PROAUDIOMASTERY
BY MAHAL STUDIO

MAHAL STUDIO

PRO AUDIO SECRETS

50 ADVANCED MUSIC PRODUCTION TECHNIQUES

ARRANGE, MIX & MASTER WITH CONFIDENCE

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monitoring

1

Place your stereo monitors at an equilateral triangle with your ears.

If you're using nearfield monitor speakers, it is important to place them properly in order to create an optimal listening space. Your speakers need to be at the same height as your ears while sitting down (assuming you don't work at a standing desk). Also, they should not be very close to any walls on either side. Thirdly, the left and right speakers and your head (ears) should form an equilateral triangle, with each monitor angled directly towards your ear.

Ideal Monitoring Setup
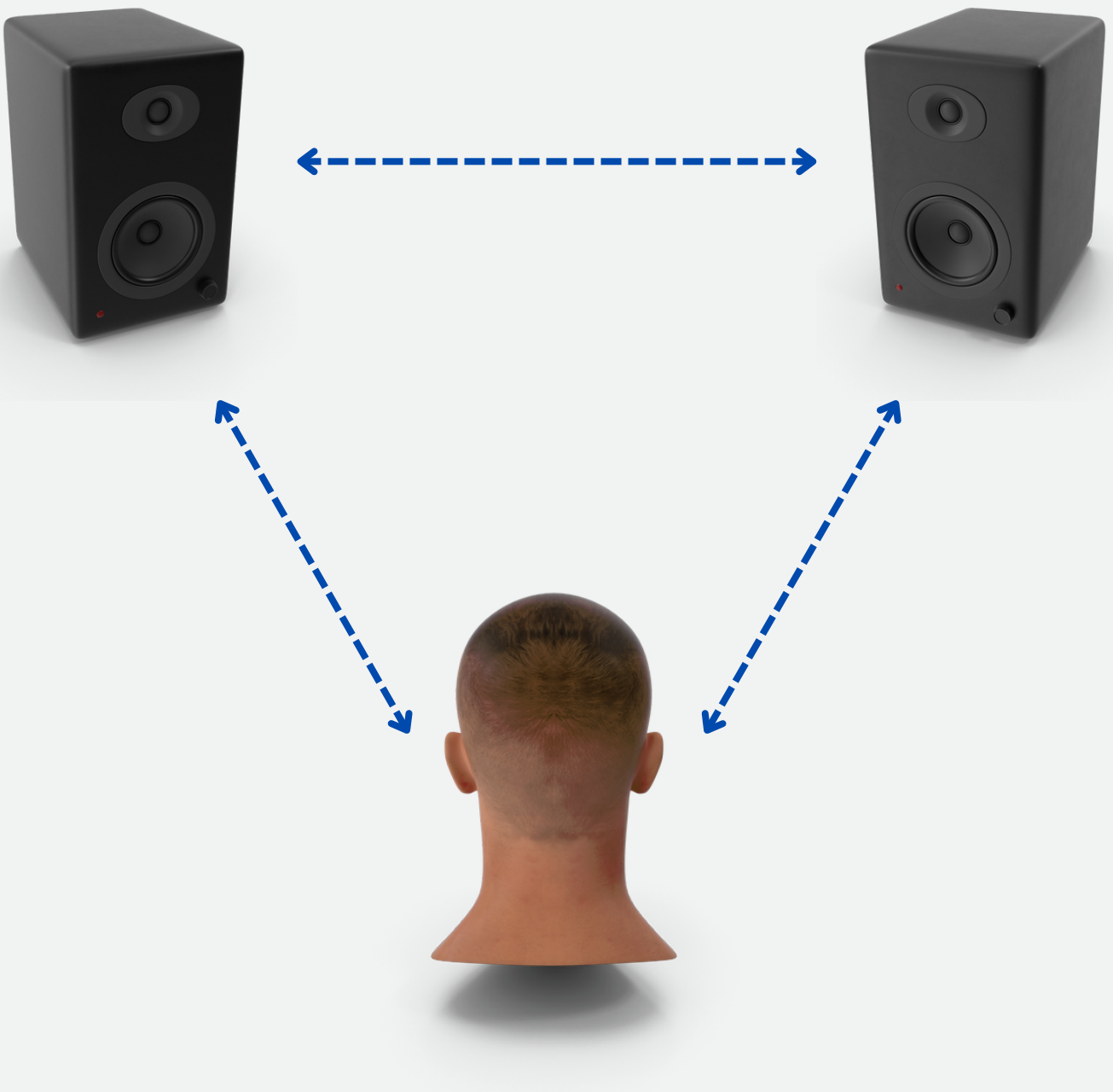
2

Eliminate all room corners at 90 degree angles.

Easier said than done, but for a perfect monitoring environment, no two walls in your space should sharply meet at a 90 degree angle. Use bass taps and foam in all the corners of your room or studio such that your walls and ceilings do not meet at sharp edges. This, however, does not apply if you're producing exclusively using headphones.

3

Monitor the most part of your mix at normal conversational volume.

Normal conversations take place at around 60 dB. When monitoring your mix, it should be playing at no more than the volume at which people talk to each other at home or in an office. Very high or loud listening levels lead to fatigue too soon and also do not give you the correct idea about the balance of your mix owing to loudness bias.

4

Your low end needs to be monitored at slightly higher levels.

It is difficult to hear the deeper frequencies clearly at very low volumes, therefore, this is the only area that you should be monitoring at higher levels. But don't prolong this for the reasons mentioned earlier. In order to fully understand how the different elements in your low end sound like you'll need to listen to them by turning up the volume a bit more for short durations.

5

Monitor often in mono.

From time to time during your entire mixing process, flip your master channel down to mono and listen to how your mix sounds. Occasionally due to phase differences between the left and right stereo channels, things can cancel out leading to certain elements sounding too weak or getting lost in the mix altogether. Also, remember that your song might not reach all of your listeners in full stereo, therefore, you have to take care not to deprive them of a decent listening experience if it doesn't. In general, if it sounds good in mono, it should sound great in stereo.

