

Column by Renzo van Riemsdijk (Masterenzo):

To dither or not to dither (that's the question)

Shakespeare's Hamlet, who doesn't know it. The fact that William S. back then knew what dither was is hardly imaginable nowadays. A wise man it was, Shakespeare. Dither cannot be seen, smelled or tasted and you can hardly hear it.

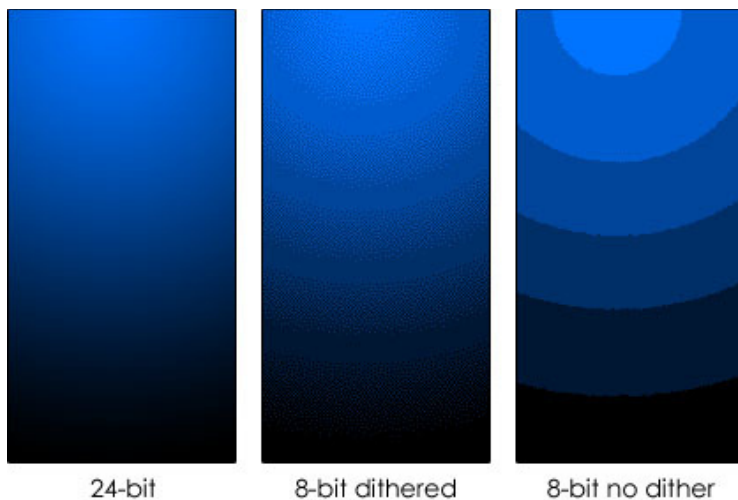
But still it's an important thing used by us, the mastering engineers. But what is that "thing" exactly?

In last month's column I made the comparison between resolution and photography. Let's just do that one more time.

We again imagine this picture taken from internet being blown up to poster size. We see the picture made up of blocks and it's not a pretty sight at all.

Okay, now it's time to add some *dither noise*.

Noise? Yes indeed. Technically speaking dither is a type of noise. What we see is that the corners of the blocks are tied together by the noise and as this is done, we're looking at a completely different picture. It's still far from perfect but because the blocks have been replaced by lines the image looks much better! (see the image below)



Okay, now it's time to return to the land of audio and studio.

The same principle is valid for music files (.wav or .aif). Like I wrote in my previous column the resolution of a CD is 16 bit. In a DAW (your computer plus software) we work with an internal resolution up to 64 bits (or even higher). Would we save our files as 16 bit all the bits above bit number 16 would be cut off. This means that also the information contained in those higher bits is being cut off and thrown away. This is no very pretty thing at all so instead we use 16 bit dither noise to mask the loss of those higher bits.

It's quite difficult to hear but for some people cutting off those bits feels like a loss of depth and/or a deteriorated stereo image.

Unfortunately back in the eighties the developers of the compact disc decided to use a 16 bit resolution (little did they know). But fortunately for us time hasn't stood still. Nowadays the 24 bit resolution is widely used for recording and mixing but also as a final (Hi-Res) format.

When finishing a mix it's best practice to add 24 bit dither to your mixes as a final step during mixdown to reduce the bit depth from the higher internal 64 bits to 24 bits. Only when you render your tracks as 32 bit (floating) files there's no need to add dither noise.

When doing this, refrain yourself from using *noise shaping*. Noise shaping is being used to optimise the frequency range of the dither noise for the human hearing. This only works well if no further processing is applied so noise shaping is merely used when dithering to 16 bit resolution.

Be aware that dither only works when it's applied as the *very last step in processing*. If you'd apply dither to lower the resolution to 24 bit internally and you would apply a small fade afterwards, the resolution will immediately rise to the high internal resolution of 64 bits.

Well, what a technical paper it turned out to be. I'm quite dazzled myself and in need of a beer. Next month a less heavy subject please.

Renzo

Renzo (Masterenzo) is a Rotterdam based Dutch mastering engineer. He has worked for Gery Mendes (GMB), The Legendary Orchestra Of Love and Phil Bee's Freedom. More info about mastering and about Masterenzo can be found on his [website](#).