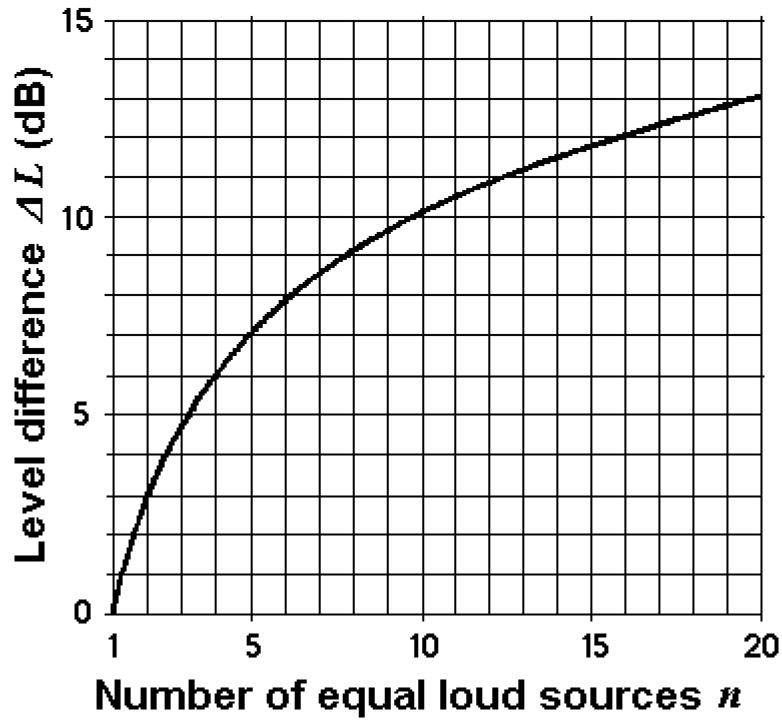
Sound info

The closer a receptor is to a noise source the louder the noise seems; for every doubling of distance from a source the intensity drops by about 6 dB over land and about 5 dB over water. *Conversely, if you move half the distance closer, the sound intensity would increase 6dB. Practically, if you are 6 ft. from a noise source and move to 8 ft. (or 4 ft.) the sound intensity would decrease (increase) by 2 dB which would generally not be perceptible. At 9 ft. (or 3 ft.) the sound intensity would change by 3 dB which would just be barely noticeable or perceptible.*

Adding of equal strong non-coherent sound sources



Level increase ΔL for n equal loud sound sources	
Number of n equal loud sound sources	Level increase ΔL in dB
1	0
2	3.0
3	4.8
4	6.0
5	7.0
6	7.8
7	8.5
8	9.0
9	9.5
10	10.0
12	10.8
16	12.0
20	13.0

Perception Vs. Reality: What Our Ears Hear

by Acoustics By Design *on December 12, 2008*

It seems like everyone is talking about decibels these days: "5 dB of this" and "3 dB of that." As acoustical consultants, we hear people using these metrics and often wonder to ourselves, "Do they really know what a decibel is?" Occasionally, someone is brave enough to ask the more important question, "Just how much is a decibel?" The answer to that question is, of course: well, it depends. Are we talking about *physical* sound levels or *perceived* sound levels? There is a big difference!

Let's lay some ground work. A decibel is a ratio of how much acoustical energy we hear compared to some "reference level". For humans, the reference level is the "threshold of hearing". This means that we always talk about decibels in the positive sense, such as 50dB or 60dB; we don't say that some noise is -20dB. To further confuse matters, humans hear

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“weighted” noise levels. It is “weighted” because our ears do not treat all frequencies the same. We “hear” some frequencies as being louder than others; our ears do not have a very “flat” response. To accommodate this, there are several different algorithms of decibel weightings that we call “scales.” Most commonly, you hear about the dBA scale (this is the one that applies to humans) and the dBC scale (but that’s for another blog). Just remember that the most commonly used scale is dBA, and that’s what most people are referring to when they talk about decibels (whether they know it or not). At any rate, the dBA scale gives us a good starting point from which to measure sound. It yields a single-numbered result and gives us a good idea of the overall sound level (when, in reality, the sound is at many different noise levels all across the frequency spectrum).

Reality

Physics tells us that for every doubling of acoustical energy, there is a 3dB increase. Conversely, a 3dB decrease means the sound is cut in half. So, 3 is the magic number right? Well, not so fast. This is where we see a conflict between scientific calculations and *perceived* sound levels. “Perceived” sound levels report how our ears and brain interpret the sound. In other words, perception answers the question of “What*sounds* ‘twice as loud’?”

Perception

Sound studies tell us time and again that a 3dBA increase in sound level is barely noticeable to the human ear. In fact, you have to raise a sound level by 5dBA before most listeners report a noticeable or significant change. Further, it takes a 10dBA increase before the average listener *hears* “double the sound.” That’s a far cry from 3dB.

So is perception the ultimate reality? What really constitutes *twice the sound* or *half the sound*? And why can’t our ears hear what is proven to be scientific fact? The answer to each of these questions is, of course: well, it depends!

Acoustics By Design

Acoustics By Design consultants provide acoustical consulting services to architects, engineers, facility directors, municipalities, and building owners. Our team includes acoustical consultants, acoustical engineers, noise consultants, and vibration consultants. Our firm also includes an integrated team of audio-visual consultants who design audio, video, theatrical lighting, and technical systems and integrate them with the native acoustical environment.

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