

Music 101
Acoustics - The Science of Sound

What makes a room good for listening to music?

Some obvious considerations:

1. CLARITY - Each note should arrive cleanly, crisply, and unobscured.
2. UNIFORMITY - Listeners in all parts of the hall should hear as nearly the same sound as possible; there should be no dead spots.
3. FREEDOM FROM ECHO - Even though there must be repeated reflections of sound of the walls, none should be perceived as a separate echo.
4. PERFORMER SATISFACTION - the stage must be free from distracting echoes and at the same time provide enough enclosure that performers in a group can hear each other.
5. FREEDOM FROM NOISE - Soft passages in the music should not be disturbed by traffic noise or ventilation system noise.

Some not so obvious considerations:

6. INTIMACY - Music sounds as if it were being played in a small hall. The time delay between the direct and first reflection should be less than 15 milliseconds.
7. LIVENESS - Adequate reverberation time for middle and high frequencies (also called "brilliance").
8. WARMTH - Longer reverberation time for bass tones below 250 Hz.
9. ENVELOPMENT - The listener should not feel separated from the source but rather bathed in sound from the sides rather than from the ceiling. Yet, the sound must be identified as originating on the stage to match the sense of sound with that of sight.

10. **EARLY DECAY TIME** - The initial rate of decay of reverberant sound appears to be more important than the total reverberation time.