“Defining the Key Voice Qualities in Musical Theatre - Belt, Mix and Legit: A Review of the Literature”

Corresponding Author:

Jamie Read 

Address:

READ College, St Bart’s Theatre, St Bartholomew’s Road, Reading, RG1 3QA

Abstract

The voice qualities Belt, Legit and Mix are necessary tools for any contemporary Musical Theatre performer. This literature review seeks to ascertain if it is possible to define these voice qualities by four categories: Physiology, Acoustics, Breathing and Pedagogy.

All available literature has been compiled and assessed through the paradigm of Social Constructivism and a process of Action Research, linking research to practice. Material for this review has been assessed for authority, the validity, accuracy, objectivity, coverage, and currency to ensure that only appropriate research is included.

It was found that there is consensus on the physiology of both phonation source and vocal tract for Belt and Legit qualities, with Mix tending to fall in between the parameters of these two qualities. The researcher also found that there are acoustic properties that can be shown to be typical of Belt quality (namely a tuning of the second formant to the first harmonic), and that Legit quality follows a similar pattern to the established Classical Voice, showing a strong fundamental frequency.

The most ambiguous areas at the present time appear to be breathing and pedagogy, with no clarity emerging in the research as to a consistent approach in any given style. It is noted by the researcher that further evidence-based studies are needed to provide clarity in these areas, and one area of potential further interest might be the use of visual aids to help singers with formant tuning.

Introduction

Musical Theatre is a wide-ranging and under-researched area of singing, both in terms of our understanding of vocal function and also pedagogy. The author has worked in

the field as both a performer and pedagogue for 20 years, and through first-hand experience can confirm that a musical theatre performer is expected to sing in a great many styles including, most notably, the qualities known as Belt, Mix and Legit (Bourne and Kenny, 2015; Edwin, 2009, Green et al, 2013, LoVetri 2002). Although there has been some attempt to understand the physiology and acoustics of Belt quality (McGlashan et al, 2017; Bourne, 2012; Bestebreurtje and Schutte 1999; Lebowitz and Baken, 2009; Schutte and Miller 1991; DeLeo LeBorgne et al, 2009) there is little agreement as to what constitutes the physiological and acoustic parameters of either Mix or Legit, and in practice in the voice studio it can be difficult to know how best to serve the learner and help them to safely, effectively and clearly develop their technique. To date there is also no clear pedagogical research for any of the 3 qualities, leaving many teachers to develop their own approach with or without supporting evidence. This lack of consistency causes problems for students and teachers of voice alike, with conflicting terminologies between the classical voice community, the CCM[1] community and the performance community as a whole (Hoch and Sandage, 1997).

There is also confusion in the current research surrounding the vocal health implications of the Musical Theatre voice. Hoffman-Ruddy et al (2001) note that choral singers and musical theatre singers in their study have an equal number of vocal health deviations, whilst Sundberg et al (1992) state that:

“According to the general opinion among voice teachers and laryngologists, belting may be detrimental to the voice.” (Sundberg et al, 1992).

[1] Contemporary Commercial Music

Bourne and Kenny (2012) note a lower subglottic pressure and a shorter closed quotient of the vocal folds in Legit quality than in Belting which would indicate a 'safer' vocal production, but then the results of Björkner's study (2006) indicate that a Musical Theatre belter's phonation is no more hyperfunctional than that of an opera singer. Once again, for those working in Musical Theatre as either performers or pedagogues, conflicting advice and information only increases the likelihood of poor practice and misinformation.

In this literature review, the researcher will attempt to draw together the available research to consider, through a process of action research and influenced by thematic analysis, if it is possible to define these three qualities and form a pedagogical approach to training Musical Theatre singers. The researcher is Director of Voice Faculty at READ College (a leading vocational musical theatre foundation college) and also works in private practice in London with professional West End theatre performers. Such action research will aim to shape the work of the researcher and the voice faculty READ College, helping to improve delivery and outcomes for both tutors and students (Hine, 2013). It is also helped that this literature review may provide the basis for future research to develop our understanding of Voice Pedagogy in the field of Musical Theatre (MT) and may help to move the discussion on as the style and demands on MT singers, and their teachers, continue to evolve (Roll, 2015; Green et al, 2013).

Methodology

The methods for this research report have comprised a qualitative literature review, summarising current research in the field of Musical Theatre Voice and, as detailed

previously, specifically working towards acoustic and physiological descriptions of the voice qualities known as Belt, Mix and Legit.

