Averaging

Multiple Averaged Measurements

Measuring

In REW it is possible to average a number of measurements. The idea behind this is to eliminate over-corrections which validity is limited to the exact place where the microphone has been setup in case of a single measurement. Use an imaginary cube of 25 cm around your hear position and perform +/- 5 measurements all at ear height with the mic always pointing to the front wall (or to the ceiling if your mic is designed that way and it has 90 degrees calibration file). Resulting in a total of 10 measurements for two speakers - to the left, right, front and rear of the LP each around 25 cm away from LP. If you consider bass upper frequency limit to be 200 Hz which converts to a wavelength of 43 cm, a 50 cm wide (25 x 2) measurement area seems to cover enough of the bass waves.

For the center head position, take two measurements for Left and Right speakers as this is the most important location. Using two measurements at the LP will give a slight bias to the central position during averaging. Keep both measurements if they are identical (they should be identical at least past the speaker's lowest bass frequency capacity). If they are not identical it is probably caused by some unwanted environmental noise during measurement, you should delete the irrelevant looking one.

Time Alignment

Before averaging make sure that all measurements are time aligned prior to making any kind of algebra on these measurements. Select the corresponding measurements inside the 'All SPL' tag of REW and use the 'Time Align' function in the Control window. Do not align IR starts!

Averaging

Select the measurements you want to average in the 'All SPL' tag of REW and use an Average function inside the Control window.There are several algorithms for averaging. Vector Average differs from other methods (like RMS Average) because it sums magnitudes and phases coherently, meaning phase differences cause cancellation and dips, especially in high frequencies or different positions, which is great for multiple measurements at the same spot but less so for different locations. The RMS Average, however, treats measurements as incoherent (ignores phase) by averaging power, resulting in a smoother curve without deep nulls from phase cancellation, making it better for multi-position averaging (like across a listening area). The difference often appears as dips in the vector average that aren't in the RMS average, due to reflections or timing variations between measurements. When to Use Which Average

- Vector Average: Use for multiple measurements from the exact same spot (or time/level aligned) to see the coherent sum, good for detailed analysis and filter generation for that specific point.
- RMS + Phase Average / dB + Phase Average: Good for multiple measurements from different

spots, averaging power while keeping phase info, resulting in a smoother, less cancelled curve.
- RMS Average: Best for averaging many measurements from different locations (spatial averaging) to get a general, smooth representation of the overall room response, effectively removing reflections.

Why They Differ (The “Problem”)

- Phase Cancellation: With vector averaging, if measurements have slight timing shifts (due to reflections, mic placement differences, or clock drift), the phase relationship changes, causing destructive interference (dips) at certain frequencies.
- Coherent vs. Incoherent: Vector averaging is coherent (like summing sound waves in phase), while RMS averaging is incoherent (like summing sound power), which doesn't cancel out.
- Spatial Averaging: For multiple listening positions, RMS averaging is better because it averages the power (what you hear) rather than the complex wave, which is less affected by reflections and phase.

Solution if They Differ Unexpectedly

- Time-Align: If using Vector Average for nearby spots, time-align the impulse responses first using REW's tools.

In case of Vector Averaging check the averaged curve. In case of anomalies, there is probably a phase problem in the measurements (reflections or timing). For simple EQ (room nodes)use then RMS/DB averaging. Dips in the curve are occurring at frequencies where measurements are out of phase with each other due to room effects. You can use the RMS or dB average to ignore phase, giving a magnitude-only result. If you need phase in the result you could use the RMS+phase or dB+phase average options.