

Psychoacoustics

The study of subjective human perception of sounds.

Both the ear and the brain are involved in a person's listening experience.

We hear what our brains want us to hear.

How Much Louder Does That Seem?

- *Relative loudness perception:*
- *Not a linear perception due to how the inner ear works.*
- *It is however more like a log scale. Therefore we use decibels (dB)*

Why are we interested in Psychoacoustics?

Listeners tend to notice things that seem "louder" to their brains. That's why commercials seem louder on TV.

As communicators, we want to control what listeners pay attention to: the message, the "beats" in the story line, or details that enrich the story.

At least, we want to avoid obscuring the important sonic details with less important sounds.

Facts

- *A common form of sound masking in offices, is pink noise. It also works for sleepers in noisy motels.*
- *People standing watch in the dark can perceive sounds that are not really there.*
- *If you hear two notes, at least 50Hz apart, you will perceive two additional notes, A+B and A-B.*

Tuning Out Noises

- *We can tune out details. A person listens to scratchy records eventually stops noticing the background noise, and simply perceives the music. S/he might not even remember hearing scratches.*
- *You probably don't notice the background noises much in this room until we record a narration in here.*

- Something **sounds louder** even if the amplitude is the same, **if...**
 - *more frequency overtone elements, or an EQ boost in the 800-2000 Hz range, are added to it.*
 - *If it is moved away from other sounds in a sound field (like stereo or 5.1 surround)*
 - *"Making room in the pan" (panorama)*

Loudness vs. Amplitude

Amplitude and loudness are related but not the same...

- Something **sounds louder**, even if the amplitude is the same, **if**:*
- *its frequency is around 1000-2000Hz*
 - *Or - other sounds are now quieter*
 - *(or muted completely - common in film)*
 - *Or - the amplitude never drops*
 - *(as in commercials)*

- Something **sounds louder** even if the amplitude is the same, also **if...**
 - *No other sounds in the mix occupy the same frequency range.*
 - *So you can EQ some "frequency space" in the EQ of the other tracks.*

Loud Lows?

True low frequencies are hard to reproduce over most compact speakers and many home audio systems, even with subwoofers. Some theaters can do it.

“Loud” Lows

*But editors or sound designers usually **cheat** by putting in a little of the very low fundamental we **want** (say 25 Hz) and add a **lot of the next octave** (50 Hz in this case).*

– (Naturally WAVES sells a plugin for this!)

*If we get the balance between the frequencies right, people **perceive** they are hearing more of the 25 Hz note and we save money on heavy duty speakers and amplifier power.*

So...

- If key dialog is panned to the middle, don't put any other sounds in the exact middle, except perhaps low frequency sounds that are below the vocal frequency range.
- If other sounds are in the same range, pan them a little right or left.
- Keep all the words in a dialog track at even amplitude.
- Keep masking sounds at lower amplitude.