Through the paradigm of Social Constructivism, the researcher will undertake so-called Insider Research (Robson, 2002) within the field of expertise of Musical Theatre (MT). The researcher is an established practitioner in the field of MT pedagogy and will be able to bring experiential learning to the research, as well as seeing the benefit that a clearer understanding of the key voice qualities in the field will bring. Social Constructivism allows the researcher to get a sense of the social reality of a problem and to seek consensus, if not outright objective 'truth' (Berger and Luckmann, 1966). In the field of voice pedagogy, such a paradigm lends itself very well as opinion is often divided on what constitutes particular vocal qualities and whether or not they are aesthetically acceptable (Edwin, 2003).

A process of action research will be applied by the researcher, which is by its natures a collaborative exercise (Lomax, 2002). It allows the researcher to work within a community of practice of other practitioners and to assimilate their views and understanding into both research and teaching practice (Moon, 2009). Such a process is especially useful in an educational setting, since it has been noted to help to improve both outcomes for learners as well as facilitating professional development and empowerment for pedagogues (Hine, 2013). A process of thematic analysis will be applied, to draw out emergent themes in the literature, and analyse their meaning in the context of this research.

Research for this review will be taken from peer-reviewed journals and articles. Evaluating the validity of sources will be important to ensure the quality of the data,

and consideration will be given to: The authority of the study, the validity of the study, the accuracy of the work, the objectivity of the author, the coverage of the research, and finally the currency of the work, considering if any more up-to-date information has been published in the meantime.

Research Results and Data

In order to search for emergent themes, the researcher has divided the literature into the categories of Belt, Mix and Legit, and then within those categories has broken down each voice quality into Physiology, Acoustics, Breath and Pedagogy.

To begin with, the researcher looked for correlating descriptions of each category of voice quality.

Belt:

Belting is a CCM[2] phonation style that has been in use regularly in Musical Theatre, and being popularised by the likes of Ethel Merman, Barbara Streisand, and Patti LuPone (DeLeo LeBorgne et al, 2009). It has been described more thoroughly in the female voice than in the male, and is more likely to occur in the higher range in 'chest' register up to approximately D5 590Hz (Estill, 1988; Kayes and Welch, 2016). It has been noted that a clear definition of belting is lacking, with some disagreement amongst pedagogues and voice scientists about its precise parameters (McGlashan et al 2016; Bourne, 2012; Lebowitz and Baken 2009; DeLeo LeBorgne et al, 2009).

Several sub-styles of belting were demonstrated by Lisa Popeil in Sundberg, Thalen and Popeil 2010, including "heavy, brassy, ringy, nasal and speechlike" with the

[2] Contemporary Commercial Music

conclusion that these substyles had differences in subglottic pressure and closed quotient and similarities in formant tuning strategies. It is important to note however that this was a single subject study, which while providing clarity between the different substyles, may also limit the validity of the results. Also, Bourne & Garnier (2011) find that there is no difference in closed quotient of the vocal folds or power ratio between “twangy” and “chesty” belting and suggest that they are not fundamentally different modes of production, but rather variations of one another.

McGlashan et al (2016) also presented results for two substyles of belting which they describe as “edge and overdrive” which again showed differences, with “overdrive” having greater pharyngeal constriction than “edge”. In this study 12 subjects demonstrated the substyles of belting, but here it is worth noting that all were trained in one particular pedagogical model which uses the terms “edge” and “overdrive” and which funded the research.

There is broad agreement on several key factors about Belt, however, which might help to form a consensus. These factors are as follows:

Vocal Tract:

In Belting, it has been shown that the vocal tract is “megaphone” shaped, with a high larynx, narrow aryepiglottic space, pharyngeal constriction, a high and forward-placed tongue position, and a widened jaw opening (Bourne & Garnier, 2012; Bestebreurtje & Schutte, 1999; Lebowitz & Baken, 2009; Schutte & Miller, 1991; DeLeo LeBorgne et al 2009; Sundberg et al 1992; Echternach et al, 2008). This is in direct contrast with the vocal tract shaping for classical singing qualities (including Legit) which will be discussed in more detail below.

It has also been shown that Belt quality has a high degree of activity in the Thyroarytenoid (Vocalis) muscles within the vocal folds themselves, leading to a longer closed quotient (>50% as observed by Schutte & Miller, 1991) of the vocal folds and higher subglottic pressures than would be expected for classical styles of singing (Edwin, 2008; Estill, 1988; Kayes & Welch, 2016; Titze, 2009; Björkner, 2006; Bourne & Kenny 2012; Echternach et al, 2014; Kochis-Jennings et al, 2014, Bourne & Garnier, 2012).

