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Music Theater Voice: Production, Physiology and Pedagogy

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[Associate Editor's note: This article is actually a chapter from the newly published book, *Perspectives on Teaching Singing* (Brisbane: Australian Academic Press, 2010), and appears with permission. It is an excellent summation of recent CCM discussions in *Journal of Singing*.]

WHAT IS MUSIC THEATER VOICE?

MUSIC THEATER VOICE IS A STYLE within the broader field of Contemporary Commercial Music (CCM), previously described as “non-classical” music,¹ and includes vocal qualities described in the professional industry as “belt” and “legit.”

The belt sound may have originated in the early twentieth century vaudeville, with performers such as May Irwin, Stella Mayhew, Ethel Levey, and Sophie Tucker who sang in a style parodying African American women.² In 1930, Ethel Merman made belt famous when she sang the final C₅ (C above middle C) of “I’ve Got Rhythm” for sixteen bars in a loud chest voice without amplification over a band of brass, reeds, and drums.³ Her performance earned her multiple encores, prompting George Gershwin to visit her during the interval and advise her never to take a singing lesson.⁴

The growing importance of plot in the American musical of the 1940s and 50s led composers to write melodies that were lower in pitch and more restricted in vocal range, so that the text could be more easily understood. At the same time, composer/writer teams such as Rodgers and Hammerstein wrote more realistic characters, often requiring performers to place vocal expressivity before beauty. Celeste Holm, who first created the role of Ado Annie in *Oklahoma* (1943), sang Schubert’s “An die Musik” for her audition, but was asked if she could also sing in a more “untrained voice.” She produced what she described as her “hog call” and got the role.⁵

Music theater sound changed radically with the introduction of the rock musical in the 1960s and 70s. Lead roles in musicals such as *Hair* (1967), *Jesus Christ Superstar* (1971), and *Rent* (1994) required strong contemporary singers that had the stamina for eight shows a week. More recently, the musical *Wicked* (2003) extended the technical requirements of the female belt sound, requiring an F₅ in the song “Defying Gravity.”

Legit vocal quality is grounded in classical tradition, arising out of the popularity of operetta in the early twentieth century.⁶ Early music theater

singing from the beginning of the twentieth century was almost all classical, although the tessitura was generally lower and the range more restricted than for operatic repertoire. The music theater legit sound was most popular in the musicals of the 1940s, 50s, and 60s, but has generally declined in use since then. It is still a required sound for some roles in music theater productions, such as Johanna in *Sweeney Todd* (1979) or Fabrizio in *Light in the Piazza* (2003).

This article will report on responses from a survey of experienced music theater pedagogues from Australia, the United Kingdom, the United States, and Asia about current industry definitions and methods of training. Current knowledge on the vocal health risks for music theater voice will be discussed and a review of scientific literature on the physiology and acoustic characteristics of music theater vocal qualities will be presented. A summary of research on vocal registers and laryngeal mechanisms will be followed by a discussion of registers in the music theater voice, and the implications for vocal health and training. Finally, the article will offer specific recommendations, including an evaluation of the appropriateness of classical methods for teaching the music theater singing voice.

DO WE NEED A PEDAGOGY FOR MUSIC THEATER VOICE?

In the past decade, the demand for training in music theater singing has grown and singing teachers are now seeking specific training methods for this style. In 2001, the president of the National Association of Teachers of Singing (NATS) reported that a workshop in that year on the music theater and belt voice attracted over 300 members from eight countries and forty-six states from the USA. "It was thought that this might have been the largest workshop registration in NATS history."⁷ A survey of Victorian members of the Australian National Association of Teachers of Singing (ANATS) in 2006 showed a similarly high level of interest among members for workshops on music theater vocal techniques.⁸ A survey of 139 singing teachers from the UK and the USA reported that 91% of respondents taught Contemporary Commercial Music (CCM) vocal styles, but only 45% had any specific training for teaching this style.⁹ A follow up survey of 145 US singing teachers that asked questions about

training background and experience found that only 19% of music theater voice teachers were assessed as having training appropriate to teaching this.¹⁰ A total of 58% of respondents indicated that their training methods for classical voice and music theater voice were completely different, while only 4% taught both styles the same way, 7% taught these styles similarly, and 31% reported some differences in their training methods. An Australian survey in 1998 found that tertiary singing teachers of music theater or contemporary commercial styles were more aware of current scientific knowledge of the voice than their classical colleagues.¹¹ There is no known research on pedagogic differences between these teacher populations.