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arrangement

6

Use variations in your chorus sections.

The chorus of your song is an element that repeats multiple times throughout, and simply copy+pasting the same thing each time might not sound the most interesting. So, adding some variation, e.g., a different instrument or a slight change in one of the key elements of your arrangement, i.e., the melody, harmony or rhythm can make the different chorus sections less monotonous.

7

Layer your arrangement.

An arrangement typically has multiple layers, but what makes it effective is how you add and remove instruments between layers as the song progresses. For instance, adding some extra low and high end during the chorus enhances its power, which means you need to cut down a bit on the bass elements and shiny instruments right before the chorus, where you add them back in full glory. Similarly, introducing an instrument after every few bars during the intro and build-up of the song keeps the excitement going. Using multiple harmonic elements to drive certain parts of the song also gives the same effect.

8

Use pads to fix a thin arrangement.

Pads, or those sustained synth or string sounds, help in multiple ways, such as making your sound fuller and richer, adding a bed of air and texture, and in some cases, even making it wider. Depending on the genre, pads do not even necessarily have to be too prominent, but should add enough to your song mix such that when you turn it off you immediately sense something missing. They can also act as a kind of glue to blend in everything else together.

9

Never use two lead elements at once.

The human brain finds it rather difficult to focus on and process when two lead elements are used at the same time, say, a lead guitar playing along with the main vocals. Instead, use a guitar that serves as the harmony or rhythm section. Or, if you may absolutely want to use the lead guitar, have it play phrases in the gaps between the vocals. The same rule applies to lead instruments as well. Note that we are talking about the "role" an instrument plays in your song arrangement here, and not the instrument itself. Here's an example to help you understand the difference: vocals can either perform the lead melody of your song, or be used as a background harmonic element, which are two distinct roles.

10

The rule of 2.

