



THE FIVE BIGGEST MIXING MISTAKES

HOFA-College's tutors have analysed more than 21,000 student mixes. We draw on this practical experience to identify the five most common mistakes made by beginners.

MARC RÖHM & JOCHEN WEYER

HOFA-College is an international online academy for audio engineering and music production, with thousands of active students. A key benefit of the College's programmes is that students receive detailed feedback on their work. Students are provided with multitracks of studio productions from all musical genres that can be mixed in their home studios. Tutors supply detailed feedback on the mix in written form, which includes descriptions of the most important settings used in the original mix.

Over the years, hundreds of different mixes of the same songs, created from identical audio stems or multitracks, have

been analysed by HOFA audio engineers, and thousands of reports have been written. From these analyses we can see patterns: a set of common mixing flaws that stop people reaching the goal of a balanced frequency spectrum and a 'natural' sound. By 'natural' in this context, we mean appropriate for the genre and its expected audience.

In this article, we identify the five mistakes most often made by ambitious beginners, to raise awareness of the most common pitfalls in mixing audio and to provide readers with the opportunity to avoid them in their own productions.

Out Of Balance

We frequently receive mixes that are tonally imbalanced due to

inappropriate level ratios between the individual elements in the mix. These inconsistencies affect all areas of the frequency spectrum, depending on the frequency focus of the corresponding elements. For example, an unbalanced — and often weak — low end usually results from misjudged kick drum and bass levels. Either the kick drum and bass are not loud enough to provide a solid rhythmic and tonal foundation to the mix, or one of them is too loud, causing an overemphasis on the low frequencies.

Imbalances in the frequency content of the mix also frequently result from an unclear hierarchy of leading and accompanying elements in the mix. Finding an appropriate level for the lead vocal is a particular challenge. Most

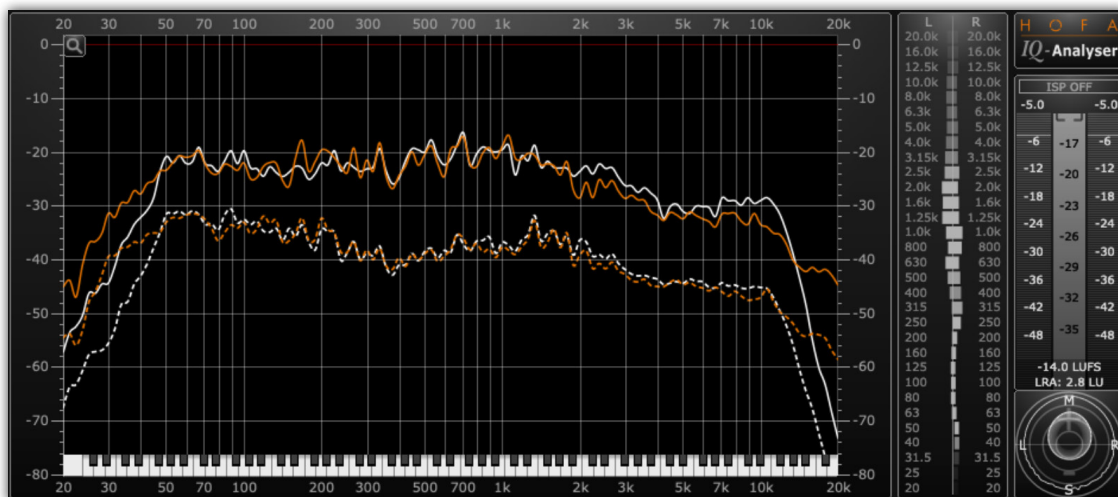
Using a frequency analyser to compare the frequency responses of a given mix and a reference song from a similar genre — with adjusted loudness levels — can reveal divergences in frequency content. This can help identify individual elements that are too loud or too quiet, or too bright or too dark.

often, the vocal is mixed too loud: this ensures a leading position

in the mix, but loses the connection to the music, and leaves the vocal isolated at the front of the mix. The opposite scenario is also common: vocals are buried in the mix and have a hard time taking the lead because they are competing with instruments that are the same volume or even louder. In regard to melodic instruments, establishing a clear hierarchy can avoid frequency overlap and masking in the midrange, and also helps to create some space for the vocals. The lack of a hierarchical structure in the mix often results from the mistaken belief that all instruments should be mixed at equal volume in order to make each instrument audible to the same degree, which we also see quite often.

