Problems and Future Considerations in Naive Room Response Deconvolution*

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Based on *Conclusion*† by

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Abstract

Conclusion of determining room inpulse responses and deconvolving the response out of a recorded signal.

We began data comparison by observing the differences between the theoretical impulse responses and actual impulse responses in each room. None of the four actual responses were similar to the theoretical responses. The differences could be due the non ideality of the rooms, as the rooms were neither perfectly rectangular nor empty, while Room Demo Response assumed both of these conditions. Clipping was also neglected in the theoretical model. Clipping equalizes all signals above a certain threshold determined by the soudn card in the laptop; this non-linear effect removed information from the signal in such a way that the lost information was unrecoverable by our Fourier analysis. Commercial applications of room impulse response measurements, such as measuring the response from each seat in an orchestra hall, require a more robust theoretical model that accounts for objects in the room as well as the exact shape of a room. Such elaborate theoretical data was not necessary; we were able to access the rooms in question and find the impulse response through direct measurement.

The goal of signal deconvolution was to remove the room response on a recorded signal. However, this process also amplified the noise. Some of the noise was already prevalent in the recorded signal, as our microphones were sensitive enough to hear a group of people conversing outside with the door closed. Since the noise was already in the signal and was not entirely random it could not be easily filtered out. The deconvolution did reproduce the original signal; however the quality was significantly worse than the recorded signal. If we could record the impulse and input responses without noise, our method of deconvolution would be able to reproduce the original high quality recorded signal. Unfortunately this is not possible under normal

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conditions. Another attempt could also be made using a more complex deconvolution scheme, such as Wiener deconvolution. Ideally we could find a method that is either resistant to noise or removess noise entirely; this would immediately lead to better results. Perfect deconvolution would be useful in creating a clean input signal given a recorded signal regardless of recording environment. Naive deconvolution only works well with noiseless signals. Future applications of our theory would have to use more complex deconvolution methods.