When it comes to rhythm and harmony, you are better off playing no more than 2 different voices per element. This means, a pair of instruments (or the same instrument doubled in some cases) playing the harmony (one playing the chords and the other an arpeggio, for example) can sound good as they would complement each other, but can quickly get chaotic if it goes beyond 2. Same applies to the rhythm as well, e.g., using a percussion part on top of your main drums. Note that the percussion needs to play a different pattern in the same time signature and tempo to be the most effective here. If there are multiple percussion instruments playing the exact same pattern in unison, it could get difficult to mix them all.

11

Don't put too many things in the same register.

It's simple: too many instruments playing in the same register are competing for space in the same band of overlapping frequencies, thereby making it all the more difficult to mix. The solution is to move a few instruments up or down by an octave, automatically resulting in a richer sound that is also relatively easy to mix. Fix it early, don't wait till you mix!

12

Leverage transitions.

Transitions and effects, or FX (and we do not mean effect plugins here) can instantly spice up your songs. Whooshes, sweeps, swirls, falling star effects, crashes, hits, stabs—you name it! They can build tension or form a bridge between two sections of your song, or simply add ambience (wind chimes, rattles and rain-sticks, for example). The key here is to use a sound that is very different and unexpected, yet fits into your arrangement to set the right mood. They're called ear candy, for obvious reasons. You might even use a narrow bandpass filter in the 800 Hz area on certain elements such as vocals to give a lo-fi effect and use that as a cool shift. Other types of rhythmic transitions are breaks and fills.

13

Start with the hook if possible.

With social media driving our ever dwindling attention span, it is extremely rare (albeit unfortunately) to have songs these days with a meaty intro, no matter how good they sound to a serious listener. Therefore, to instantly grab attention you may start your song with the hook element, such as a guitar riff, and then build the rest of your arrangement around it. But of course, employ it as a creative choice without compromising on your musical sensibilities. An alternate hack for this is to have a different edit or "cut" of your song that starts right at the hook for the more casual listeners who are yet to become hardcore fans of your music. You can always release the full track too where you explore your musical ideas more thoroughly. Multiple edits also result in more content—— that's a win-win!

14

Build anticipation.

Don't dump all your musical ideas in one single place. Introduce something in each section. Add a layer at regular intervals. Drop something unexpected, like a chromatic note, or a sudden change in key. If done right, the resulting effect would not distract but be rather compelling. Good examples are drops and breaks.

15

Avoid clutter.

This is similar in principle as to why we shouldn't put too many things in the same register. If you're overdoing your arrangement and putting in too many layers together, you might need to take a step back and re-evaluate your creative choices. Don't be afraid to let go of few things totally. Or move them out to a different part of the song. Remember: the more the number of elements, the less space they get in the mix; on the other hand, the lesser the number of elements, the more bandwidth each of them receive.

16

Juxtapose slow and fast.

One of my personal favourites: you don't need every piece of your song to be playing at the exact same speed all the time—few things could go at double or half the tempo. As an example, vocals at 60 BPM with the rhythm in double time (120 BPM) gives the illusion of a much faster track without losing out on the nuances of an unhurried vocal performance. Mix and match some slow and fast elements for a more dynamic arrangement.

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editing

17

Automate fade-ins and outs.

Fade-ins and fade-outs still work in a variety of contexts and not just for the outro of your songs. Use automation effectively to create fades, and remember to use exponential rather than linear curves, as they sound more natural.

❌   ✅
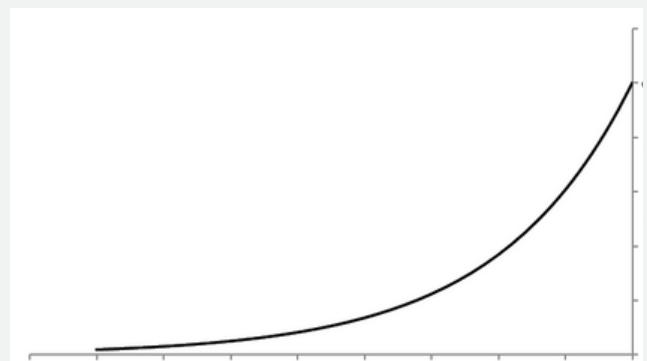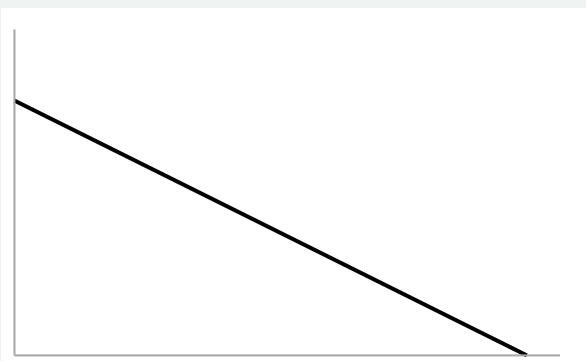
18

Cut at zero-crossings.