PERCEPTIONS OF EXPERT STUDIO TEACHERS OF MUSIC THEATER VOICE

In order to gather more information about the knowledge and practice of expert teachers, and their perceptual understandings of the physiologic and acoustic qualities of belt, legit, and mix in the music theater voice, the first author conducted a semistructured interview with twelve expert teachers from Australia, Asia, USA, and UK. All teachers were music theater voice specialists and taught at tertiary institutions and/or private studios for professional music theater singers in the Broadway, West End, or professional Australian Industry.

Respondents described belt as a chest or thyroarytenoid (TA) dominant sound with "forward," "twangy" vowels.¹² They articulated a range of belting styles, suggesting that there may be more than one type of belt sound. Responses suggested that there was confusion among teachers when defining male belt, although the majority of teachers asserted that men can belt in their higher range, generally at pitches where they may choose to sing in chest or falsetto. Incidentally, this was also the pitch range where eleven of the twelve teachers agreed that women belted. Most teachers agreed that belt may have vibrato, is generally loud, and may use nasality as a character choice.

Respondents all agreed that legit is a more classically-based vocal quality, with a brighter and "twangier" sound than the classical voice. They suggested that for women, legit is cricothyroid (CT) or head register dominant,¹³ while for men, it generally remains in chest or TA dom-

inant production. Vowels are brighter and twangier than classical vowels.

Most respondents described mix as a sound that balanced chest (thick vocal folds) and head register (thin vocal folds). At the same time, teachers expressed their frustration with the term, suggesting that it lacked clarity.

- “I don’t use the word mix. I still don’t know what mixing is.”
- “I don’t use the word mix even though it is employed a lot in the profession, for this simple reason: All good singing is a mix, so to me it’s a redundant term.”

Results from the survey suggest that the management of vocal registration in music theater singing appears to be a big concern for all teachers, and followed two contradictory lines of opinion on the use of chest register in the belt sound: 1) that belt is defined as chest register taken up in pitch, past the usual point of transition into head register; or 2) that belt should not be produced in this way because it is vocally damaging to do so. Many of the teachers reported their discomfort with the term chest voice, and used other terms instead such as chest register, chest register dominant, TA dominant, thick folds.

MUSIC THEATER VOICE AND VOCAL HEALTH

Singing teachers have long expressed concern about the inherent risk of music theater singing. Note these three quotes that cover a fifty year time span.

This technic is characterized by a loud, “thick” and unpleasant quality, and an extremely limited range of about one octave. It is the type of phonation employed exclusively by the “coon-shouter” or “jazz singer” and cannot, for a moment, be considered as real singing.¹⁴

Another singer is out of a show with a ruptured blood vessel on a vocal cord! . . . you can blame it all on chest voice and belting . . . Singing with the greatest amount of unnecessary tension is called chest voice; singing with a little less is called belting.¹⁵

To argue that some singers belt and survive has all the weight of observing that some people smoke three packs a day, live to eighty, and die of causes other than cancer, emphysema, or heart attack.¹⁶

Miles and Hollien conducted a review of literature and a survey of experienced teachers and researchers about belt voice. Their findings indicated a high level of concern among teachers about the inherent risks of singing in this style and concluded that “it appears well

established that the singer who belts frequently experiences vocal pathology.”¹⁷ Miles and Hollien further stated that there was little evidence to indicate why belt had a reputation for being unhealthy, or information about other factors that may have also led to vocal injury, such as poor vocal training, or susceptibility to vocal damage in the singer.

In fact, research on vocal health for the music theater and belt voice is hard to find. Lawrence suggested that common pathologies for belters included signs of hyperfunction, including reddening of the edges of the folds and edema, and vocal fold polyps and nodules, as well as tired and tender neck muscles resulting in “vocal weakness and loss of vocal control, loss of volume and vocal fatigue.”¹⁸ However, this study provided no quantitative or comparative data to indicate how prevalent these injuries are among music theater performers and how these rates compared with other types of singers. Only one study to date has compared the vocal health of professional opera, contemporary, and music theater singers. It found no significant differences between groups in terms of vocal impairment, disability, or handicap.¹⁹

In the last decade, North American teachers appear to be less critical of the aesthetic and health of the belt sound. The *Journal of Singing* has published a number of articles on belt voice over the past decade, arguing that it is a valid and reasonably safe vocal style if taught properly.²⁰ Robert Edwin, an Associate Editor of the journal, has written and commissioned a series of articles that describe the sound, the look and feel of belt.²¹ The American Academy of Teachers of Singing (AATS) has also published “Promoting Vocal Health in the Production of High School Music Theater,” a paper that includes suggestions for avoiding or reducing the risks that young singers may face in amateur music theater productions.²² Australian singing publications demonstrate some support for the training of music theater voice through the publication of a number of articles in *Australian Voice*.²³ The majority of research, however, is still weighted heavily towards classical voice.

