ABSTRACT

Speech-language pathologists use microphones and sound level meters (SLMs) for voice measurement while diagnosing and treating communication problems. This thesis focuses on the analysis and evaluation of lower-cost microphones and sound level meter applications for the measurement of voice. Researchers in this field have established a set of guidelines for microphone performance requiring a flat frequency response within the frequency range of speech. A flat frequency response is desirable as significant amplification or attenuation of certain frequencies may lead to incorrect conclusions about diagnosis and treatment. An additional requirement, specifying that the microphone must be unidirectional to attenuate background noise, presents the proximity effect. The proximity effect is an increase in low frequency response when the microphone is too close to a sound source. The first part of this thesis research proposes a frequency response measurement protocol for evaluating a microphone's suitability for the measurement of voice. Speech-language pathologists also use SLMs for vocal intensity measurements. The ubiquity of smartphones has led to the development of SLM smartphone apps. These SLM apps may provide a low-cost, portable option for vocal intensity measurement. The second part of this thesis research develops measurement and statistical analysis methods for comparing low-cost SLM apps to high-quality, precision SLMs. The experimental and analysis protocols developed in this research are applied to a selection of low-cost microphones and SLMs for voice measurement. These protocols, however, are general and can be applied to the evaluation of microphones and SLMs for a number of sound measurement applications.