Often overlooked, but while comping and/or editing your audio samples, cut them at zero-crossings, or at a point where the waveform crosses the zero line (silence). If you don't, there is often an audible pop at the cut point during playback. Even better, add a tiny amount of fade in and fade out at the cut points. Trim the silent parts of your recordings by cutting them out as often there is a small amount of noise present there instead of true silence.
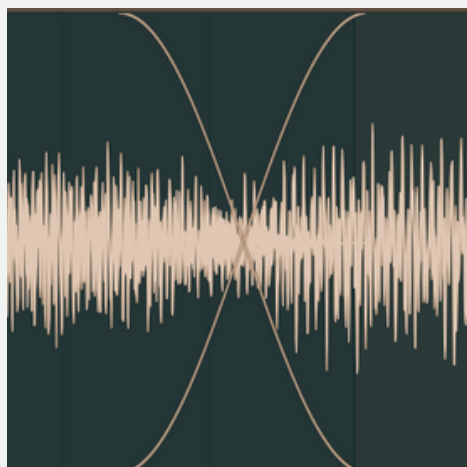

Cut here

19

Crossfade while comping.

This is in conjunction with the previous technique. When stitching two edits together make sure they flow smoothly into each other. This is best done by adding a tiny amount of crossfade (using automation) between the two pieces of audio to avoid any kinds of unwanted pops or clicks at the transition point.

20

Introduce a slight delay between elements that clash.

At times, certain problems can be fixed much earlier at the editing stage rather than while mixing. Two elements that clash with each other may be cleaned up considerably by introducing a slight delay between them, just a few milliseconds or so. Take drums and bass as an example: place the bass slightly behind the drums to reduce their mutual overlap.

Few milliseconds delay

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balancing

21

Take panning law into account.

Panning things closer to one or the other side can actually increase the volume of the instrument, therefore rebalancing might be necessary. When circular panning law is applied, your signal becomes 3 dB louder when panned 100% left or 100% right compared to the center. Under triangular panning law, level is not affected by panning.

3 dB

2 dB

1 dB

0 dB

L   C   R
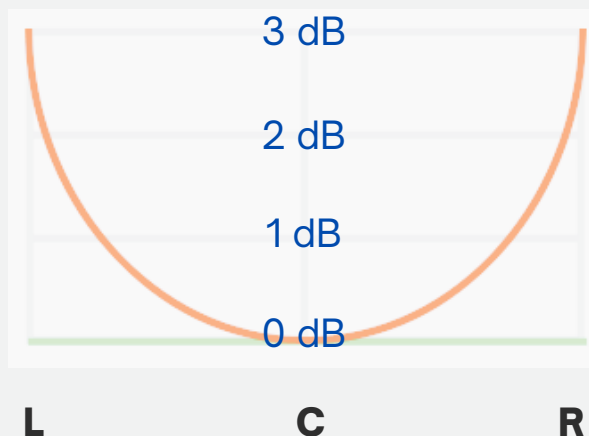
22

Balance according to genre.

While a good ballpark is to make the kick and snare almost twice as loud as the bass and vocals, and four times as loud as the other accompanying instruments, the fine balance among various elements also varies across genres. In rock and dance music, the vocal levels are set a little lower than in pop and jazz, for example. This is to keep things consistent and predictable within a certain broad genre.

23

If you have two instruments with largely overlapping frequencies, pan one to the left and the other to the right.

