

# Acoustic Differences between Professional and Novice **Musical Theatre Singers**

Brian Manternach, DM<sup>1</sup>; Lynn Maxfield, PhD<sup>2</sup>

<sup>1</sup>Department of Theatre, University of Utah, Salt Lake City, UT 2National Center for Voice and Speech, University of Utah, Salt Lake City, UT



**Department of Theatre** THE UNIVERSITY OF UTAH

Singing Style

LEGI

Singing Style

Novice

Novice

## Background

Research examining Contemporary Commercial Music (CCM) styles of singing has increased significantly over the last ten years. Despite the plethora of recent information. however. researchers have vet to reach consensus on many aspects relating to these contemporary methods of vocal production.

Researchers have relied on acoustic analysis software as an important tool in outlining the differences between classical and CCM singing. The information provided has been especially useful in the many university music theatre programs that advocate vocal "cross training" where singers build both "legit" and "belt" techniques. Like their classical-singing counterparts, CCM singers progress in proficiency through training as well as through the vocal maturity that comes with age.

This study, therefore, considered whether the belt and legit sounds of professional-level singers would show significant acoustic differences when compared to the belt and legit singing of younger college students.

As research continues to identify the aforementioned gualities, teachers of singing are better equipped to develop methods for building guality belt and legit singing in student voices.

### Participants

# N=11 (4 professional, 7 novice)

This study involved four professional-level female singers and seven novice female singers. The professional-level singers were active music theatre performers in equity houses and voice teachers who specialize in CCM styles. All of the novice singers were undergraduates in their first or second year of collegiate vocal study in a BFA program in either theatre or music theatre.

#### Materials:

Microphone - Contryman Isomax B3 - mic-to-mouth distance: 6 cm - sample rate: 44.100 Hz

Pre-amp - FMC (model RNP) Digital converter – ADInstruments Powerlab Software – Labchart 7 pro

Methods

#### Procedure:

All participants were asked to sing a five-note scale (Do re mi fa sol), sustaining the top note for five seconds. The scales were performed in four kevs:

- -F major with a top note of C5
- -G b major with a top note of D b 5

-in the key of G major with a top note of D5 -in the key of A b major with a top note of E b 5

Each participant was instructed to perform the scales in what they perceived as their legit style. followed by what they perceived as their **belt** stvle

Prior to analysis, the ascending portion of the scale was discarded, leaving only the sustained phonation on scale degree 5 (sol). Further, to avoid any instability that may have accompanied onset or offset, the middle 2.5 seconds of each top note was excerpted for final analysis.

## Analysis

Three acoustic analyses were applied to the excerpted recordings from each singer using the Praat voice and speech analysis software: The spectral slope of the long term average spectrum (LTAS) was calculated, as well as the noise to harmonic ratio (NHR), and finally the dominant harmonic (1st, 2nd, or 3rd) was noted for each sample. Results were compared across pitch, style (belt v. legit), and training level (professional v. novice).



The data suggest several points worth noting. First, as the singers (novice and professional) went from belt to legit styles, the fact that there was no significant difference in the dominant harmonic may imply that all singers were using elements of CCM style in their legit singing, creating a sound that does not perfectly mirror classical singing.

Second, while there was no significant difference in noise-to-harmonic ratio (NHR) from belt to legit, the presence of higher NHR in the professional singers than in the novice singers may indicate that, if intentional, this rougher tone quality is not only desirable but is an appropriate sound for both styles.

Third, though all singers associated a low spectral slope with the belt technique, the professionals produced even shallower slopes than the novice singers. This ability to access more high-harmonic energy likely contributes to the "brassy" sound quality that is often associated with belt singing.

Certainly, additional studies involving greater numbers of singers are necessary to further explore the above trends. Follow-up studies may compare the data of singers who perform primarily legit repertoire to those who perform primarily in genres requiring belt. It would also be worth analyzing how the music theatre "mix" sound compares to belt and legit. Lastly, incorporating larvngeal data (collected via an electroglottograph) alongside the acoustic analysis would provide further insights on the differences between these singing styles.