ABSTRACT

Fundamentals of Versatile Vocal Technique

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In the twentieth and twenty-first centuries, the boundaries of vocal technique have been expanded into realms heretofore unexplored. The physical nature of singing has not changed; only the ends to which it is employed. Two distinct styles have emerged: classical and contemporary/musical theatre technique. Pedagogues from the two fields teach many of the same concepts, but differ in their emphasis on certain elements over others. This thesis discusses the elements of singing stressed roughly equally by both styles of singing, and describes certain techniques used to teach them.

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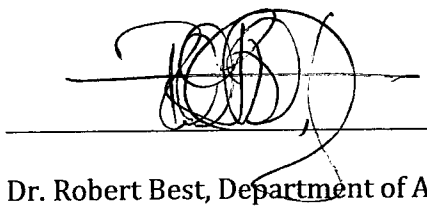

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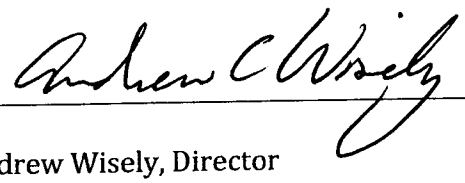

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FUNDAMENTALS OF VERSATILE VOCAL TECHNIQUE

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By

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TABLE OF CONTENTS

CHAPTER ONE

Vocal Styles and Research Methods

As background to the presentation of this information, it seems appropriate to begin with the way singing is understood today and a brief overview of how the research was conducted.

Vocal Styles

The world of singing is complex and varied. Virtually every culture in the world uses singing in their music to some extent or other. Even limiting the scope of singing to Western music, the variety of sounds employed is staggering. From untrained folk singers to opera singers, from country music to the pop hits, the versatility and flexibility of the human voice are on display every day.

In classrooms and universities, however, the focus is narrower. Teachers of singing generally fall into one of two categories: classical or commercial music/musical theatre. The classical style is usually employed in operatic performances, classical concerts and recitals, and in most choral music. Commercial/musical theatre style is used in pop concerts, usually on the radio, and on the Broadway stage. They can be distinguished by their approach to vowels, registration, and the rhythmic and melodic elements employed.

Vowels and Amplification

One fundamental difference between the two styles of singing is their use of amplification. Although it is not an ironclad distinction, classical singing is typically unamplified while musical/commercial singing is amplified.

This distinction is an important factor in how the two styles differ in their approach to vowel formation. The classical style makes more fine distinctions in the formation of vowels. Classical singers modify vowels from the standard speaking sounds in order to achieve acoustical power, as explained in Chapter Two. This is especially vital in the extended ranges used by many classical composers. Sopranos in their upper range, for example, modify the vowels to reduce vocal strain and achieve proper intonation.[1]

Musical theatre, by contrast, does not call for as much vowel modification. Because performers are amplified, there is less need to modify for acoustic aid. Instead, the style focuses more on a natural, speaking style of delivery. This is also possible because the melodies are usually confined to a more moderate range, avoiding the extreme upper registers (i.e., above the treble clef for women) and lower registers (below about a B on the bass clef for any men).

Registration

The definition of a vocal register will be given in greater detail in the next chapter, but in short it is a use of a particular laryngeal configuration in a particular

[1] William Vennard, *Singing: The Mechanism and the Technic*, Revised Ed. (New York: Carl Fischer, 1967) p. 158-159

range, resulting in a particular vocal sound. Much study has been devoted to the question of how many registers singers actually have, but most teachers today agree on at least two registers: a heavier, low register called full voice, chest voice, or heavy mechanism; and a higher, lighter register called falsetto (in men), head voice (in women), or light mechanism. Most singers make use of one register primarily, (referred to as their *modal voice*): men use chest voice, and women use head voice. This is true of both styles of singing.[2]

The use of the falsetto for men is typically considered a special effect, and rarely employed in either style.[3] However, the use of chest voice for women is more common. Particularly in the musical theatre world, it is common for women to utilize, to some degree, chest voice into the upper part of the treble clef. This style is called "belting" and is a source of great contention in the teaching world. This controversy is treated in greater detail in Chapter Three, in the section on registration.