Balancing is not only in terms of levels or EQ alone. Panning also plays an important role in balancing overlapping sounds. Often, panning clashing instruments in pairs a little to the left and right (by 30-50%) often helps bring out the clarity in each, making them more distinctly audible. But remember to also check in mono as described earlier. Panning shouldn't make things sound worse in mono.

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mixing

24

Follow the order of importance.

Identify what's driving your song and proceed accordingly to mix the different elements one by one. Typically, the kick and bass form the backbone of your song, so you should start at that. Then take up the lead element, which is usually the vocals. Go down in the order of importance a particular track has on your overall mix. Things will be much easier this way, as well as more structured.

25

Balance your low end with EQ for clear drums and bass.

One of the most challenging of all mixing problems is getting your low end right, which primarily comprises of the kick and the bass. The quickest way is to boost the kick between 80-120 Hz and cut the bass in the same area. Then, cut the kick between 120-250 Hz and boost the bass in that same region. Tweak to find the center frequency in each of these two bands to get the best of the kick and the bass respectively. Then boost the bass once more slightly below 80 Hz. Also, consider boosting some of its upper harmonics as it will give the bass more definition. This is the quickest and tested method for a clean low end.

26

Add EQ after compression, not before.

If you use EQ before compression, the effect of compression on your signal will mostly negate the EQ corrections you have made. Therefore it is best to insert the EQ serially after the compressor.

27

Know the problematic frequency areas. Tackle muddy, boxy and harsh tones.

If your mix sounds muddy or there is too much boom in the low end, 200-250 Hz is where you need to cut. But don't over-indulge as cutting too much will make it thin and weak. In fact, if your mix sounds thin, you might need to boost a little here. Similarly, if you experience "boxiness" or a dull thud in your kick drum, you need to cut around 400-500 Hz. If your vocals sound too harsh or tinny, the 800 Hz area might be to blame and you'll need to cut here. In fact, a narrow bandpass filter at 800 Hz is stylistically used as the "telephone effect" for a lo-fi sound. These frequency characteristics apply to other instruments as well, but especially evident in the examples provided above.

28

Roll off below 100 Hz for all instruments other than the bass and the kick

The other rule for a clean low end is to not allow any other instruments in this region. A good practice would be to roll off all other instruments below 100 Hz. But don't use a high pass filter here with a hard cutoff, attenuate by 6-10 dB, or maybe even lower to preserve some of the natural warmth of the other elements.
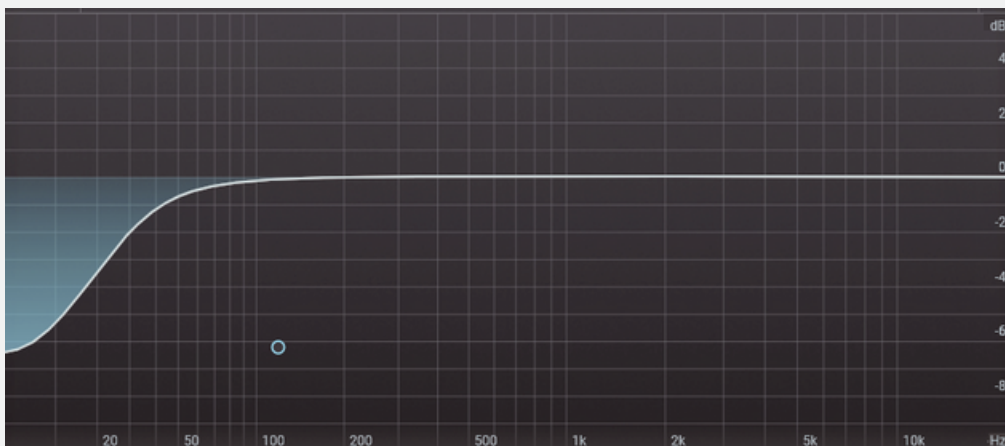
29

Add presence and air to your vocals.