Imbalances can also arise within multimiked drum kits: these are often not balanced within themselves and thus do not form a coherent unit. Frequently, the kick drum and/or the snare are too quiet and fail to cut through the mix, or the hi-hat and cymbals are too loud, which leads to an overemphasis on the high frequencies and a rather 'hissy' sound.

Our advice: Listening to reference mixes from the same genre can help to get a feeling for the level of the vocals and the instruments, the different pieces of the drum kit, or the instruments that constitute the low end in a particular genre. These references can be loaded into the current mix project; after the volume has been adjusted to match that of the mix, you can switch between mix and reference in order to compare the overall tonality or the level and frequency response of individual elements. In addition, working with an analyser can reveal over- or under-emphases in different frequency ranges in the mix



compared to reference songs from a similar genre or with similar tonality or instrumentation. Analysers are especially useful when you're forced to work with headphones, or with a less than perfect monitoring setup.

For a balanced and defined low end, a good starting point is to have kick drum and bass making equal contributions. In order to avoid masking of different instruments and create some space for the vocals, devise a clear hierarchical plan before starting the mix and stick to it. In addition, careful use of high-frequency EQ boost can help to bring elements to the front of the mix without raising them in level too much, which can lead to masking or a mid-heavy mix.

Frequency Balance

The second major issue that diminishes the return on efforts to achieve a balanced mix is misjudgments regarding the tone of elements within the mix. This relates to the fundamental frequencies of individual elements (instruments and vocals), as well as the high-frequency content. We often see a mismanagement of the fundamentals that results in either too much reduction or insufficient control of the fundamental range. Cleaning up the fundamental range too much, for example by excessive high-pass filtering, often leads to thin-sounding vocals and instruments. Percussive elements such as kick drum and snare lose punch if they are reduced too much in the fundamental range, and vocals lack weight and impact. Too much attenuation of the fundamental frequencies of kick drum and bass often results in a thin overall mix sound.

This strategy of aggressively managing the lower mid-frequencies is most likely

a consequence of the desire to avoid the dreaded 'mud', the fear of which is widespread in online communities. While this is a legitimate concern, as there are many elements that can contribute energy in this frequency area that is not really necessary for either the mix or the element in question, we have the impression that inexperienced engineers often indulge in a kind of 'anticipatory compliance' here. To avoid an overemphasis of the lower mids, they cut too forcefully in this frequency range and unbalance the mix.

By contrast, not paying enough attention to potential problems in this area often means the mix is marred by audible resonances, unevenness or boominess in the respective frequency range. Frequency overlaps between instruments that play in the same range can produce masking and lead to the mix as a whole sounding muddy, with bass elements not clearly defined.

Our advice: An overemphasis in the lower-mid frequencies can be avoided by careful EQ'ing that doesn't reduce the fundamental frequencies too much. A dynamic EQ can be useful in this context, as it can be made to operate only when there is a problem rather than all the time. Where there are several instruments that play in a similar frequency range, again, it's vital to establish a hierarchical structure of leading and accompanying instruments; pan position can also help to separate them. In order to create a defined bottom end, visualise the low frequencies in terms of 'slots' that are reserved for certain elements. For example, you might arrange things so that the kick drum is the only thing with

»

■ A dynamic equaliser can be a useful alternative to conventional EQ when you need to control intermittent resonances or peaks without applying a global frequency cut.