Resonance:

In almost every available study on Belting, it is noted that the unique shape of the vocal tract produces the effect of tuning the first formant to the second harmonic in any given tone, leading to a weaker fundamental frequency than would be seen in classical voice production (Sundberg, 2014; Bourne & Garnier, 2012; Sundberg, 2010; Titze, 2016; Bestebreurtje & Schutte, 1999; Estill, 1988; Sundberg and Thalén, 2014). This resonance strategy has been described as producing a brassy quality which has similar acoustic properties to a trumpet also having a similar shape, with a narrow input (pharynx) and a wide output (mouth) shape (Titze, 2016).

Breath:

There is some discrepancy in the literature as to the efficacy of particular breathing patterns in Belt quality. Sundberg and Thalén (2014) begin by stating that there is a common assumption amongst voice pedagogues and clinicians that the respiratory behaviour of the singer strongly influences the type of phonation produced, however by the end of the paper only 1 of their 4 breathing hypotheses has been proven correct; that Belt is produced with a higher degree of glottal adduction (in other words, effort at vocal fold level), with no evident pattern in chest expansion or use of the abdominal wall.

One paper specifically covering the breathing for belting (Hein, 2010) shows that subglottic pressures increase in relation to pitch for both Belt and Legit qualities, but that Belt quality always has higher levels of subglottic pressure than Legit. The same is noted by Schutte & Miller, 1991; Estill, 1988; Sundberg et al, 2010; and Sundberg et al, 1992 to name a few.

Hein also goes on to state that because the closed quotient of the vocal folds is longer in Belt quality than in Legit, it is reasonable to assume that less air would be used (Hein, 2010).

However, in terms of finding a technique for breathing in Belt quality there are few rules that seem to apply. Differences in rib cage expansion during inhalation and abdominal wall contraction during exhalation do not follow a regular pattern in singers studied (Sundberg et al, 2014; Hein, 2010, Collyer et al, 2009) regardless of voice quality, but one point of agreement seems to be that Belt singers will tend to use a lower lung volume and higher subglottic pressure than those using classical voice qualities (Sundberg, 1992; Estill, 1988; Björkner 2006; Sundberg et al, 2014; Hein, 2010).

Pedagogy:

Pedagogically, there is little evidence of a clear technique for teaching belting. It was noted in a survey of NATS[3] members that 89% of respondents taught in the Musical Theatre style and with 96% of those also teaching Classical voice styles. However, astonishingly only 45% of them had any training to teach Musical Theatre and only 21% had graduate or undergraduate level training (LoVetri 2002). Evidence has been put forward that 'cross-training' the voice in more than one style has positive effects

[3] National Association of Teachers of Singing, USA

both artistically and for vocal health (Turnbow, 2014; Edwin, 2008) and there have been several surveys of the requirements for contemporary Musical Theatre performers and their teachers (Roll, 2015; Bourne and Kenny, 2015; Edwin, 2009; Green et al 2013). To date, however, there seems to be no evidence-based model for training Belt quality.

Mix:

Moving on to the quality known as Mix, there is currently less research available and even more scant examples of pedagogical practice. It is certainly the case that the contemporary style of Musical Theatre that is likely to demand this style of singing is on the rise, with 55% of Broadway performers being asked to bring pop and rock songs to auditions over a surveyed six-month period, and the highest paid Broadway and touring jobs going to those who can sing in this style (Freeman et al, 2015).

Of six professional Musical Theatre singers observed by Bourne & Garnier (2012), three felt able to demonstrate the style known as mix, and these examples were compared with Belt and Legit for vocal tract resonances, glottal behaviour and voice spectrum. Interestingly, the three singers appeared to have different strategies for achieving the quality, with all three falling somewhere between Belt and Legit qualities but one falling closer to Belt and the other two falling closer to Legit. Lower closed quotients were recorded for all three than in Belt quality.

The idea of a ‘Mixed Voice’ has previously been used in classical singing to describe the area between the first vocal register change and the second in the female voice (Miller, 1986) and these are broken down further into a ‘head mix’ and ‘chest mix’ which may refer to greater muscular activity in the Cricothyroid (CT) and

Thyroarytenoid (TA) muscles respectively (Kochis-Jennings, 2014). Physiologically, higher energy in the TA muscles would indicate thicker vocal folds and a stronger ‘singer’s formant’ circa 3000Hz which would often be described perceptually as chest voice. Higher energy in the CT muscles is likely to create more energy in the fundamental frequency and thinner vocal folds, which might be described perceptually as head voice (Kochis-Jennings, 2014).

Since these muscles are an opposing pair, it seems reasonable to assert that the balance of effort between them will affect the registration of the voice and the transition from lower to upper registers. If a singer is able to successfully modify their registration and also the shape of the vocal tract, then they might create a sound that is similar to the Belt quality but contains elements of both classical and belt singing, thus ‘Mix’ (Bourne and Kenny, 2008).