This often works like magic to make vocals sound better instantly. Giving a nice little boost between 4 and 6 kHz adds presence to your vocals, making them sound more natural and bringing them closer out of the mix. If needed you can even add some air above 10 kHz as per taste.
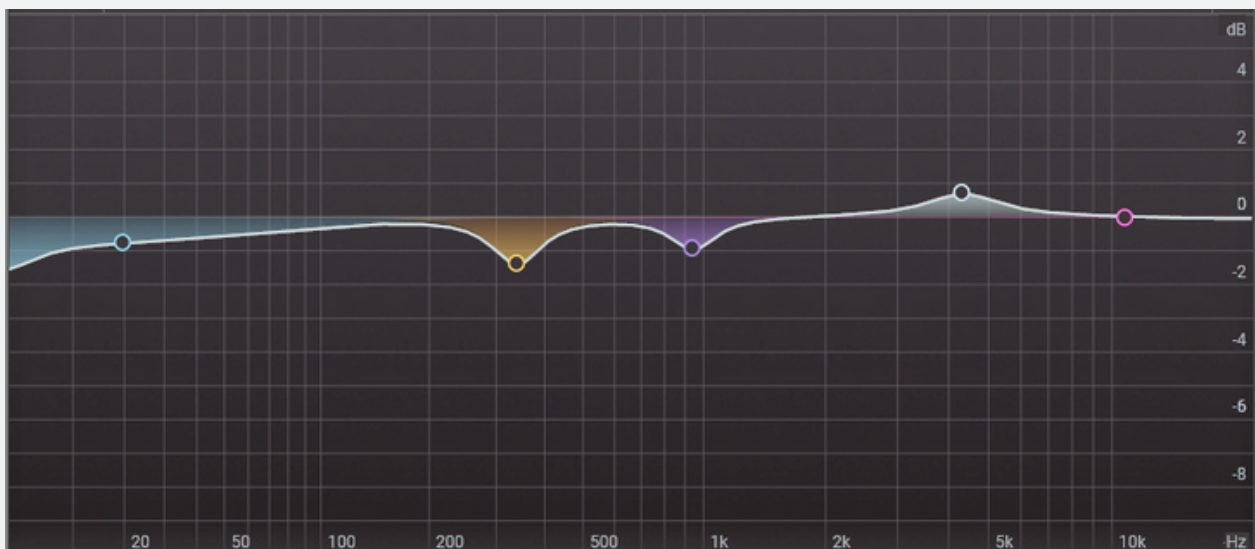
30

Understand how and where to add depth, or not.

A particular element could be either in the forefront of the mix (e.g., lead vocals), or be tucked way back (e.g., backing vocals, backing guitars, pads etc.). Adding ambient effects, i.e., reverb and delay, help push an element back in the mix. In other words, the wetter the sound, the farther away it seems for the listener. Depth can also be achieved by panning something left or right. Mono or centered elements stand out upfront, as do dry sounds. Two other magical effects are saturation and distortion—try them on vocals and acoustic stringed instruments for instant vibe and front-and-center shine.

31

The secret to boost effectively.

Often, to get the best results for a particular sound, boost not in one single place but two. If you're finding it difficult for an instrument to cut through the mix you give a good boost to a dominant frequency, only to make things too harsh. Alternatively, you could apply two smaller boosts in two different regions, it might cut through a lot easily without being too overwhelming. Remember, as a general rule: never boost two sounds at the same center frequency: if you boost one, the other needs to be cut in the same region and boosted elsewhere.

32

Never EQ in solo.

Most of the EQ process is about cutting things (subtractive EQ) so that everything fits well *together.* If you EQ in solo, it rarely serves the purpose and would mostly sound worse than the raw sound. Ideally, you should EQ in the full context of the mix, or if you must, solo at least a related group of tracks together, e.g., kick and bass while EQing the low end. Remember: it should fit into the mix rather than sound good standalone. If you are experienced enough, the only time you'd use EQ on solo instruments would be during recording.

33

EQ reverb and delay.

EQing reverb and delay makes them blend in well without being too in-your-face and pushing it back in the mix. Sometimes, you just need to "feel" the effect for it to be truly effective, you don't really need to hear it. But if you turn it off, you'll immediately sense something missing. You can achieve this through EQ. Use a little warmth for naturally bright vocals, and add some high-end shine for otherwise warm-sounding vocals. Also remember than adding brightness makes the effect more prominent, while cutting the higher frequencies makes it more subtle.

