CRITICAL LISTENING

Critical listening is the ability to listen to a track in an objective, analytical manner. Detaching ourselves from the music in this way is much harder than first thought, especially if the person listening had a part in the production or mixing of the music.

We need to listen to the track and dissect it with a whole new level of depth and understanding. This allows us to deconstruct the sounds and music we make, in order to identify any problems that we may have within our mix, allowing us to figure out how we can then rectify them.

A keen critical listening ear comes with lots of practice and can take years to develop. There are three main categories that we can divide a sound into when we are making a critical analysis:

- **FREQUENCY**
- **DYNAMICS**
- **HARMONIC CONTENT (timbre)**

FREQUENCY

This directly correlates to pitch, however frequency on its own is only a small part of the sound, as we will soon see in the timbre section.

DYNAMICS

Dynamic range is another fundamental characteristic of sound. Dynamic range simply means the difference between the loudest and quietest parts. This could be of a single sample, such as a snare hit, or it could be used in a more general context, such as the dynamic range of a vocalist throughout an entire track.

Usually a vocalist will fluctuate in volume throughout different sections of the track, meaning that they are very dynamic, and will often use a compressor to keep the dynamic peaks under control.

Another example of dynamic range, which is used in the majority of productions in some form or another, is controlling dynamics of individual sounds to shape how they are heard within the mix.

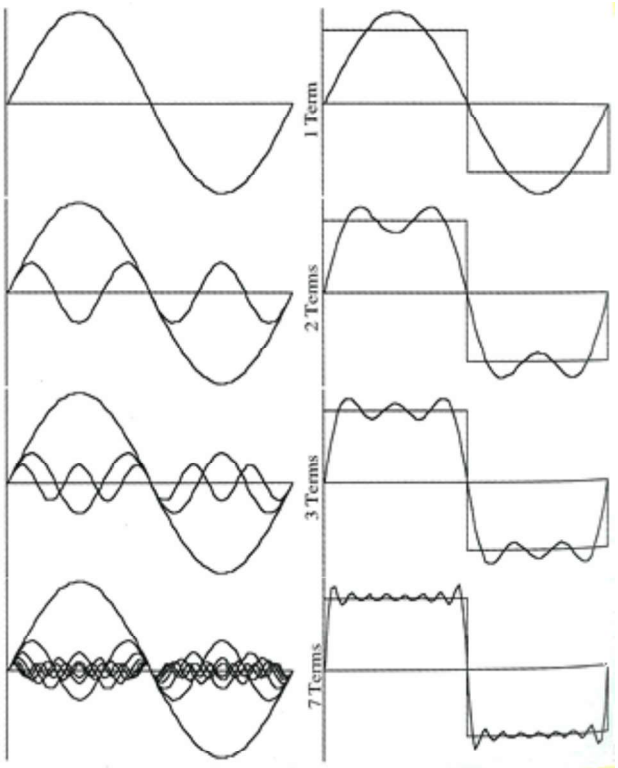
Compressors and envelopes can be used to control the attack and decay phases of sounds such as kick drums. This can be used to soften attacks that are 'peaking,' or 'clipping', as well as to give sounds more bite and punch.

TIMBRE

As we should now be aware, a tone generator playing a sine wave at 440Hz is equivalent in pitch to A4 on the keyboard. If we now double this frequency to 880Hz, we now hear A5 on the keyboard. For every doubling in frequency, we go one octave (12 semitones) up the keyboard.

If we now load an instance of the grand piano in Ableton, and play the same A4 and A5 notes, we can tell they sound completely different to the sine wave. Even if they had the same dynamics as our sine wave, they would still sound completely different due to their harmonic content or timbre.

The extra harmonics are also known as overtones and they layer together to give us our sound. To prove this, we could use a 24dB per octave low pass filter, to remove these overtones until we are only left with the pianos fundamental frequency, which will make it sound very similar to our sine wave. This proves that we can make almost any sound purely out of multiple sine waves at different frequencies, which is the basis for additive synthesis and was theorised by Joseph Fourier (Fourier's Theorem).



We can use Fourier's theorem to use a potentially infinite amount of sine waves to create any complex periodic waveform. In this case a square wave.