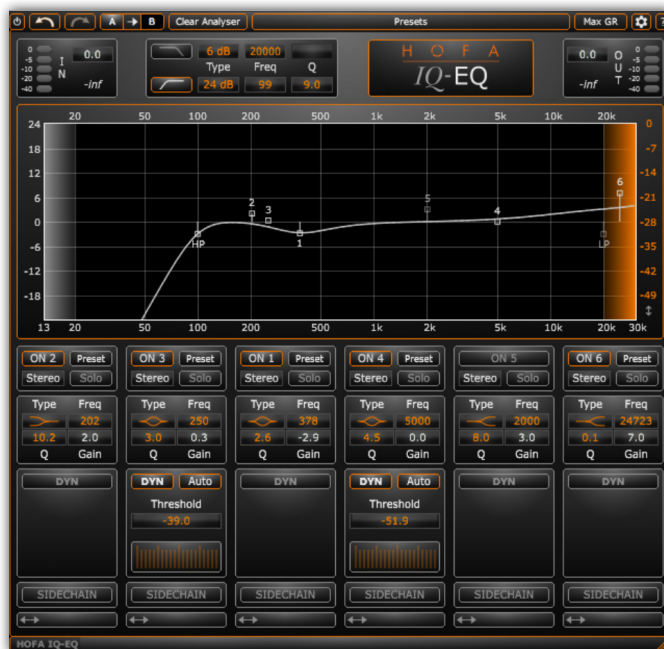
» significant content below 50Hz, while the bass guitar is most prominent between 60-100 Hz and the meat of the snare drum lies above this.

As for the high frequencies, we often hear vocals that are too bright, which in turn exaggerates sibilance. Adding high-frequency boost to the vocals is an understandable strategy to maintain or ensure intelligibility, but a more appropriate response might be to adjust competing elements that are too bright. An inappropriate drum balance can also present too much energy in the high frequencies, for example where the hi-hat or cymbals are too loud. To counteract this effect, students sometimes tame the high frequencies of individual drum elements too much, resulting in the kick and snare losing definition and being unable to cut through the mix, or an overall dull-sounding mix.

Our advice: In most genres, the vocals should be the brightest element in the mix, and the brightness of the other elements in the mix should be adjusted with respect to the vocal sound. To open up the sound of individual elements in the mix, use broad strokes to add high frequencies rather than boosting specific frequencies. High shelving filters turning over at 1 or 2 kHz are a good starting point.

Depth

One of the most challenging aspects of mixing is to produce



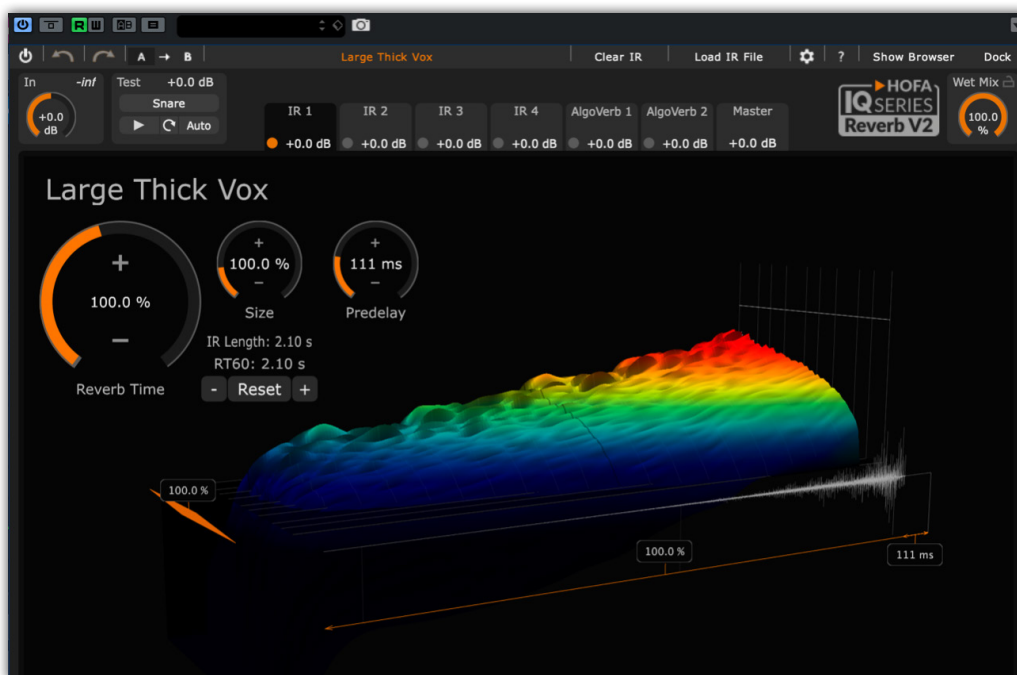
a three-dimensional 'space' in which each element of the mix will live. This means not only using the pan control to position sources along the left-right plane, but also creating front-to-back depth. One of the key tools available for achieving this is reverb, but it's vital to use this in the correct way. We often hear reverbs that are too small and thus too close to the direct signal, resulting in a rather indirect sound. In many cases, reverbs are also too bright: this means they are not sufficiently separated from the direct signal, so protrude into the

