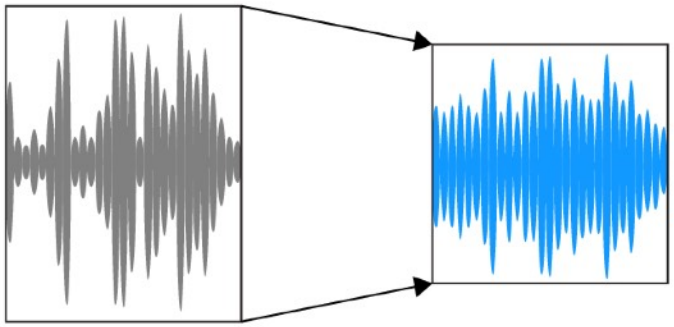




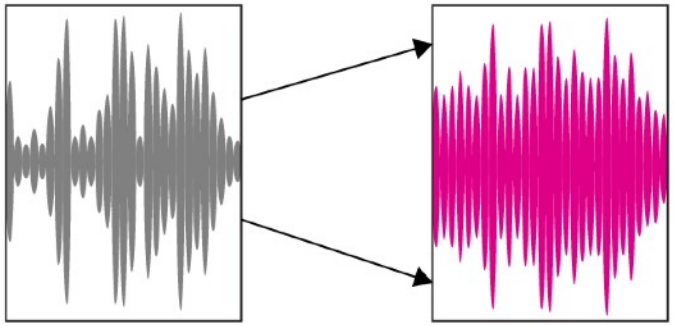
Dynamic processors

COMPRESSOR

downward compression

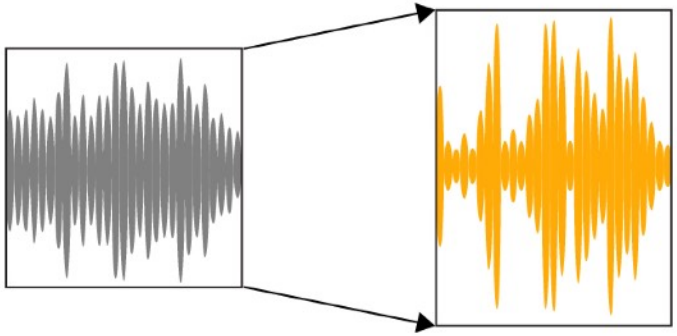


upward compression

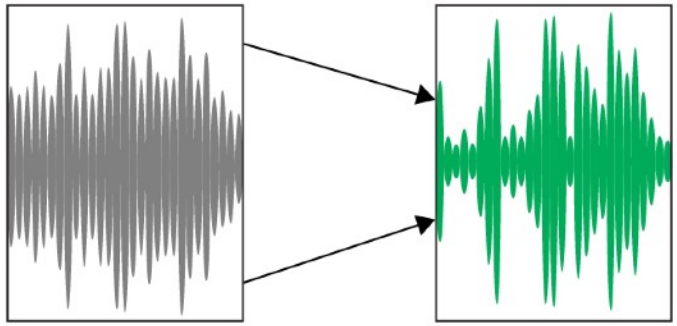


EXPANDER

upward expansion