In each stage of the diagram we can see how more sine waves are used at varying frequencies to square off the square wave.

TRAINING OUR EARS

A point that we would like to reiterate is that we aren't going to improve our critical listening capabilities overnight.

It takes lots of time and practice to train our ears and we must be training them as often as we possibly can. We can do this by mentally dissecting songs that we hear on the radio or on podcasts. There are also plenty of useful ear training videos on YouTube, which will allow us to hone in on frequency and dynamics.

We can think about the elements such as: frequencies, timbre, dynamics, stereo image and depth. We can also think in terms of different instruments and how they come in and out of the mix during various sections of the arrangement. Although it is very tempting, we should not be using our eyes to mix. We don't use our eyes to hear music when we listen to it, so therefore we should not be using our eyes when mixing because our brain will subconsciously make decisions for us, based on what we see rather than what we can hear.

For example: We may see a cluster of resonant frequencies in a kick drum at a certain frequency range. Many producers are aware that 200Hz is a common area for a build up in 'muddy' and 'boxy' frequencies. We should be using our ears and sweeping through these frequencies to listen for resonances. Just because we are aware of these common problematic areas does not mean that this particular sample is going to benefit from this blanket style of treatment. the ears are our best tool, not our eyes.

IMAGING

Most modern electronic music is listened to in stereo. Stereo is when sound is reproduced to come out of two independent audio channels through a symmetrical configuration of speakers.

This allows for sounds to be placed in a 'space' in the mix between the two speakers, by using panning and relative volume between each speaker. This 'space' is known as the stereo field.

To grasp a better understanding of this concept, listen to this short YouTube clip using headphones:

https://www.youtube.com/watch?v=IUDTlvagjJA

These recordings can utilize stereo imaging techniques to really place the listener in the space.

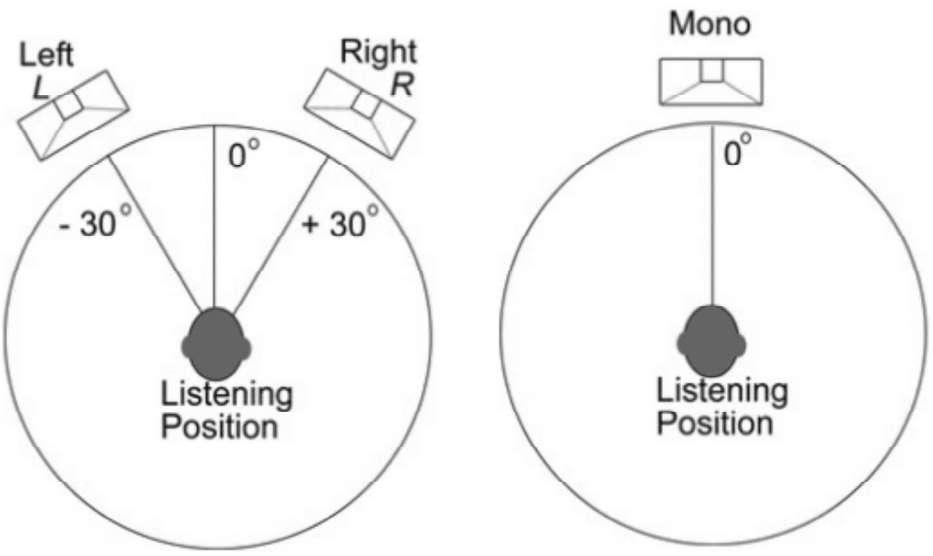
We also have 'mono' or monophonic sound. Monophonic sound is the reproduction of sound using one channel, instead of two independent ones. This is how most club sound systems work, so that the volumes and audio playback is the same, regardless of our positioning within the club. This is worth taking note of, because we don't want any of our music to have any phase issues when summed to mono, which often causes issues such as a 'phasey' sound, peaks, or complete cancellation of certain frequencies.

If we load a track into our DAW, we can easily tell if it is mono or stereo by looking at the waveform to see if there are two separate channels.

When these two separate channels are on one track, this is known as stereo-interleaved. Meaning that there are two channels that are kept together as one individual file, as opposed to having two separate mono audio files on separate tracks, which would require panning to make the full stereo track.