Rhythmic and Melodic Elements

One final difference between these styles is in the musical techniques employed. As a general rule, classical style can be expected to use a wider range and more complex rhythms than musical theatre. These two excerpts, from Handel's *Messiah* (classical) and the musical *Next to Normal* (musical theater) give examples of the differences in the use of range:

[2] Ibid., p. 73

[3] Ibid., p. 76

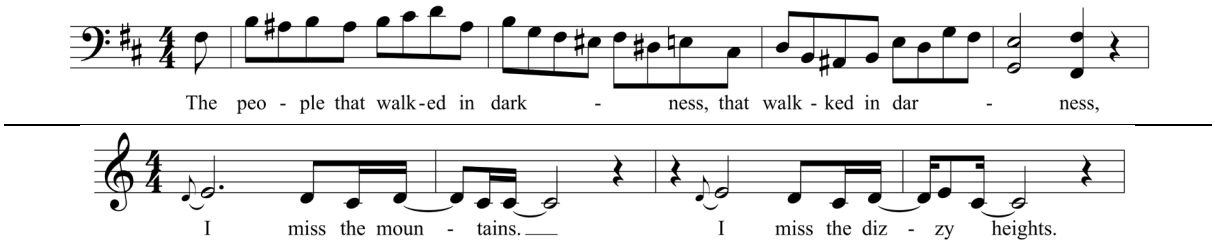

Figure 1: "The People that Walked in Darkness" from Messiah*, and "I Miss the Mountains" from* Next to Normal

Musical theatre, in addition to using a range that mimics speech, often mimics speech more closely in melody and rhythm. Compare the following examples:

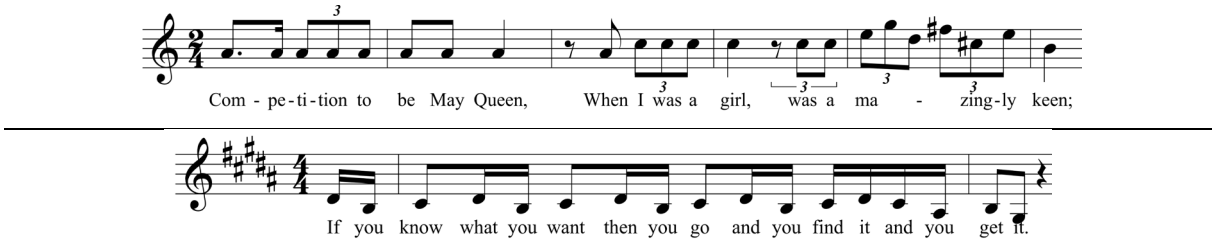

Figure 2: From Act I of Albert Herring *and "Maybe They're Magic" from* Into the Woods

The first example, drawn from Benjamin Britten's opera *Albert Herring*, has some rhythmic elements similar to speech, but generally is less speech-like than the second example, from the musical *Into the Woods*.

Of course, these characteristics are not universal. Operettas by Gilbert and Sullivan, definitely in the classical style, commonly employ a relatively narrow range, as in this song from *Ruddigore*:

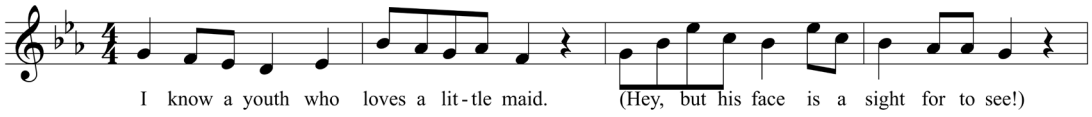

Figure 3: "I know a youth" from Ruddigore

Conversely, musicals sometimes employ more extended ranges, as in this piece from *My Fair Lady*:

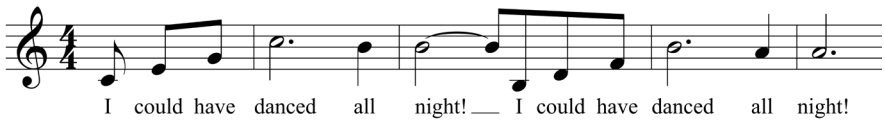

Figure 4: "I Could Have Danced All Night" from My Fair Lady

In any event, it should be noted that all of these characterizations are very simplified and do not hold true in all cases; both styles are widely varied. All of the examples given above were carefully selected to show the differences. This side-by side comparison could be extended to many more dimensions of the music, and could easily take an entire book on its own.

Research Methods

The research for this project was carried out through extensive reading coupled with interviews and surveys.

Books such as Barbara Doscher's *The Functional Unity of the Singing Voice* and William Vennard's *Singing: The Mechanism and the Technic* provide an overview of the mechanics of the voice. Other scientific literature, such as Berton Coffin's *Sounds of Singing* and *What Every Singer Needs to Know About the Body*, written by Melissa Malde, provided additional information on specific topics.