34

Use reverb and delay to blend things in.

Reverb and delay are not always used for the explicit purpose of adding ambience to sounds as a stylistic choice. They can also be used effectively to blend things in better. The more you add, the more you push an element back in the mix, so use only a very small amount, perhaps even EQed to reduce the brightness, and it will act as a "glue". It is also a common practice to set up a few bus channels on your mixer with only a generic glue reverb and/or a delay added and send route all tracks that are sticking out a little too much in the mix.

35

Prefer delay over reverb.

For the simple reason that reverb adds a lot more blur than delay does. Whether it be for gluing or ambience, delays are a lot cleaner than reverbs. But that does not mean you should never use reverbs, just don't overuse it. Try a delay instead, maybe it will serve the purpose equally well. Also, be cautious with using copious amounts of delay on your main vocals, the echoes could interfere in bad ways with the raw vocals, making them less distinct. Delays at the end of phrases work best. Moreover, need I say that your delays should always be synced to the tempo of your song?

36

Reverb is best used on an aux send.

If you must use a reverb, it works better when you put it on an aux send channel and mix it in with the original signal. This preserves transparency. Plugins often come with a dry-to-wet mix knob, but they're not always as good as having direct control over the ratio using your channel level faders.

37

Check reverb on both speakers and headphones as it might sound drier on speakers.

Headphones make each and everything much clearer to your ears, especially reverbs. When listening on speakers, you might actually not hear the reverb as well. Make sure to balance the amount of reverb such that it sounds almost the same on both speakers and headphones. Otherwise you might be left with something that sounds too dry on speakers.

38

Use a pre-delay to avoid blur.

Use around 10-20 ms of pre-delay on reverbs to keep things more transparent and less blurry, especially when the reverb is set up with a long decay time as a creative effect.

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compression

39

How fast is fast?

In absolute numbers, a value of less than 1 ms is considered a fast attack time for a compressor. Between 10 and 100 ms would be a slow attack. On the other hand, 50 to 100 ms is considered a fast release, and anything above 2 seconds would qualify as a slow release. Remember, slower attack and release times preserve the transients, and faster attack and release times lead to a more even and thicker sound with low dynamic range. Use slower attack and release on your drums to enhance their power, and faster attack and release while compressing bass and vocals, as the goal is to make them more prominent and aggressive.

40

Sync your compressor to the tempo of your song.

For the best compression effect, set the attack and release times as per the tempo of your song, i.e., at a fraction of a note's length. Use the **calculator here** to get ballpark reference values according to tempo but don't be afraid to tweak further. When done right, the compressor will pump in time with the song, making the effect all the more pronounced.

41

Even out the bass and vocals.

As mentioned earlier, the purpose of using compression on bass and vocals is to smoothen their dynamic range, thereby making them more prominent in the mix. For bass, the compressor should be set to a fairly high ratio of 8:1; even 10:1 or higher if required, effectively serving as a limiter. For vocals, the ratio doesn't need to be that high, maybe around 4:1 or 6:1 with a slightly long release time to keep things natural. Try different ratios to get the best result as per the situation.

42

Bring out the punch in drums.

We have already described that in order to enhance the power of the drum hits, the compressor needs to be set at a slower attack and release. A slower attack causes the original drum signal to slip out before the compression kicks in, thereby enhancing the transient burst of energy of the individual hits. While tweaking the compressor use the snare as a reference. Start with a very high attack and a short release; bring down the attack until the smack of the snare begins to sound flat. Then set the knob just a tad bit higher, no more than a couple of milliseconds. Next, increase the release time such that the signal level drops by the maximum right before the next snare hit in line. As for ratio, start with a relatively low ratio of 2:1 and work up from there.

43

Two is better than one.

When it comes to compression, often it is more effective to use two compressors instead of one when you want to balance between transients and thickness. Set up two compressors in serial, with the first one meant to reduce dynamics and thicken the sound (low attack and release, higher ratio), and the second to control the transient peaks (slower attack and release, lower ratio). This technique effectively delegates work between two compressors for better effect. A similar practice is often implemented using two EQs in serial—one to shape the low end and the other for the higher frequencies.