When we place sounds, it is our aim to spread them across the stereo field to create a cohesive stereo image. A good example of this is to think of a live band set out on a stage. If we close our eyes, we can paint a mental picture of what the stage looks like and where the players of the band are situated, purely from the sound and direction of the instruments.

This is yet another tool that we can use as producers to add layers of interest to our productions. There will be a book dedicated specifically to reverb and depth in this mix series. For now, we just need to have a very basic awareness of the fact that there is more than one dimension to a mix. We also need to think in terms of width, as well as direction and height.



SPATIAL AWARENESS

So far we have covered frequency, timbre, volume (height) and direction (including width) of our sounds. But what about depth?

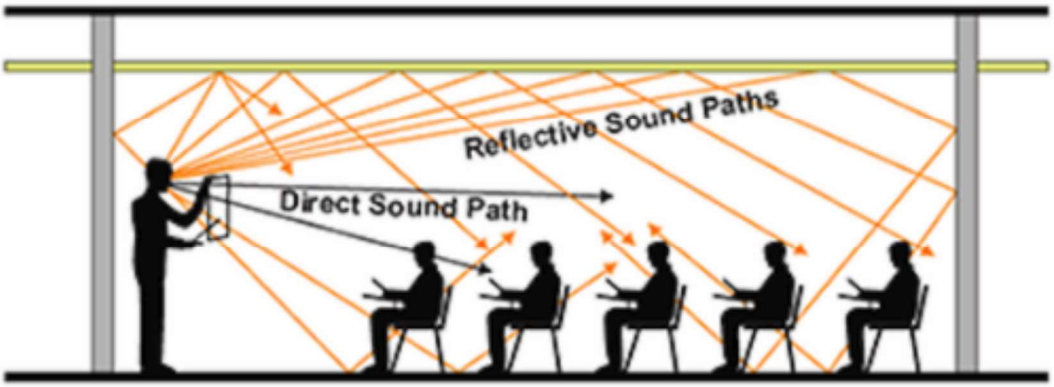
We need to be spatially aware when listening and critiquing mixes. In every day life we hear a natural reverb on every single sound we hear. For sound to reach us, some of it will go directly to our ears, some of it will bounce off the walls of the room, then to our ears, and some of it could bounce around a room several times before reaching our ears.

This is the reason that when we listen to a sound, we are able to make educated guesses as to the size of the room the noise was made in, the type of room, (tiled walls or lots of curtains and carpets) and of course the distance we are away from the sound.

As mix engineers, we can use the fact that our ears have this added skill set of depth detection to create a sense of space and depth within our tracks. We can accomplish this with a few different tools at our disposal. From Reverb (most common), right the way through to compression, EQ, delay & volume.

REVERBERATION – The time it takes for the reflected sound to reduce to 60dBs from the cessation of the original sound signal. (Measured in seconds)

- Reflected sound tends to 'build up' to a level louder than the direct sound. Reflected sounds **mask** direct sound.
- Late arriving reflections tend to **smear** direct sound.



CRITICAL LISTENING SUMMARY

Everything we have covered so far will help us to be able to listen, analyse and critique our mixes, as well as to hopefully help create some great sounding ones. We also need to know that we can trust what we are hearing and know that it is an accurate representation of our creations. If we aren't accurately monitoring our track, then we will have no way of telling how the track will translate to the rest of the world.

CRITICAL LISTENING KEY POINTS

- Critical listening is listening to a track in an objective analytical manner
- Critical listening takes time and practice, paying attention to the frequency, dynamics, and harmonics of each individual sound and how it fits in the mix.
- Dynamic range is the difference between the loudest and the quietest parts in a mix
- Macro dynamics can be thought of as the long-term dynamics
- Micro dynamics can be thought of as the dynamics between different components of a single sound
- Timbre describes the tone and harmonics of a sound
- Mono is the reproduction of sound through a single channel
- Stereo is the reproduction of sound through separate channels
- Mixes can be analysed in terms of height, width and depth
- Reverb and other effects can be used to introduce an element of dimension into a mix