EN Home Studio Mastering

JD Young

PREVIEW

11. DYNAMICS

11.1 Dynamics and dynamic range

When you are adjusting a track's dynamics it is important to distinguish between its *dynamics* and its *dynamic range.* A track's *dynamics* are the differences in volume and intensity throughout the entire track, such as the differences between verse and chorus. A track's *dynamic range* is the difference between the peak volume and the mean volume at any given point in the track. Dynamics are best judged with your ears, whereas for determining dynamic range a real-time meter is your best option. Most RMS meters feature an additional real-time meter for dynamic range.

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In professional productions the dynamics sound controlled, with ample dynamic range available even during the loudest passages. The track sounds lively and no single element, such as the vocals or solo instruments, attract any unwanted attention. The transients convey a powerful sound to the mix, while the lead instruments sound steady and constant. Transitions from soft to louder passages are powerful, and transitions from loud to softer passages are subtle. The quality of a production's dynamics is the sum of the performance of the musicians, and the work of the recording and mixing engineers. After that, it is up to the mastering engineer to detect potential problems and to determine points of improvement, as well as to match the dynamics and dynamic range of the different tracks.

11.2 Compressors

You can adjust a track's dynamics using a *compressor.* A compressor allows you to adjust the volume of a track starting from a specific volume threshold. You can choose to influence only the loudest peaks, anything above a certain volume, or the entire dynamic range of a track. In most cases, your aim will be to use a compressor to achieve the desired result without its workings being audible to the listener. For mastering, it is important to have a multiband compressor with MS function in addition to a regular compressor. This allows you to adjust different frequency ranges separately, and lets you influence a track's mono or stereo information independently from each other.

A compressor has four basic controls:

• **threshold**
• **ratio**
• **attack time**
• **release time**

The **threshold** is used to set the volume level above which the compressor kicks in. It allows you to set which part of the track will be affected by the compressor and which part is left alone. In mastering, threshold values are often set to subtly affect the average volume, or to cause a decrease in peak or average volume ranging between 1 and 3 dB. The **ratio** is used to set the degree by which the track's volume is reduced (or sometimes increased) when it exceeds the threshold. A ratio of 3:1, for example, will reduce any peak above the threshold by a factor 3. This decrease in volume is called *gain reduction.* What ratio you should use depends on the effect you want to achieve, although in mastering — in contrast to mixing — it will often be either very low, such as 1.1:1, or quite high, such as 10:1. The **attack time** lets you determine the time it takes from the moment the threshold is exceeded until the compressor has achieved the intended gain reduction. This allows you to decide whether you want to affect the transients or not. Common attack times used in mastering range up to about 250 ms. The **release time** lets you determine the time it takes from the moment the peak returns below the threshold until the achieved gain reduction is reverted to 0 dB. This allows you to control the extent to which you can hear the compressor's workings. Common release times used in mastering range up to about 500 ms, and are often set to correspond with the tempo of a song. This way the gain reduction will have reverted back to 0 dB right at the start of the next transient. Some compressors feature an additional *soft knee* option, which gradually increases the ratio to the set value instead of making a sudden change from 1:1 (no compression) to 3:1, for example. This can make the workings of the compressor more subtle, and therefore less audible.

During this phase of mastering, where compression is used to adjust dynamics rather than to maximize loudness, it is important to leave your tracks' transients intact. Generally you will only reduce transients when you are maximizing loudness, because reducing them more than once can make a track sound lifeless. For this reason, the attack times used in adjusting dynamics during mastering are rarely lower than 10 to 15 ms.

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11.3 Compression techniques

During mastering, you have a few different compression techniques at your disposal to influence the dynamics of a track. When using these techniques, it is important to listen to the compressed and the non-compressed signal at the same perceived loudness. This makes the compressor's workings easier to hear and also prevents you from making bad decisions because tracks that sound louder sound better to the human ear. As every compressor has its own unique sonic character, it is good to try a few different ones to see which one sounds best, especially if you intend to use heavy compression.

The most commonly used compression techniques are:

- **moderate limiting**
- **punch**
- **expansion**
- **parallel compression**

You can use the **moderate limiting** technique when an element in your track draws unwanted attention by prominently standing out from the mix. This will usually be either the vocals or a solo instrument, but a drummer or percussionist can sound out of control in terms of dynamics too. You set the attack time depending on the type of instrument. For lead instruments with a lot of sustain like the vocals or synthesizers, set a high attack time of around 200 ms. For percussion instruments such as snare drums or tambourines, set a low attack time of about 15 ms. To test the effectiveness of the attack time, set the release time to 50 ms and the ratio to 10:1. Then lower the threshold to the point where the compressor's effect is clearly audible. Depending on the attack time, either the rhythmic or the lead instruments will be compressed. Adjust the attack time if necessary. Now set the threshold to the point where you get a maximum of around 3 dB gain reduction during the loudest passages of the track. Experiment with the ratio if necessary: the higher the ratio, the more the compressor will reduce the peaks. When you are satisfied with the ratio, increase the release time to ensure that the compressor performs its task subtly, preventing the plug-in from drawing attention to itself. For instruments featuring a great deal of sustain, this can sometimes amount to 500 ms or more. If necessary you can use a multiband compressor with MS function to influence a specific element in your track (*more on this subject in section 11.4: MS multiband compression*).