Other books cover the specific techniques of classical style. Readings from Coffin's *Historical Vocal Pedagogy Classics* and Jerome Hines's *Great Singers on Great Singing* provided more anecdotal evidence from the perspective of well-regarded singers and singing teachers. Many of these singers were able to clearly articulate the

elements of their technique. In addition, Manuel Garcia, a highly influential pedagogue and voice researcher, published a foundational treatise on voice technique and singing. This book was also very informative.

The progression of Musical Theatre style is less well documented. It is relatively new, dating back to only the 1940s or so; therefore, the pedagogy is less developed, and more passed down by tradition than in writing. There are virtually no published textbooks on the musical theatre technique, and interviews with musical theatre performers about their technique are few and far between. This information was gathered exclusively through surveys and interviews. Those books on the science of the voice mention some details of the vocal mechanism that make theatrical styles possible, but they didn't cover the specifics of theatre and commercial music techniques.

In addition to reading the books cited in the bibliography, research was conducted through in-person interviews and online surveys. Initial interviews with local teachers were conducted in person, and some follow-up questions were answered through e-mail. In addition, an online form was created using Google Docs, and sent to a number of teachers for completion. The link was also posted to /r/music, a sub community of Reddit, an online, discussion-based website. Reddit relies on the opinions of readers to sort the wheat from the chaff by "upvoting" good or worthwhile posts, and "downvoting" useless or bad posts. Unfortunately, this post did not garner much attention when it was posted, and so it did not move up the pages where it would get more attention. No responses were received through this method.

All teachers were asked the same questions. After the first few interviews, some questions were discarded as not helpful, and others were added. Questions included:

- What style of music do you primarily train students for?
- Please describe your education and experience.
- What skills, knowledge, and abilities do you think are indispensable to a successful singer?
- What books and teaching guides do you find valuable and/or high quality?
- What concepts do you try to teach when working with students on breath, resonance, vowel shape and placement, and use of registers? What techniques or analogies do you use?
- Do you teach about the anatomy of the voice in lessons?
- When listening to performers, what aural characteristics tell you they have strong or healthy technique?

In reading certain books, such as *Historical Vocal Pedagogy Classics* and *Great Singers on Great Singing*, these same questions were used to summarize the thoughts of the teachers and singers whose words are recorded there.

Challenges

One of the central challenges for this work was obtaining wide enough research. Books were relatively easy to obtain, as the Baylor University library contains many of the most important books in this field. In fact, there are so many books on vocal pedagogy that the books consulted here are only the tip of the iceberg. They were chosen because of their scientific basis and the fact that they were cited by many of those interviewed.

The primary challenge was in accessing the working professionals in the field. Due to time and financial constraints, it was unfeasible to visit even a majority of them in person. The idea to create an online survey only occurred near the end of the process, and was therefore only slightly effective. By the time it was sent out, the deadline was looming and the teachers had little time to respond.

Overall, those interviewed represent a very small cross-section of the world of teaching. They are uniformly well educated, and successful in their approach to either technique. This should provide a representative preliminary foundation for conclusions. Further research in this field will be necessary to develop well-supported conclusions.

Another major challenge to consider is the fact that many teachers and performers use the same words to mean different things, or refer to the same thing by a different word. William Vennard notes this in many places throughout his book[4], and it is also clear throughout the book *Great Singers on Great Singing*, which interviewed working professionals.

This issue of vocabulary is more problematic when comparing between fields (classical vs. musical theatre) rather than across any single field. But it is an important consideration in a study like this, which attempts to compare the two fields.

In short, this research is incomplete, as the subject is too complex to be dealt with in a relatively short research period. As with many worthwhile studies, deeper examinations provide more dimensions on which research can be compiled. For example, the four dimensions discussed in this thesis (Breath, Resonance, Vowel

[4] See, for example, Vennard p. 13

Placement, and Registers) are only the tip of the iceberg. Other techniques could include posture (in greater detail), vibrato, and agility, as well as many others.

Future researchers would also do well to cast a wide net for interviews and surveys. Publicizing the research in the *Journal of Singing*, for instance, could provide greater input. Also, in addition to interviewing more private instructors, it would be beneficial to include well-regarded, successful choir directors in such a survey; if they have an understanding of the voice, they may have ideas for exercises to develop technique quickly and efficiently. Finally, working professionals might provide helpful insight—books such as *Great Singers on Great Singing* show that many working professionals could give insights on how they sing which may be beneficial to understanding what their teachers taught.