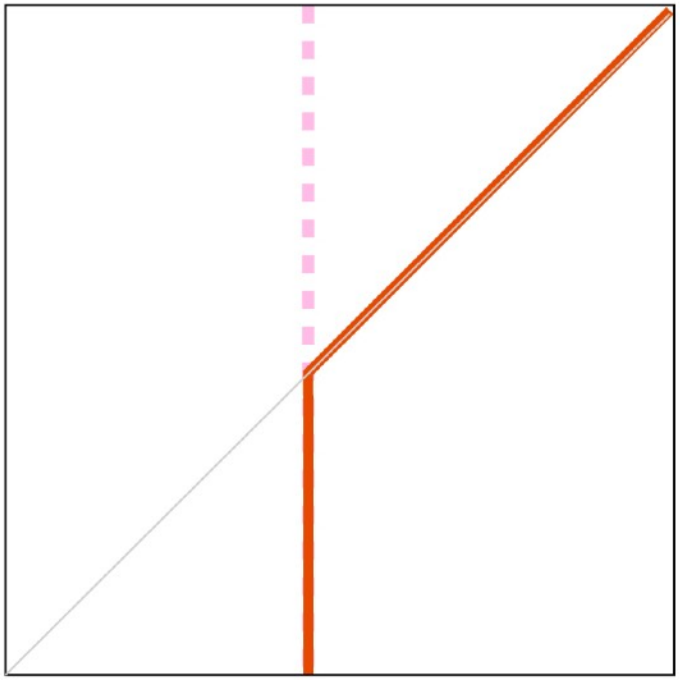


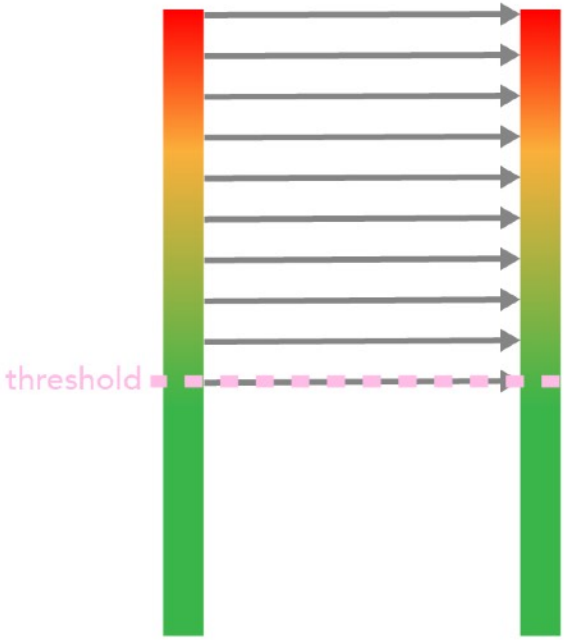
downward expansion

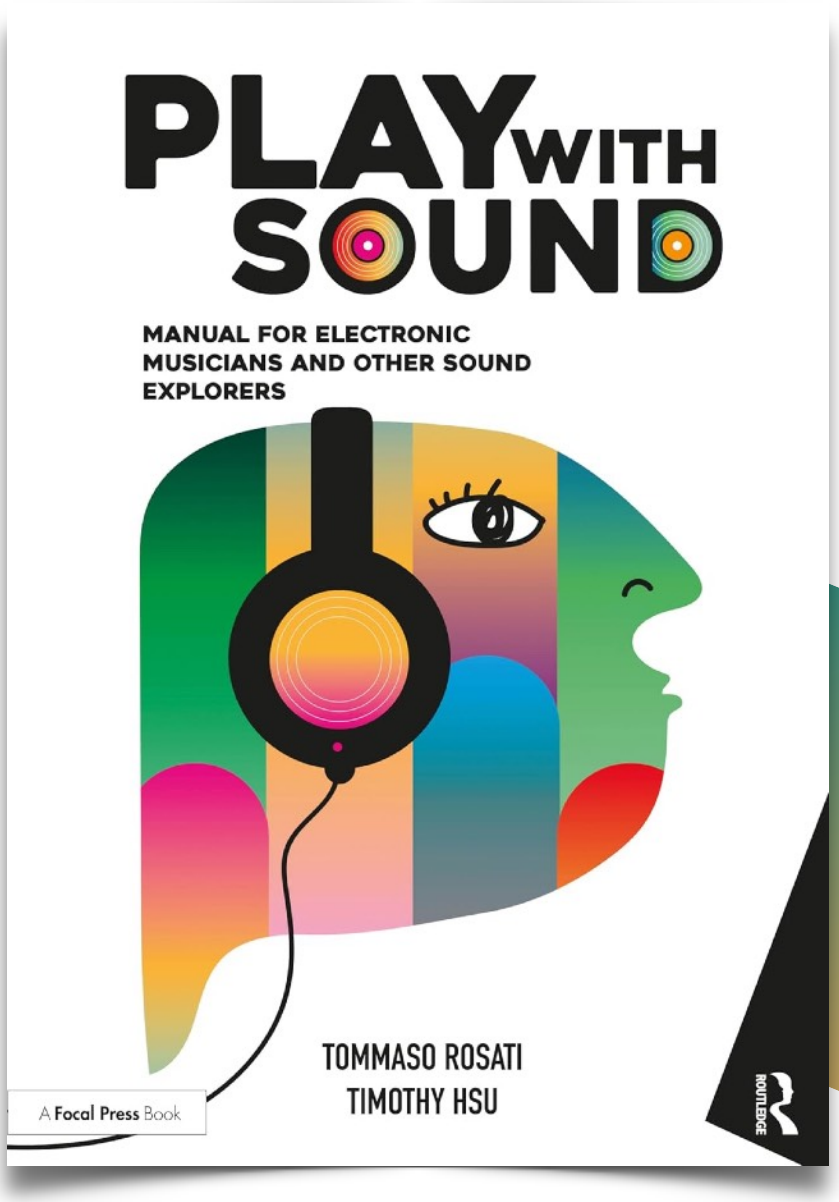


GATE

A **Gate** is a dynamic processor that eliminates sound below a user-selected threshold.







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