In a survey of elite teachers of contemporary musical theatre, it was reported that each and every female student who was observed being taught by one of four ‘master teachers’ reported using Mix as a tactic for reaching higher Belt-sounding notes, and all four of these teachers deliberately worked on bring more ‘head voice’, or CT dominant voice production into the Belt quality to access notes above C5 (Roll, 2015).

In the same study, it was also reported that every master teacher of the Belt style who was observed, and their students, felt that belting was a balance between resonance and registration. This would again suggest that Mix quality could be a CT-dominant phonation style, but with a vocal tract configuration similar to that detailed in the Belt quality research above (Roll, 2015).

Sound pressure levels (SPL) measured in decibels have also been shown to differ between Belt and Mix qualities, with an increase of some 10 dB in a 1992 study by

Sundberg et al. Interestingly the SPL levels of Mix quality were very similar to that of classical style singing, which would be comparable in style to Legit. Once again, the closed quotient is recorded as higher in Belt quality than in Classical or Legit, and it is suggested that SPL levels are higher because the subglottic pressure is higher in this mode of singing than the other two (Sundberg et al, 1992). It is worth noting that this study is a single subject experiment, with demonstrations given by co-author Jeanette LoVetri. However, findings such as larynx position (high for belting, lower for opera) and pharyngeal constriction (narrow for belting, wide for opera) are consistent with several others and do not contradict any research seen by the author to date (Edwin, 2008; Estill, 1988; Kayes, 2016).

It is also noteworthy that all available research at the current time seems to be based on female singers. The author is able to confirm that he has both taught and demonstrated Mix voice as a male singer to other male voices, but no scientific studies into the male Mix voice quality have yet come to light.

Pedagogically, Mix voice seems widely taught (Sundberg et al, 1993; Roll, 2015) but there is once again no reliable teaching strategy. Certainly, lessening the subglottic pressure and adductive forces would seem to make the task of creating a belt-like sound easier for the singer (Sundberg et al, 1993) and therefore better for vocal health. It has been reported that a simultaneous onset of tone (where breath and vocal fold closure come together) may be beneficial to accessing this voice quality (Steinhauer et al, 2004) and resonance also seems to play a key part, with Titze (2009) stating that:

"Many pedagogical approaches to teaching signing styles are based on the concept that there are preferred vowel configurations for a given pitch."

It would certainly seem that a key feature of Mix quality singing is in the registration of the voice source, and also the configuration of the vocal tract (Kochis-Jennings, 2014).

Legit:

Legit voice quality (short for Legitimate) refers to a more classical voice production that is accessible to both the male and female voice (Edwin, 2009) recognised in singers such as Julie Andrews, Kristin Chenoweth and Audra McDonald (Bourne and Kenny, 2015a). The phonation for Legit quality is produced largely in CT-dominant 'head' voice and often has a larger pitch range than Belt (Bourne and Kenny, 2015b). It has often been described as the opposing quality to Belt in studies, and was defined as a 'neutral' quality by Sundberg and Thalén (2014).

Unlike Belt and Mix qualities, Legit does not seem to exhibit the specific tuning of the first formant, but displays a strong fundamental frequency (Bourne and Garnier 2012). The open quotient of the vocal folds is longer than in Belt, and subglottic pressure levels are also noticeably lower (Bourne and Gariner, 2012; Estill, 1988; Sundberg et al 1992). However, it is notable that subglottic pressure will increase for higher pitches in both Belt and more classical sounds, with Björkner (2006) noting a doubling of subglottic pressure levels with a doubling of fundamental frequency.

Having its roots in the classical voice, it could be easy to simplify Legit voice quality to something that is just 'similar to Opera'. However, it is noted from experience by the researcher as an experienced and expert pedagogue in the Musical Theatre field, that the sound quality is somewhat different than Opera, with an often lighter and more lyric delivery and a more conversational quality than Opera (Bourne and Kenney, 2015). Good diction and text clarity were also noted as important points, and the sound was also noted to contain 'ring' and 'brightness' (Bourne and Kenny, 2015).

Whilst we can say that it is a sound that is in necessary for contemporary Musical Theatre singers to master (Green et al, 2013; Edwin, 2003; Freeman et al, 2015), in the vast majority of research we see this voice quality dealt with as simply 'Classical' and not thoroughly explored. As such, some of the following research in this literature review deals with classical or opera as a substitute for Legit.