In short, one hopes that this will not be the final layer of research on this topic, and that someone with more connections and a greater command of the literature will delve deeper into this topic than is possible in an undergraduate thesis.

CHAPTER TWO

Background: Physiology and Physics of the Singing Voice

For as long as there have been singers, there have been teachers of singing. Since the Middle Ages, teachers have been developing techniques for using the voice effectively and in stylistically appropriate ways. As these styles have changed, so have vocal techniques. The emergence of the *bel canto* movement in the Eighteenth Century changed how singers used their voices, and how composers wrote for them. In the Twentieth Century, avant-garde composition and popular styles such as rock and roll, blues, and jazz introduced new vocal sounds into the modern ear; with them came some new techniques for teaching them.

Although some techniques, such as the use of vibrato, or how extensively to use the low mechanism in the higher range, have changed over time, the fundamental principles of singing have remained the same. These are grounded in the physics of sound and the physiology of the human body.

The Physical Foundations of Singing

In order to understand the physics of singing, a basic grasp of general acoustics is in order. Once the scientific terminology has been explained, the specific relationship to singing can be developed more clearly.

The Nature of Sound

Acoustics is the measurement of sound waves and how that phenomenon is perceived. A *sound wave* is a compression and rarefaction of molecules, most often of air, which travels through a physical medium and is sensed by a hearing organ.[1] The speed of this compression and rarefaction is referred to as *frequency*, and is measured in Hertz (Hz), or Cycles per Second (cps). This vibration produces variations in air density, a phenomenon that is perceived as pitch. For example, a body vibrating at 440 Hz would be producing a pitch corresponding to the standard A4 (the pitch to which instrumental ensembles tune before performance, used here as a convenient reference). The amount of variation between the highest or lowest air densities and the halfway point, or neutral, is called *amplitude*; with some allowances for particular pitch and its placement in the human hearing spectrum, amplitude is perceived as volume and is measured in decibels (dB).[2]

An important element in singing is the phenomenon of *harmonic frequencies* and *resonance*. Simply put, a harmonic frequency is a multiple or approximate multiple of the *fundamental* pitch. Such harmonics almost always occur where vibration occurs. For example, taking a C2 (65.4 Hz), an instrument producing this frequency is likely also producing multiples of 65.4 Hz, such as 130.8, 196.2, 261.6, 327 Hz, and so on. This set of frequencies is called the *harmonic series* of C2. Each of these frequencies corresponds more or less to another note as shown below:

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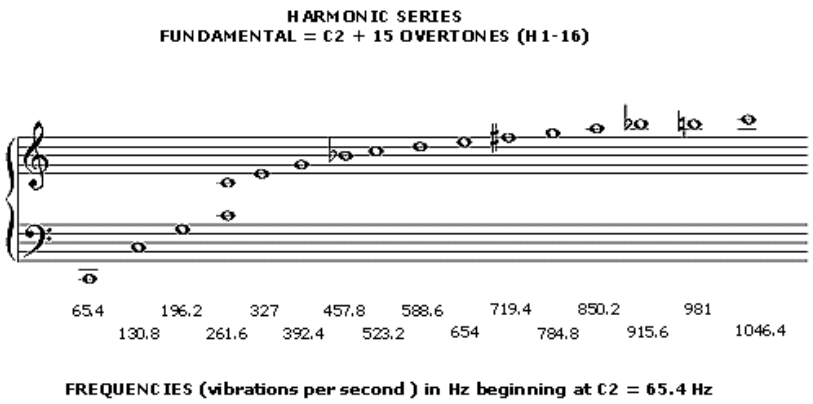
[1] Barbara Doscher *The Functional Unity of the Singing Voice*, 2nd ed. (Metuchen, NJ: Scarecrow Press, 1994), 85

[2] Ibid., ch. 5 offers more information on these concepts.



The Harmonic Series on C2

Some voice teachers maintain that they can pick out these upper overtones specifically when listening to single pitches. Vennard offers an interesting example of how to begin to hear them. He suggests that the student depress keys in the upper portion of the piano and play a note of which they are the overtones (i.e., hold C4, E4, and G4, while playing C2 as above). One can hear the sympathetic resonance, and can begin to hear these notes as components of the lower note.[3]

These harmonics occur at amplitudes lower than the fundamental pitch, but not all at the same amplitude. The relative strength of these various harmonics contributes to the *timbre* or unique sound of a particular instrument.