THE SCIENCE OF MUSIC THEATER VOICE PRODUCTION

There are a number of studies that examine the distinct physiologic and acoustic differences in the production

of the belt sound. From this research we can describe belt as typically produced with a high larynx and tongue, narrower pharyngeal space, and high lung pressures,²⁴ although there are singers who may be able to produce this sound with a relatively low larynx and wide pharyngeal space.²⁵ The vocalis or thyroarytenoid muscle activity is dominant over cricothyroid muscle activity, resulting in strong glottal adduction with the vocal folds closed for a larger percentage of the vibratory phase than for classical singing. There are not many studies specifically addressing breath use and support in the belt voice, although subglottal pressures have been shown to be higher in the production of belt than for classical sounds.²⁶

Belt voice has a weaker fundamental and comparatively low energy in the upper partials of the sound compared with the operatic sound. Belt also has higher sound pressure levels and higher first and second formant frequencies.²⁷ Singers appear to adjust their vocal tract shape in order to tune the first formant to the frequency of the second harmonic in the sound spectrum, contributing to the loud, bright quality of this sound.²⁸

Only one article to date has measured the acoustic qualities of legit sound in comparison to belt, describing it as a falsetto mode of vocal fold vibration with a high first formant that is slightly below the second harmonic, producing a light, open sound that facilitates easy comprehension of the sung text.²⁹

The only study of the music theater mix sound compared a single subject demonstrating mix, belt, and operatic sounds. Mix quality was a combination of the other two qualities with high upper harmonics and higher first and second formants as in belt production, and lower subglottal pressure with moderate SPL as with operatic production.³⁰

BELT AND THE VOCAL REGISTERS

Given the concern and uncertainty surrounding the use of chest register in the belt voice, it is worth examining current research on vocal registers. In particular, what is chest register, how does it relate to belt, and what are the inefficiencies or risks to performers singing in chest or belt?

Vocal registers are defined perceptually by pitch ranges of homogeneous vocal timbre. While the speech community largely agrees on the existence of three registers (pulse or vocal fry, modal or chest, and falsetto), the

singing community is still very much divided on the number of registers, their names, and how they should be defined.³¹ Registers are underlined by different modes of vocal fold vibration and vocal tract adjustments. In particular, four “laryngeal mechanisms” (labelled M0-M3) have been defined physiologically.³² Mechanisms M1 and M2 are most commonly used in speech and singing, and are characterized by fundamentally different muscle adjustments.

- Laryngeal mechanism 1 (M1) has thick vocal folds, i.e., a higher vibrating mass of the folds than in M2. This is due to the coupling of the vocalis within the vocal fold. The vocalis muscle is dominant over the cricothyroid muscle.
- Laryngeal mechanism 2 (M2) has thinner folds, i.e., less vibrating mass, than M1. This is due to the decoupling of the vocalis within the vocal fold. The folds are more stretched, due to the dominance of cricothyroid muscle activity over thyroarytenoid muscle.

These different glottal configurations have an effect on the pattern of vocal fold vibration.

- In M1, the folds vibrate over their whole length with vertical phase difference. The amplitude is greater. The closed phase is longer than the open phase and is generally in the range of 30%-80% of the vibratory cycle.³³
- In M2, the folds vibrate with lower amplitude and no vertical phase difference. The open phase is always longer than the closed phase, i.e., greater than 50% of the vibratory cycle.

Differences in glottal vibration can be observed to some extent through indirect and noninvasive methods such as electroglottography (EGG).³⁴

Thus, chest register may be produced by mechanism M1, while falsetto register (men) and head register (women) may be produced in mechanism M2. As M1 and M2 share an overlapping pitch range between E₃ (165Hz) and F[#]₄ (370Hz) for male voices, and G₃ (196 Hz) to G₄ (392 Hz) for female voices, singers can choose to vocalize in either M1 or M2 depending on the intended vocal quality.

As yet, there is no published research on laryngeal mechanisms in the contemporary or music theater voice. However, a number of inferences can be made from the available evidence. Research on the belt voice that defines laryngeal behavior as a long closed phase, with thick

vocal folds, and strong adduction with dominant vocalis or thyroarytenoid muscle activity, suggests that belt voice is in mechanism M1.³⁵ Most expert teachers also support this definition, even when they express confusion about the relationship between belt and chest.³⁶ Further, Schutte and Miller and Bestebreurtje and Schutte support the pedagogic theory that belt is chest register lifted higher than its traditional classical frequency range.³⁷ There have been no studies that describe the laryngeal behavior of legit quality in the music theater voice; however, it is frequently associated with head register by teachers and some researchers, which suggests that this is an M2 mechanism.