44

Mix in a little dose of heavily compressed audio with the original to get a fatter sound.

This is another technique of using two compressors, but in parallel. It is typically used on the drum bus—the output of the bus being routed to an aux channel that is heavily compressed or limited, and then a little bit of this compressed signal is mixed in, enough to result in a bigger sound without being squashed out and/or overly aggressive. Feel free to use this trick on any other instrument you see fit, like the bass.

45

Put a de-esser at the end of your vocal chain.

A de-esser is a special type of multiband compressor that is meant to reduce sibilance in vocals. It is typically placed last in your vocal processing chain. This is because compression early on can often enhance these unwanted sibilant tones, so it makes sense to use the de-esser at the very end to do a dedicated job in pinpointing the bad frequencies and fixing them up.

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mastering

46

Master at -14 LUFS with -1 dB of headroom.

The LUFS is a measure of perceived loudness. Two tracks at the same LUFS will sound equally loud irrespective of what their actual headroom or peak meters say. It has become nearly standard to master your tracks at -14 LUFS as that is what major digital streaming platforms like Spotify normalize to. Yes, there is additional processing that all digital platforms apply to your uploaded track, hence to be safe from unwanted distortions in your audio, leave about 1 dB of headroom, or in other words, your audio should peak at no higher than -1 dB. Some people go for only -0.1 dB of headroom though, but it's always better to leave a little more to account for factors beyond our control.

47

Listen to everything for a final time at extremely low volume.

The goal is to have a mix that translates well on almost every device on Earth (well, at the very least). Therefore, to make sure everything is audible in the mix you need to monitor it at a "whispering" level. Other techniques for the same is to listen to it from a farther distance, maybe from an adjacent room, or monitor it in a noisy environment and see if you're still able to make out the key elements of your song. This is to ensure your mix still sounds good not only in the optimal environment of your studio but also in other realistic situations your audience would probably be in when the song comes on.

48

Know when to stop.

You can spend a few hours, a few days or even months trying to attain perfection in your mix and master, but it is important to know when to stop. Too much focus on perfection could mean you're never getting anything released, which beats the purpose of putting your heart and soul into producing a song—it can never become a hit if nobody gets the chance to listen to it, right? More than self-inflicting a skewed goal of perfection, you can use actual feedback from your real human listeners to improve in your next release. STOP when you're endlessly adjusting less than a dB here and there, or when your tweaks are no longer making a discernable difference. Being ambitious is great, but sometimes being good enough is actually good enough from a practically achievable point of view.

49

Use the right bitrate.

Avoid downsampling, i.e., if you've recorded all of your audio in 32-bit, set up your project bitrate as well to 32 and not 24. A bit depth of 16 is acceptable in most cases for your final render (in fact, this is CD-quality and works for all distributors). 24 bits is the studio standard. 32-bit is finest.🦄

50

Mastering is more than the master channel.

In fact, when mastering multiple tracks that make up an album or EPs, you'll need to ensure a consistent sound and level across them all, as well as the duration of silence or the amount of crossfade from one track to another. Use the EQ and maximizer to the best effect here, but remember to be subtle. EQing the master track affects all elements of the mix simultaneously, therefore refrain from making large boosts or cuts as the effects are multiplied across everything. Just as you would mix to make a single track coherent, the same applies when you master an album—the tracks should all sound as part of a whole and tell a story collectively, rather than being a disjoint compilation of random musical pieces.

51

BONUS TIP: Use your ears— duh!

Depending on how you look at it, this could possibly be the most useless or the most useful piece of advice you ever got. Truth be told, if you cannot hear the often subtle differences these music production techniques make, you need to train your ears to understand and spot them. You can learn a lot by simply listening to a lot. Be observant. Don't be afraid to bend the rules—a lot of tricks and techniques in music production were actually discovered by sheer accident! Take inspiration and mould it into your own style. As I always say, it's no rocket science!