Sound | Part D

We are used to high quality sound now. The dominant standard for sound is known as Pulse Code Modulation and is often found in files with extensions WAV or AIFF. These files can take 50 megabytes for one song. Yet, we don't want to give up all this memory, so, just like with other digital data formats, we use compression - lossy and lossless.

Lossy means that some data is lost during the compression, resulting in potential loss of quality. Lossless means no data is lost. If we repeatedly uncompressed and re-compressed a lossy format sound its quality will keep on going down until it sounds like a warble. Lossless format file will sound exactly same, no matter how many times you recompress it. Note, that similar concepts of lossy and lossless exist in graphics, too.

Lossless compression is very neat as it allows us to save space to a degree without losing any quality. But for the 1 to 11 compression or more we need lossy compression like MP3, so that a song becomes 3 megabytes and we can store 11 songs or more in the space taken by just one uncompressed file. MP3 and similar format files do their space saving magic by analysing sound and using something known as "psychoacoustics".

We know that if two sounds happen at the same time, our ear only picks up the loudest one. So, we can use fewer bits for the quieter sound, essentially "losing" it. MP3 files miss out on the quieter sounds, they also narrow the stereo image – by decreasing the difference in sound that comes from the left and right earphones or speakers and replacing it with the same data which saves space. They have other tricks, as well. Now, we have other formats like Ogg-Vorbis or FLAC which have higher quality but are not as popular.