Expert teachers define mix as a blending of chest and head registers; however, recent research on classical mix voice does not support this theory. It seems that singers in this quality either sing in mechanism M1 or M2 for a given pitch, while also adjusting their vocal tract and laryngeal open quotient so that the overall sound quality imitates that of the alternate mechanism.³⁸

These findings suggest that male and female music theater singers need to develop a flexible approach to their technique in order to produce the broad range of sounds required in the music theater profession. A female singer may produce belt in mechanism M1, legit in mechanism M2, and mix quality by disguising the transition between mechanisms through careful resonance adjustments. Male singers are more likely to sing in M1 for most of their vocal range, so register management may not be such an issue, except in the upper notes of their range, where choices would need to be made about which mechanism to use, depending on the intended vocal style.

If belt is a quality produced in mechanism M1, what does this tell us about the vocal health risks for this style? M1 is a mode of production that has strong forces of glottal adduction, with high subglottal pressures. Many medical specialists and voice therapists have expressed concern about the long-term effects of singing in this manner, particularly at high levels of intensity. However, predicting vocal strain and quantifying vocal effort may not be as simple as measuring glottal adduction and open/closed quotients. Bjorkner compared male music theater singers with male operatic singers; she found that the degree of pressed phonation was similar in both groups, even though subglottal pressure and closed quotient were higher in the music theater singers. It is also

possible that some teachers teach a style of belt that has a relatively high open quotient and a low level of volume, which may be less effortful for the singer.³⁹

RECOMMENDATIONS:

Training for music theater singing should include the following:

- 1) Women need to practice in both chest register (for belt) and head register (for legit), as well as with a seamless register transition (for mix). Although the teacher and student may perceive the mix sound to be in a middle register, this is not physiologically correct.
- 2) Men may move between classical and contemporary styles in their training and repertoire more easily than women, because they sing in laryngeal mechanism M1 for most of their range. However, they need to be more flexible in their higher pitch range when making a choice to sing in either belt voice or classical voice. Men need careful guidance in the development of their higher pitch range for contemporary singing in order to prevent excessive vocal tension that may be associated with the production of the loud, bright qualities of belt.
- 3) Teachers should encourage students to develop bright and forward resonance qualities for belt and mix, as well as a more balanced timbre for legit. The back or covered sound typical of the classical vocal style is not stylistically appropriate for music theater singing. Exercises that promote twang and forward vowels can assist students to develop this quality in their sound.
- 4) Classical vocal training may offer some advantages to music theater singers in the improvement of their technique when:
 - a) Disguising the vocal break between mechanisms. A prime purpose of classical vocal training is to reduce the audibility of the register break for both male and female sounds. Exercises that assist singers learning to balance registers may be appropriate for music theater singers learning to sing in mix.
 - b) Learning to sing in M2 at speaking pitch in legit quality. Many classical voice teaching methods encourage female classical singers to sing in their head register for most of their pitch range. Exercises

that encourage singers to bring the head register lower in the range may assist in the production of the female legit voice.

- 5) Classical vocal training is not likely to be useful for students learning to produce the belt sound. Female music theater singers need to be able to sing in M1 at relatively high frequencies in an efficient and aesthetically pleasing manner, whereas female classical singers are actively discouraged from singing in their chest register as much as possible. Male contemporary singers need to be able to sing M1 at relatively high pitches in belt production with ease while maintaining a loud volume, while male classical singers are generally encouraged to transition into M2, lower in their pitch range.

SUMMARY

The evidence suggests that music theater singers need to be versatile and flexible in their vocal choices. They need to be able to produce sounds that are distinctly in mechanism M1 and M2, as well as sounds that blend the transition point between them. When singing in belt, women may need to be able to maintain M1 production at higher pitches than they would need to for classical singing. Male singers may also need to maintain mechanism M1 for belt quality in their upper range. Music theater singers need to be able to produce bright and relatively loud sounds, as well as the more balanced, warm sounds of legit and mix qualities. Vocal health is of concern for teachers and singers, but there is very little evidence-based information on how singers can produce music theater qualities efficiently and safely.

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Tracy Bourne is a singer, actor, singing teacher, and writer with a special interest in new music theater works. For the past ten years, she has been the Lecturer in Singing at the University of Ballarat Arts Academy, where she has been responsible for the vocal training of students in the Bachelor of Arts (Music Theatre) course. She is currently undertaking a PhD on music theater vocal qualities at the University of Sydney, under the supervision of Professor Dianna Kenny and Dr. Maëva Garnier.

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