foreground of the mix instead of adding depth. The relative level of reverb and dry signal is also vital. Reverbs that are too loud lead to a diffuse sound that lacks impact. Too little reverb, meanwhile, causes the elements in question to lose their connection to the other elements in the mix and appear isolated, with the overall mix appearing dry and too direct.

Since the vocals are frequently the most important element in a mix, special attention is naturally paid to the vocal reverb. However, this can lead to a choice of reverb that does not blend as well with the space in which the other elements in the mix live. Creating additional depth with delays is also possible, but not easily accomplished. These are often too loud and too bright, which makes them audible as a distinct effect rather than creating a sense of depth through subtle use.

Our advice: Reverbs and delays used to create depth don't have to be very audible but should be used rather subtly. To create a homogeneous space and convincing depth in the mix that also allows for a suitable connection of the individual elements, try to choose a reverb that simulates a natural acoustic environment. Use special reverb sounds such as spring reverbs with caution and as an effect to add excitement to

» **Vocals can often benefit from a long reverb that 'opens up' behind them. The decay time will depend on the tempo of the song; a long pre-delay setting can help to maintain intelligibility.**



» a special instrument or part rather than to simulate an acoustic environment. As far as vocal reverbs are concerned, use a reverb with longer decay times that nicely opens up behind the singer and blends well with the other reverbs used in the mix. Cutting high frequencies on reverbs and delays helps to separate them from the effected signal and places them further back in the mix, creating depth.

Dynamic Control

Controlling dynamics is another task that has a fairly steep learning curve, and it is often not easy for the untrained ear to work out what processing is needed. Mastering this complex subject takes some time and even more practice. As a result, the amount of dynamic control necessary for a certain element in the mix is often misjudged, as is the purpose and the desired outcome of controlling the dynamics. We often see an overuse of dynamic tools, with incorrect or incompatible control times resulting in too much or inappropriate dynamic control of individual elements. Consequently, the affected elements move further back in the mix, lose their transients and sound unnatural and lifeless. At the other extreme, lack of control or inappropriate settings can mean that signals such as vocals are dynamically unstable, moving to the back of the mix in some sections and jumping out in others. Poor dynamic control can also make sibilants too prominent. Attack and release times are particularly important with percussive elements like drums, which don't cut through the mix enough if the transients are softened.

More surprisingly, we receive quite a high number of mixes that employ (sometimes heavy) mix bus compression or even limiting in order to increase loudness, in effect trying to master the mix while still at the mixing stage. In most cases, this use of dynamic tools on the master bus leads to unwanted side-effects like audible level changes which disturb the carefully

■ A high-frequency cut applied to reverbs and delays can help separate the effect from the direct signal and place them further back in the mix, creating depth.