Other bodies around the producing body, such as the body of a string instrument, or a nearby wall, may also be stimulated to sympathetic vibration or *resonance* with the original reed, string, vocal fold or other vibrating body. This vibration can modify or amplify the sound in various ways.

The Mechanics of Instruments

[3] Vennard, p. 13

Vennard notes that instruments are composed of three fundamental parts: an *actuator*, a *vibrator*, and a *resonator.*[4] The actuator provides energy for the vibrator, the vibrator produces pitch, and the resonators take that pitch and modify and amplify it, making a musical tone. The table below offers a few examples of these respective components in various musical instruments:

Components of Instruments

Instrument	Actuator	Vibrator	Resonator
Voice	Breath	Vocal folds	Oral cavity
Oboe	Breath	Double reed	Instrument body
Clarinet	Breath	Reed and mouthpiece	Instrument body
Trombone	Breath	Lip buzz	Instrument body
Violin	Bow	String	Instrument body
Piano	Key and hammer	String	Sound board
Marimba	Mallet	Bar	Pipes

In the voice, wind, and brass instruments, the vibration is caused by the breath moving forcing a vibrator to open and close. This is partly due to the *Bernoulli Effect*. Essentially, this law of physics states that a gas (in this case, air) in motion is under a lower pressure than the same gas at rest.[5] So when air flows through the vocal folds, it is at a lower pressure than the air beside the folds, creating a vacuum which sucks the folds shut. The closing increases subglottic pressure (pressure below the *glottis*, the point where the vocal folds meet), which then forces the folds open, creating the cycle of vibration that produces pitch.[6]

[4] Vennard, p. 14-15

[5] Doscher, p. 59

[6] Ibid., p. 60

Vennard notes that understanding the application of the Bernoulli Effect to singing is a relatively recent occurrence. Although the aerodynamics of singing are now understood, the other factor in play is the myoelastic (muscle elasticity) properties of the vocal folds. This means that the vocal folds are elastic and want to return to their original shape when stretched. When subglottic pressure becomes strong enough, they are pushed apart as described above. However, in addition to the suction of lower pressure, they try to pull together by elastic force as well.[7]

Barbara Doscher explores the mechanics of phonation and the interesting implications of the interactions of breath pressure and airflow in Chapter Three of her book, *The Functional Unity of the Singing Voice*. These will be further noted in later sections.

Resonance and Timbre

The vocal folds produce vibrations at a given frequency or pitch, and the singing tone is resonated through the vocal tract. The manipulation of the vocal tract emphasizes different harmonics of the series, producing vocal timbre.

The timbre of the voice is highly variable from person to person, but also depends somewhat on the frequency being produced and the vowel on which it is sustained. This is particularly true of the extremes of the range. This dependence has been the subject of much scientific inquiry in recent years.

The position of the tongue in the mouth is the primary determinant of vowels. The tongue may be arched in a number of ways, and the position of this arch determines the vowel. When it arches toward the front of the mouth, vowels such as [i]

[7] Vennard, p. 42

(as in easy) and [I] (initial) are produced; when arched toward the middle, neutral vowels like [E] (every) and [shwa] (under) result; and toward the back, results in [u] (useful) and [U] (foot). Tongue position also effectively divides the mouth into two resonating chambers: between the tongue arch and the larynx, and between the tongue arch and the lips. The resonances of these two chambers create *formants*, particular resonant frequencies that lend power to the voice. Because of these resonances, singers can be heard over even an orchestra.

Since the mouth and pharynx are malleable, it stands to reason that they can be modified to adjust (and hopefully improve) the resonance with any given pitch on a particular vowel. Berton Coffin has written two extensive books on the particular vowel shapes that form the most ideal resonances for any given pitch. Anyone with a further interest in this topic is encouraged to examine these books, referenced in the bibliography to this work.