Collyer et al (2009) reinforce the idea that breath management is an important part of classical vocal training, and that it is considered essential for vocal health. Classical/Legit singing has been noted for having lower subglottic pressures than belting, and Sundberg and Thalén (2014) show that untrained singers show signs of an increased glottal adduction as lung volume decreases leading to a more pressed and hyperfunctional phonation type. On the other hand, trained opera singers did not display this same trait, but instead had a consistent breathing pattern.

Interestingly, Hein (2010) compared the lung volume and chest/abdominal of different singers in both Belt and Legit qualities, and whilst there was a sometimes marked difference from one subject to another, there was hardly any difference recorded in the breathing patterns for the two styles. Sundberg and Thalén (2014) showed similar results, with no consistent breathing pattern established from one singer to another.

Physiologically, one important difference between Belt and Legit qualities would appear to be the placement of the tongue, with the more forward position often being taught for belting, and a more backed articulation common to Legit (Bourne and Garnier, 2012).

Registration also seems to be important, with the Belt and Legit appearing to come from two different laryngeal behaviours at both the sound source and in the filter, with

the open quotient of the vocal folds being much longer in Legit and the fundamental frequency also being stronger than in Belt (Bourne and Garnier 2012).

In a study pertaining specifically to the male voice, Titze and Worley (2009) note that there is wider mouth opening for the Belt style than the Classical when analysing video footage of elite singers such as Luciano Pavarotti and Cab Calloway singing an A4 and the same vowel sound. This more closed mouth shape for Classical singing is referred to as the inverted megaphone (Sundberg et al, 1992; Titze and Worley, 2009) and leads to the stronger fundamental frequency that we associate with this style of singing, detailed above.

From a pedagogical perspective, and in the researcher's personal experience, it has often been implied that classical training should come first, as belting is seen as a more high-risk vocal strategy (Sundberg et al, 1992). However, in "Belting and Classical Voice Quality: Some Physiological Differences" the suggestion is made that singers who are successful belters are able to lessen and modulate the laryngeal effort to imitate opera singers more easily than opera singers are able to change their laryngeal postures to imitate belters, and therefore one could extrapolate that it might be efficient to teach belting first (Estill, 1988). Certainly, it is clear that training the voice in both Classical and Belt techniques simultaneously has benefits, and that there is an interdependence of skills between styles (Turnbow, 2014).

The teaching of classical voice is well documented, however specific techniques for Legit as a voice quality do not seem to be covered in current literature.

Discussion and Analysis of Findings

At the present time, there is a deficit of research in Musical Theatre styles, with an increasing number of papers on Belt quality but very few on Mix and Legit qualities.

This is likely to lead to confusion for pedagogues and learners alike, which in turn may lead to the reinforcing of poor practice. Within his own private practice, the researcher has noted an increasing number of clients wishing to learn these styles but who don't know where to find a better understanding of them. Through the literature reviewed in this paper, it is possible to extract emergent themes and attempt to form a coherent analysis, and to apply this knowledge in practice in the voice studio to help such clients.

Physiology:

It is possible to characterise the physiology of Belt quality as having a megaphone shaped vocal tract, and that of Legit is having an inverted megaphone shape. These parameters help to tune the vocal tract resonances of the voice qualities, and will be discussed below in the 'Acoustics' section of this analysis.

It can also be said that the vocal folds are in a TA dominant register for belting, with strong closure, longer closed quotient, high subglottic pressures and a higher SPL than in Legit quality. Conversely, Legit (if classified as being allied to Classical singing) can be said to be produced in a CT dominant register, have a lighter closure with a longer open quotient of the vocal folds, lower subglottic pressures and a lower SPL than Belt. The combination of vocal fold behaviour and vocal tract shape can be seen from the literature to be characteristic of these two voice qualities.

Mix as a voice quality may be harder to pin down since there are fewer references to it in the literature, but from references to it in Roll, 2015, it can be seen as a bridge to belting qualities above C5. In Sundberg et al, 1992, it is noted with interest that the subject of the study feels unable to belt beyond the C5 and instead deliberately choose to make a sound that she describes as a mixed quality.

It would seem that Mix quality varies from one singer to the next, but always within the physical parameters of either Belt of Legit/Classical voice qualities, and that some singers will tend more towards one or the other when using their Mix. The release of subglottic pressure, lightening of glottal contact and transition from TA to CT dominant registration, combined with the similarity in vocal tract resonances between Mix and Belt, would seem to indicate that Mix may be 'Belt shaped' in the vocal tract, but with more 'head voice' or CT dominance at vocal fold level to allow access to higher frequencies, although currently there is not enough research on the quality to be able to state this as fact. This leads to misinformation about Belt quality being hyperextended 'chest' register (Lebowitz and Baken, 2009) and may also have vocal health implications (Hoffman-Ruddy et al, 2001).