■ Caution is advised when using compression in order to not reduce the dynamics of the signal too much; often, it is sufficient to keep the amount of gain reduction in the single-digit range. It's also vital to assess the effect of the attack and release time on the compressed signal.

crafted volume ratios, ambience information that gets disproportionately loud, or even pumping and distortion.

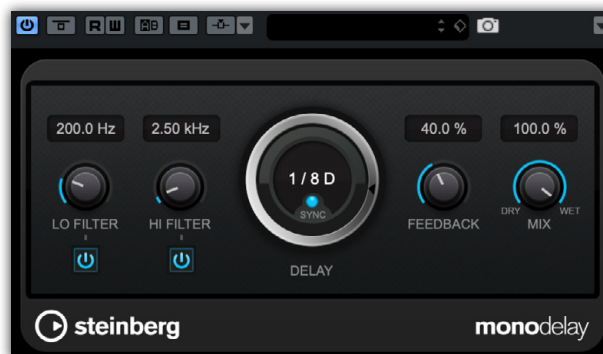
Our advice: In the beginning of your mixing career, be careful when using compression, and pay special attention to the influence of different control times on the compressed signal. Caution is advised when approaching the two-digit range in terms of gain reduction! To learn about the effect that a compressor has on a given audio signal, use a low threshold to make the compressor work hard and listen to the result; next, set the attack time to a minimum, slowly increase the attack time and listen to how the sound changes as you do so. In the case of percussive material, for example, you'll hear the initial transient begin to come through more and more strongly as the attack time is increased. When learning to mix, the use of compression and limiting on the master bus is not advised.

Gain Staging

Gain staging is crucial to the sonic integrity of any given mix, and presents some pitfalls, as it has to be managed at several different stages of signal flow in the DAW. Since most DAWs nowadays



use 64-bit floating-point calculations and thus offer almost infinite headroom, clipping within the software mixer is impossible. However, it still makes sense to sensibly level the individual tracks during mixing and stay well below the (theoretical) maximum level of individual



■ A trim plug-in can be used to adjust the level of an audio signal in a given audio track or group.

channels in the DAW or the master out. There are several reasons for this.

Plug-ins that are employed to process the recorded audio material are sometimes optimised for signal levels within a certain range. In particular, plug-ins that emulate analogue hardware are often calibrated to work best at -18dBFS. Therefore, signal levels on audio or group channels should be managed so that they don't peak too close to 0dBFS. This can be achieved using Clip Gain or equivalent to lower the level of the source audio, or by inserting a trim plug-in ahead of the other plug-ins in the signal chain; -18dBFS is a good starting point to aim for when setting the levels of individual audio tracks in the mix, depending of course on the number of tracks that are summed on the master bus.

Secondly, any signal that peaks above 0dBFS at the master bus will clip the digital-to-analogue converters of the audio interface, causing distortion. Thirdly, a consistent gain-staging strategy helps to craft consistent mixes, allowing the faders

About HOFA-College

Founded in 1988 as a recording studio, HOFA has expanded its activities to other business areas, offering online audio engineering courses, audio plug-in software, acoustic products and solutions as well as media production services. Since 2005, HOFA-College has been offering certified further education in audio engineering and music production, tailored towards the beginner, the experienced and professionals

in the music industry. A particular asset of the training is mix analyses with detailed feedback and personal support by experienced audio engineers over the whole duration of the course. The program comprises a wide variety of courses which can serve as a prerequisite for a one-year Top-Up Bachelor in Music Production and Audio Engineering.

<https://hofa-college.com>

to be left at or near the 0dB position where they have the highest resolution. Start the mix process by using trim plug-ins or Clip Gain to adjust the levels of individual audio files so that a reasonable rough balance is achieved without moving any faders. Many variables that can negatively affect the desired result are excluded in this way, and comparability is achieved on several levels: between different processing steps, between similar elements in the same mix, between the same elements in different mixes, between different mixes as a whole, and so on.

