Effects of Historical Recording Technology on Vibrato in Modern-Day Opera Singers

Objective: Many present-day scholars and voice professionals note that the use of vibrato in modern-day opera singers differs from that of opera singers who sang in the early twentieth-century. Studying the effect(s) of wax cylinder technology (the oldest form of mass produced audio recording technology) on recorded voice output signals offers a way to contextualize historical recordings so that voice teachers and other voice professionals can better understand historical singing. This study is a portion of a larger inquiry about the way in which early audio recording technology, namely wax cylinders, distorts voice output signals. The purpose of this study is to analyze the effect of wax cylinder audio recording technology on the rate and extent of vibrato of modern-day professional opera singers.

Method/Design: This study recorded 20 professional opera singers (5 sopranos, 5 mezzo sopranos, 5 tenors, 2 baritones, 1 bass-baritone, and 2 basses) with an Edison Home Phonograph onto brown-wax cylinder replicas and, simultaneously, with a flat-response omnidirectional microphone. Vibrato rate and extent measurements were extracted from: a *messa di voce* on C4/C5 on the vowel [a] and a short phrase from "Caro mio ben" in a key chosen based on voice type. Commercial historical audio samples were downloaded from the UCSB Cylinder Audio Archive and the Library of Congress Sound Recordings collection in order to compare vibrato rate and extent with both versions of the modern recordings.

Results and Conclusions: Data collection is ongoing. Wax cylinders will be digitized through the use of an *Archéophone* at the Thomas Edison National Historical Park and vibrato rate and extent will be compared (using Audacity and Voce Vista) between modern singers recorded on microphones vs. modern singers recorded on wax cylinders, as well as modern singers recorded on wax cylinders vs. digitized historical singers recorded on wax cylinders. Preliminary results indicate that there is no significant difference between vibrato measurements extracted from either recording technology other than artifacts that may be caused due to slight variations in rotations per minute during digitization.

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