You can use the **punch** technique when your track lacks power due to instrument strokes and hits that aren't 'punchy' enough. You also want to influence the percussion instruments in these cases, so choose a low attack time of 15 ms. Set the release time to 50 ms as a starting value and start with a very low ratio of 1.15:1. Now, bring down the threshold until the strokes and hits get more powerful. Be careful not to take the threshold down too far though, as this may drain the life from your track by reducing the dynamic range as a whole. If you have a hard time setting the threshold, try a higher ratio of 10:1 and then bring down

the threshold to the point where the compressor starts affecting the mean (audible) volume of the track. Once you've found that point, switch back the ratio, adjusting it to a value between 1.05:1 and 1.20:1 if necessary. About 1 or 2 dB of gain reduction will usually do the trick. Now, adjust the attack time to make sure that the correct elements are affected, and increase the release time to prevent the workings of the compressor from becoming too obvious. Using higher attack times, this compression technique can also make softer details more audible. If necessary, you can use a multiband compressor with MS function to influence a specific element in your track.

You can use the **expansion** technique when your track lacks dynamics or dynamic range because the mixing engineer used too much compression during mixing. Although lost dynamics can never be fully restored, you can use *expansion* to bring new life to a track. To do so, you will need a compressor that allows its ratio to be set to a value below 1:1. This way the dynamic range *in*creases when it exceeds the threshold. Depending on which instruments you want to influence, set either a low attack time of 15 ms or a high attack time of 200 ms. Set the release time to 50 ms, and the ratio to 0.90:1. Slowly bring down the threshold until you hear the intended instruments in the mix start to liven up. If you have a hard time setting the threshold, try a higher ratio of 10:1 and then bring down the threshold to the point where the compressor starts affecting the mean (audible) volume of the track. Once you've found that point, switch back the ratio, possibly adjusting it to a value between 0.95:1 and 0.80:1. As with the punch compression technique, you can use a multiband compressor with MS function to influence a specific element in your track.

You can use the **parallel compression** technique when a track lacks body. This is an often-used technique with a highly distinct and grand sound. For parallel compression, you need a compressor with a mix or amount function, which enables you to add a separate compressed signal to the original signal. Compressors that respond to RMS volume are more suitable for this compression technique than compressors that respond to peak volume. In contrast to the previous compression techniques, there is no need to be subtle when applying parallel compression. Set the attack time to 15 ms and the release time to 100 ms, to make sure the compression is clearly audible. Then, set the ratio to 8:1 and bring down the threshold until you can clearly hear the compressor working. You can use the sound of the snare as a reference here, which will be seriously affected with the right settings. Adjust your settings, if necessary, to make sure that the transients are left intact, while the rest of the track is firmly and audibly compressed. Set the mix or amount function to 0 dB or 0 % and slowly turn the volume of the compressed signal up until the track has enough body. If you have opted for clearly-audible compression, you usually don't need to turn the volume up as much as with more subtle compression.

Parallel compression can also be used to even out the dynamics of a track[10]. The softer passages become louder while the louder passages remain largely unaffected. With this type of parallel compression, you want the compressor to respond to the track's peak volume. Set the ratio to about 2:1, go for the fastest attack time available (or even better: enable the look-ahead function), and set the release time to about 250 ms. Now, bring down the threshold creating a maximum of about 5 dB gain reduction. Slowly turn the volume of the compressed signal up until the softer passages get the intended boost.

11.4 MS multiband compression

Compression can sometimes have unwanted side effects. When your goal is to influence just the snare drum for example, it is possible that your changes affect the guitar too. Or you may want to influence the string section only, but can't avoid negatively impacting the vocals as well. These are situations you could solve with an MS multiband compressor. In most cases, you will use only one of the bands of a multiband compressor to influence a specific frequency range. You may use two on some occasions, but rarely more than that. In addition to the previous objections against presets, the use of multiband compressor presets is strongly discouraged, because these tend to use all bands available (usually three or four), and therefore sound quite extreme. The various bands of an MS multiband compressor are generally used for the following reasons:

- **THE LOW BAND is used to give the kick drum additional punch. You can achieve this by using the solo button to set the low band to influence only the punchy portion of the kick drum's sub-low. The low band is also frequently used to even out the bass guitar. You could opt to only adjust the mono information of the track, since low tones usually contain little stereo information. Be aware, however, that multiband compression changes the bands' relative volumes. Because of this, you have to readjust the volume of the band you're working on.**

- **THE MIDDLE BAND is used to influence the dynamics of the lead instruments. This is because on some occasions, elements such as the piano or guitar parts can sound overly dynamic due to the way they were played or recorded. You can fix this by using the moderate limiting technique. Go for a subtle sound by choosing a slightly higher release time and a slightly lower ratio.**

- **THE HIGH BAND is used to keep harsh sounding vocals or solo instruments under control. The frequency causing this unpleasant harsh sound is usually somewhere around 3 kHz, and the most common way to keep it in check**

10 Katz, B. (2007). Mastering audio, the art and the science: Second edition.

is to use the moderate limiting technique on this specific frequency range. Sometimes, a ratio lower than 10:1 is chosen for a more subtle effect. For the lead vocals, you can usually suffice by adjusting the mono information only, whereas for additional vocals which are panned to the side you generally need to adjust the stereo information, leaving the lead vocals in the centre intact as much as possible. In the top-high range, this band can also be used to bring out the sound of reverbs and delays by applying the punch technique, possibly using a higher ratio.

11.5 Overcompression

Since compression can be difficult to detect for less experienced engineers, there is the risk of compressing too much. This is called *over-compression*, leading to either a lifeless mix or the typical 'breathing and pumping' sound. Learn to detect the workings of compressors, and be careful when applying them.