Although we give advice and guidance on gain staging and the overall volume of the mix, it is not uncommon for us to receive student mixes that are very quiet and far from the 0dBFS mark, or that peak at 0dBFS and have been clipped during export.

Our advice: Make sure that the peak levels of the individual audio tracks are well below 0dBFS and that the master out also peaks below 0dBFS in order to avoid clipping and leave some headroom. We recommend that the peak levels of the mix in the loudest part of the song should be below -3.0dBFS on the master out. 

Mix with the best!



"Besides the excellent interviews and fascinating, in-depth recording and mixing articles, I can always depend on Sound On Sound for complete, unbiased reviews of the latest pro-audio gear."

Bob Clearmountain, engineer, producer and mixer, Grammy Award winner (Bruce Springsteen, The Rolling Stones, Paul McCartney, INXS)

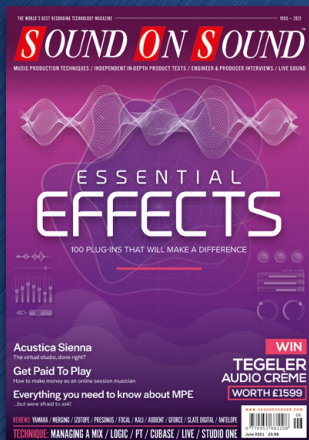
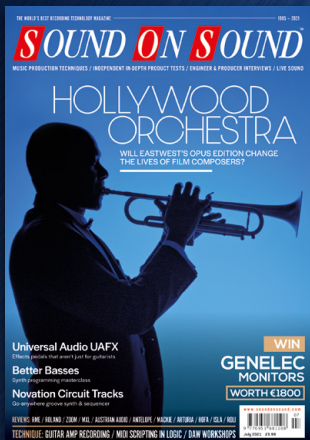


"As a professional I admire Sound On Sound as one of the most trusted and credible sources of inspiration and information."

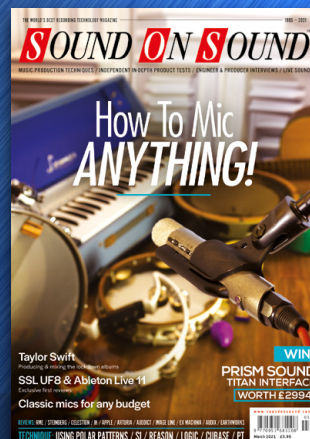
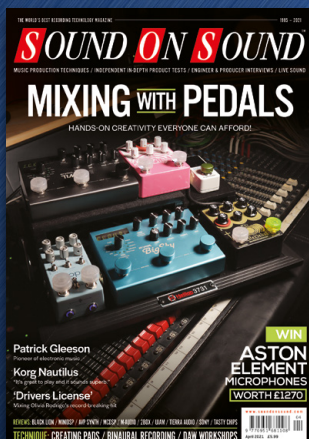
Jack Joseph Puig, mixer, producer, Grammy Award winner (Rolling Stones, U2, Mary J Blige, Black Eyed Peas)

SOUND ON SOUND

The World's Best Recording Technology Magazine



This article was originally published in Sound On Sound magazine, August 2021 edition



follow us on Twitter



find us on Facebook



go to the SOS YouTube channel



visit the SOS forum

Subscribe and Save Money!

Visit our subscriptions page at www.soundonsound.com/subscribe for more information on the Sound On Sound App go to: www.soundonsound.com/app

All contents copyright © SOS Publications Group and/or its licensors, 1985-2021. All rights reserved.

The contents of this article are subject to worldwide copyright protection and reproduction in whole or part, whether mechanical or electronic, is expressly forbidden without the prior written consent of the Publishers. Great care has been taken to ensure accuracy in the preparation of this article but neither Sound On Sound Limited nor the publishers can be held responsible for its contents. The views expressed are those of the contributors and not necessarily those of the publishers.