Audible Tweaks That Cannot Work

Richard S. Burwen

I am a non-believer in audio tweaks, especially power cords that feed regulated power supplies in any piece of equipment. Scientifically they cannot possibly have any effect on the audio signal. Yet I am convinced it is very possible, even likely, that testing them will demonstrate an audible effect. How can that happen?

The answer is: the room acoustics changed - the test was uncontrolled. In a good listening room, successive sound reflections from the ceiling, floor, walls, and any objects in the room add to produce standing waves at any given audio frequency. Because the many signals travel different distances, their differing phase shifts add and subtract to produce different sound levels at different positions. A sine wave sound from two or more speakers will produce standing waves, even without reflections. If you walk across the room while a speaker plays a pure tone, you will hear the sound become louder and softer as you pass through peaks and valleys of sound pressure. The higher the frequency, the shorter is the wavelength, and the closer together are the peaks and valleys. Because the standing wave pattern is different at each different frequency, a graph of the audio frequency response at a fixed microphone position will show hundreds of peaks and valleys, no matter how flat is the equipment and speaker system producing the sound.

All it takes is a change in position of the listener to hear a different frequency response. Furthermore, a change in position of another person or any object in the room will alter the standing wave pattern, thereby changing the frequency response at any particular listening position.

Your ears are surprisingly sensitive to frequency response. What you hear most is the general trend of the response curve, an average of the peaks and valleys, and 1 dB is noticeable. I found that if the sound is very well balanced, adjusting the response as little as 0.1 dB with tone controls becomes important to a critical ear. The peaks and valleys in frequency response produced by room reverberation may be as small as 1 dB, or as great as 30 dB, when nearly complete cancellation occurs. If an instrument in the orchestra happens to play a note that peaks at the listener, it can stand out like a sore thumb. Moving the listener’s head a few inches may reduce its level very noticeably.

My own listening studio is very live and the peaks and valleys in frequency response are big. I made a test by feeding a 5000 Hz sine wave to my 5-speaker system and placing a sound level meter on the coffee table in front of my best seat. Doing the best I could, not to move my body, I slid the sound level meter sideways from one major peak to another. The distance between peaks was only 6.7 inches and there were two minor peaks in between. When I rotated my head about 110 degrees I heard 4 peaks and 4 valleys in the sound level. Moving my body about 6 inches created a small valley where the meter was reading on the coffee table. If I moved a glass of water only 1 inch it produced 1 dB change in level at a major peak. If the meter was measuring 10 dB or so down on the side of peak, all I had to move the glass was about ¼ inch to make a 1 dB change in sound level. The glass is a small reflecting object in a 47 foot long room.

How does the change in sound with position relate to overall listening? Here is a little story.

One of my most favorite recordings and a powerful demonstrator is my own live concert recording of Mahler's Symphony 6, played by the Boston Philharmonic in Jordan Hall at the New England Conservatory, Boston, in 1984. One of the instruments of the orchestra is a sledge hammer! For each of Mahler's 3 blows of fate in the final movement, a muscular guy took a full swing and struck a whopping big anvil on the front of the stage. My two special omnidirectional microphones, pointed at the ceiling to get high frequency sound reflections, captured it well.

This was a 2-channel recording made on a Sony PCMF1 machine, now made into 5 channels using my AUDIO SPLENDOR program which added ambiance in the rear and front channels. It was saved as a 6-channel, 88.2 kHz, 32-bit floating-point, W64 music file. I love this recording so much I had re-mastered it 6 times, each time improving the sound for my own studio. After the 7th re-mastering, I called my wife Barbara down to hear this great symphony and sound. She sat in the center seat and I sat beside her. When the recording played, the violins no longer sounded quite right. I thought about one more re-mastering. After my concert finished and Barbara went upstairs, I embarked on fixing the violins. I played the offending musical passages again, but this time the violins sounded good.

I had been using quite a lot of rear speaker sound to add to front channel sound at the listening sofa and sweeten the violins. When Barbara sat in the center seat, she partially blocked sound from the right rear speaker. I figured out what to do. People damage the sound by absorbing and blocking it. So no more visitors will be allowed.

Well, that conflicts with the purpose of my sound studio. Once again I re-mastered Mahler's 6th, increasing the high frequency reverberation 0.2 dB in all channels, increasing the rear channel gain 0.8 dB, and tweaking the tone control sliders a few tenths of a dB. I spent the last 15 minutes deciding on a 0.1 dB increase in the 3 kHz slider. Without it, the orchestra was more natural. With it, the cymbals were more natural.

As you can see, frequency response is so critical, and sensitive to the listening position and reflecting and absorbing objects, it is impractical to make a truly controlled listening test on a tweak. To accurately compare one power chord with another, every person and object in the room would have to remain in the exact same position within about 1/8 wavelength at 20 kHz, only 0.08 inches. This effect is in addition to the Power of Expectation. So the controversy will go on.

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