Acoustics:

Once again, parameters for defining Belt and Legit seem slightly clearer than that of Mix quality. The literature reviewed for this paper is unanimous in stating that Belt quality employs a formant tuning strategy which weakens the fundamental frequency and instead brings the first formant more towards the second harmonic. This is achieved through the megaphone-shaped within which the key features are:

- High laryngeal position
- Narrowly constricted pharynx
- High tongue position
- Wider jaw/mouth opening

On the other hand, Legit (if understood as being closely allied with Classical voice production) tends to have a significantly stronger fundamental frequency, and does not appear to employ any clear formant tuning strategy, other than picking out the

'singer's formant'. This warmer and darker voice production is widely agreed to come from an inverse megaphone-shaped vocal tract, consisting of:

- Lowered laryngeal position
- Wide pharynx
- Backed tongue position/vowels
- Narrower jaw/mouth opening

These physiological conditions are potentially very straightforward to disseminate both in the voice studio with learners, and to fellow voice pedagogues. This may present an excellent opportunity to achieve a basic consensus about the physiology of both Belt and Legit qualities and to further the discussion of the stylistic applications of these teaching strategies.

When it comes to Mix quality, there is less data to be able to consider. Experientially from the researcher's own work with female Mix students, and also from the testimonial of students interviewed for Roll, 2015, it seems that a 'forward' resonance and a 'narrow' feeling in the voice are valued for mixing. Such a sensation may be referred to as twang, or the singer's formant, circa 2800-3000Hz. It may be interesting to note that, one of the early pioneers of Belt research, Jo Estill, was able to belt to a G5 in her 1988 study of the quality, but also identified her operatic voice type as having 'squillo' or 'ring' in it. This ring in the operatic sound is the same as the twang created by narrowing the aryepiglottic sphincter detailed above (Titze and Worley, 2016) and it might therefore be extrapolated that an ability to create this frequency within the vocal tract may well be common to operatic sopranos with 'ring' in their voice, and also successful Mix belters allowing them access to higher frequencies. This is once again borne out in Roll, 2015, where two soprano students compare the sensation of mixing

to that of accessing their whistle register in the soprano voice. From his own practice in the voice studio, the researcher is also able to confirm work with several high sopranos with no previous Belt or Mix experience, who have easily been able to transfer the idea of 'head' register with squillo to the Mix voice quality with great speed and success. It is also both important and interesting to make links between classical and contemporary vocal communities, and to increase communication and cross-style training.

Breathing:

The breath patterns for these three important Musical Theatre voice qualities do not seem to be clearly delineated, and there is little evidence in the literature to support one breathing methodology over another. Indeed, Hoch and Sandage (2017) note that terms common to teachers of classical singing, such as 'appoggio', or balanced breathing, are not always recognisable to voice scientists or those outside of the classical voice community.

It can be shown that lung volumes only decrease by a surprisingly small margin during belting (Hein, 2010), but also that breathing strategies do not seem to vary between Belt and Legit singing styles. In fact, expansion and contraction in the ribs and also the abdominal wall was almost exactly the same from one style to another.

There is a lot of literature on breathing for singing available, but very little of it is anchored specifically to one style or another. The only useful observation that the researcher can make based on the current literature is that Belt uses much higher subglottic pressures and lower lung volumes than both Legit and Mix, but any technique for inspiration and expiration seems at this stage unclear. This is highly likely

to lead to confusion and poor practice, with misnomers surrounding pressed phonation and high-pressure levels in belting able to be reinforced (Caffier et al, 2017).

Pedagogy:

On this topic, the key conclusions appear to point to the efficacy of cross-training the voice rather than working only in one style. It is clear that different and, indeed, opposing sets of extrinsic and intrinsic laryngeal muscles are used between Belt and Legit, and the conclusion is therefore drawn from several papers that a healthy balance of muscular training is beneficial to both vocal quality and health.

Assimilating the information above on the physiology and acoustics of the three voice qualities considered in this literature review, it would be interesting to look at the pedagogical consequences of working with visual aids for harmonics and formant tuning to assist students in mastering these qualities. At the present time, the researcher has not been able to find such a study, but can report anecdotally that he works regularly with clients using spectral analysis software (Estill VoicePrint Plus, by Vocal Innovations) and finds this beneficial with many of them.

As mentioned previously, there also does not seem to be any one coherent breath management strategy that can be found in current research. Pedagogically, it is possible to work with students individually to help them manage their breath flow and pressure, but within the context of this literature review it can be said that more research is needed that is specific to the needs of the contemporary Musical Theatre Singer.

Conclusions

Belt, Legit and Mix are three voice qualities used in contemporary Musical Theatre, for which there has, to date, been little cohesive research. There is demand for Musical

Theatre voice pedagogues to teach these voice qualities, and they appear to have specific physiological and acoustic parameters that are common across a majority of studies. Belt and Classical singing (of which Legit is a close descendant) have had more research undertaken than Mix, but it seems that the parameters for Mix are usually found between the Belt and Legit limits and may lean more towards one or the other depending on the singer. There is important cross-over between classical and CCM voice styles, and Mix may provide a bridge between the lighter Legit style and the heaver Belt sound.

The shape of the vocal tract would appear to be an important physiological difference, with Belt and Mix employing a ‘megaphone’ shaped tract and Legit employing a more classical ‘inverted megaphone’ shape. This research can be borne out by the author’s teaching experience and that of his community of practice, with the mouth shape and larynx height of these physiological descriptors having been taught in the voice studio for some time.

As a teacher of Musical Theatre, it is important to be equally skilled in teaching each of these three key voice qualities, since they are an integral part of the career of contemporary MT artists (Edwin, 2008). Clear, evidence-based pedagogical practice is essential for both clarity of teaching and ensuring the vocal health of students, and this provides one of the motivating factors for the author to have undertaken this research.

At the present time, the research into breathing for these voice qualities is limited, with little clarity about different strategies that may be in use. It is, however, possible to state that Belt quality has higher subglottic pressures and lower lung volumes than Legit and Mix qualities. It is also important to note that a clearer pedagogical approach

to breathing, especially investigation into different breathing patterns for Belt versus Legit qualities, is an important area for further study both in practice and through research.

Pedagogical research into the efficacy of different teaching methods and styles is also currently thin on the ground, although cross-training the voice and working consistently in more than one style can be said to be good both artistically and pedagogically. Although the researcher is able to provide anecdotal evidence of working within these three styles and being able to develop singers' voices in tandem with this research project, it is important to further this area of study with evidence-based research to ensure best practice underpinned by sound vocal health. One such area that could be explored is the use of spectrographic equipment in teaching, to ascertain if this might help students with non-auditory learning styles to acquire the formant tuning skills required for the Belt and Mix voice qualities. It is hoped that this research report may provide the basis for further study in this area.

Acknowledgements

The researcher would like to thank the Board of Trustees and the Voice Faculty at Read Dance and Theatre College for their support.

References

Berger, P. and Luckmann, T. (1966). *The social construction of reality*. United States: Anchor Books.

Bestebreurtje, M. and Schutte, H. (2000). Resonance strategies for the belting style: Results of a single female subject study. *Journal of Voice*, 14(2), pp.194-204.

Björkner, E. (2008). Musical Theater and Opera Singing—Why So Different? A Study of Subglottal Pressure, Voice Source, and Formant Frequency Characteristics. *Journal of Voice*, 22(5), pp.533-540.

Bourne, T. and Garnier, M. (2012). Physiological and acoustic characteristics of the female music theater voice. *The Journal of the Acoustical Society of America*, 131(2), pp.1586-1594.

Bourne, T. and Kenny, D. (2016). Vocal Qualities in Music Theater Voice: Perceptions of Expert Pedagogues. *Journal of Voice*, 30(1), pp.128.e1-128.e12.

Caffier, P., Ibrahim Nasr, A., Ropero Rendon, M., Wienhausen, S., Forbes, E., Seidner, W. and Nawka, T. (2017). Common Vocal Effects and Partial Glottal Vibration in Professional Nonclassical Singers. *Journal of Voice*.

DeLeo LeBorgne, W., Lee, L., Stemple, J. and Bush, H. (2010). Perceptual Findings on the Broadway Belt Voice. *Journal of Voice*, 24(6), pp.678-689.

Echternach, M., Popeil, L., Traser, L., Wienhausen, S. and Richter, B. (2014). Vocal Tract Shapes in Different Singing Functions Used in Musical Theater Singing—A Pilot Study. *Journal of Voice*, 28(5), pp.653.e1-653.e7.

Echternach, M., Sundberg, J., Arndt, S., Markl, M., Schumacher, M. and Richter, B. (2010). Vocal Tract in Female Registers—A Dynamic Real-Time MRI Study. *Journal of Voice*, 24(2), pp.133-139.

Edwin, R. (2003). A Broader Broadway. *Journal of Singing*, 59(5), pp.431-432.

Edwin, R. (2008). Cross Training for the Voice. *NATS Journal of Singing*, 65(1), pp.73-76.

Edwin, R. (2009). What's Going On On Broadway?. *Journal of Singing*, 66(1), pp.71-73.

Estill, J. (1988). Belting and Classic Voice Quality: Some Physiological Differences. *Medical Problems of Performing Artists*, March(3), pp.37-43.

Freeman, W., Green, K. and Sargent, P. (2015). Deciphering Vocal Demands for Today's Broadway Leading Ladies. *Journal of Singing*, 71(4), pp.491-495.

Green, K., Freeman, W., Edwards, M. and Meyer, D. (2014). Trends in Musical Theatre Voice: An Analysis of Audition Requirements for Singers. *Journal of Voice*, 28(3), pp.324-327.

Hein, M. (2010). Die Gesangtechnik des Beltings - eine Studie uber Atemdruck, Lungenvolumen, und Artembewegungen. *PHD Dissertation, Universitat Hamburg*.

Hine, G. (2013). The importance of action research in teacher education programs. *Issues in Educational Research*, 23(2), pp.151-163.

Hoch, M. and Sandage, M. (2017). Working Toward a Common Vocabulary: Reconciling the Terminology of Teachers of Singing, Voice Scientists, and Speech-Language Pathologists. *Journal of Voice*, 31(6), pp.647-648.

Hoffman-Ruddy, B., Lehman, J., Crandell, C., Ingram, D. and Sapienza, C. (2001). Laryngostroboscopic, Acoustic, and Environmental Characteristics of High-Risk Vocal Performers. *Journal of Voice*, 15(4), pp.543-552.

Kayes, G. and Welch, G. (2017). Can Genre Be “Heard” in Scale as Well as Song Tasks? An Exploratory Study of Female Singing in Western Lyric and Musical Theater Styles. *Journal of Voice*, 31(3), pp.388.e1-388.e12.

Kochis-Jennings, K., Finnegan, E., Hoffman, H., Jaiswal, S. and Hull, D. (2014). Cricothyroid Muscle and Thyroarytenoid Muscle Dominance in Vocal Register Control: Preliminary Results. *Journal of Voice*, 28(5), pp.652.e21-652.e29.

Lebowitz, A. and Baken, R. (2011). Correlates of the Belt Voice: A Broader Examination. *Journal of Voice*, 25(2), pp.159-165.

LoVetri, J. and Means Weekly, E. (2003). Contemporary Commercial Music (CCM) Survey: Who's Teaching What in Nonclassical Music. *Journal of Voice*, 17(2), pp.207-215.

Lovetri, J., Lesh, S. and Woo, P. (1999). Preliminary study on the ability of trained singers to control the intrinsic and extrinsic laryngeal musculature. *Journal of Voice*, 13(2), pp.219-226.

Macdonald, I., Rubin, J., Blake, E., Hirani, S. and Epstein, R. (2012). An Investigation of Abdominal Muscle Recruitment for Sustained Phonation in 25 Healthy Singers. *Journal of Voice*, 26(6), pp.815.e9-815.e16.

McGlashan, J., Thuesen, M. and Sadolin, C. (2017). Overdrive and Edge as Refiners of “Belting”?. *Journal of Voice*, 31(3), pp.385.e11-385.e22.

Miller, R. (1986). *The structure of singing*. New York: Schirmer Books.

Moon, J. (2009). *A handbook of reflective and experiential learning*. London: RoutledgeFalmer.

Roll, C. (2016). The Evolution of the Female Broadway Belt Voice: Implications for Teachers and Singers. *Journal of Voice*, 30(5), pp.639.e1-639.e9.

Schutte, H. and Miller, D. (1993). Belting and pop, nonclassical approaches to the female middle voice: Some preliminary considerations. *Journal of Voice*, 7(2), pp.142-150.

Steinhauer, K., Grayhack, J., Smiley-Oyen, A., Shaiman, S. and McNeil, M. (2004). The relationship among voice onset, voice quality, and fundamental frequency: a dynamical perspective. *Journal of Voice*, 18(4), pp.432-442.

Sundberg, J. and Thalén, M. (2015). Respiratory and Acoustical Differences Between Belt and Neutral Style of Singing. *Journal of Voice*, 29(4), pp.418-425.

Sundberg, J., Gramming, P. and Lovetri, J. (1993). Comparisons of pharynx, source, formant, and pressure characteristics in operatic and musical theatre singing. *Journal of Voice*, 7(4), pp.301-310.

Titze, I. and Worley, A. (2009). Modeling source-filter interaction in belting and high-pitched operatic male singing. *The Journal of the Acoustical Society of America*, 126(3), pp.1530-1540.

Turnbow, C., Saunders-Barton, M. and Spivey, N. (2014). Training The Next Generation of Music Theatre Voice Teachers: Penn States First MFA Pedagogy Grad Takes Stock. *Journal of Singing*, 71(2), pp.217-220.