The cornerstone of Coffin's work is the thesis that every vowel has a pitch at which it resonates most naturally and powerfully. Coffin offers an extensive technique for modifying the required pitches of a song to best resonate, using the nearest resonant vowel shape as a base.[8] This is all based in research done by Herman von Helmholtz, who investigated the physics of sympathetic resonance in cavities in an 1885 book.[9]

Questions of resonance and use of the vocal mechanism form the basis for the schools of thought investigated in this thesis. Although the fundamental mechanics are

[8] Coffin, Berton, *Sounds of Singing: Principals and Applications of Vocal Techniques with Chromatic Vowel Chart*, 2nd ed. (Metuchen, NJ: Scarecrow Press, 1987)

[9] Explained in Vennard, 14

understood, the potential ways in which these systems may be appropriately used is under constant reconsideration, in an ongoing tradition that extends from the middle ages to the modern era.

The Physiological Foundations of Singing

In the simplest of terms, singing can be seen as the interaction of three anatomical systems: respiration, phonation, and resonance. Each of these will be discussed briefly, as each contributes to the characteristics of the singing voice and tone.

Respiration

Respiration is generally considered the foundation of singing. The voice is categorized as a wind instrument, since it produces tone as a result of breath passing through the vocal folds. Thus breath acts as the *actuator*, providing energy to the vocal folds, causing them to vibrate.[10]

The lungs are the primary organs of respiration. They act as containers for the air taken in through inspiration, and as bellows to pass the air through the bronchial tubes, trachea, and larynx on expiration.

The primary active muscle of inspiration is the diaphragm. Shaped like a double-domed surface, it divides the thoracic cavity, which contains the lungs and heart, from the abdominal cavity, which contains the viscera. On inspiration, the diaphragm contracts, descends, and flattens somewhat, creating a vacuum in the lungs, which

[10] Vennard, 16

causes air to enter the lungs. Relaxation of the diaphragm puts pressure on the lungs, which, along with their natural elasticity, forces air out in the process of expiration.[11]

In addition to the diaphragm, the abdominal muscles and two sets of intercostal muscles assist with inspiration and expiration. The abdominal muscles relax, leaving room for the viscera when they are displaced by the descent of the diaphragm. A controlled inward contraction of the abdominal muscles assists the relaxation of the diaphragm in returning the body to equilibrium during the expiration process. The intercostal muscles lie between the ribs and help to expand and lower the rib cage, allowing more space for the lungs to expand.[12]

From this description of the muscles of breathing, it can be clearly understood why a major emphasis of virtually all singing teachers is posture. If major structural components are impinged upon by others, limiting their room to move, these muscles cannot function optimally.[13]

Phonation

The organ of phonation is the larynx. Suspended at the top of the bronchial tubes by a complex web of muscles, this organ contains the vocal folds, whose vibration generates the tone used for speaking and singing. Four cartilages support the intrinsic muscles of the vocal folds: the *thyroid* cartilage, the two *arytenoid* cartilages, and the

[11]Doscher, 8-11

[12] Ibid., 12-16

[13] Ibid., ch 4

cricoid cartilage. The *intrinsic* (internal) muscles are named after the cartilage from which they originate, and the cartilage into which they insert.[14]

The vocal folds consist of some four sets of muscles. The *thyro-arytenoid* muscles are the vocal folds themselves. Contraction of the thyro-arytenoids causes the vocal folds to bulk and generate a thicker or stronger tone.[15] The point at which the thyro-arytenoid muscles meet is called the *glottis*.

The *crico-thyroid* muscles are the primary antagonists to the thyro-arytenoid muscles. Contraction of these muscles acts as a lever pulling the cricoid cartilage up toward the bottom of the thyroid cartilage, and thus lengthening the thyro-arytenoids by putting them under greater tension.[16] The now lengthened (and somewhat thinned) thyro-arytenoids vibrate more quickly, producing a faster frequency and higher pitch, as described above in the section on the physical foundations of singing. Antagonism between these two muscular systems (thyro-arytenoid and crico-thyroid) is the physical basis for *registers*, as explained in the section below on registration.

Other muscles in the larynx include the *inter-arytenoids*, which maintain position of the arytenoid cartilages and *adduct* (bring together) the vocal folds, and the *posterior* and *lateral crico-arytenoids*, which *abduct* (pull apart) and help adduct the vocal folds.[17]

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[14] Ibid., 31-34

[15] Ibid., 36-37

[16] Ibid., 39

[17] Ibid., 42-44

During inspiration, the vocal folds are abducted to allow a large quantity of air to pass through quickly.[18]

Because the larynx is suspended by a web of muscles, there are a number of *extrinsic* (exterior) muscles which are tied into this system. However, these have little to do with phonation; in fact, singers are encouraged to refrain from using these muscles as much as posslble. Barbera Doscher gives a detailed explanation of all of these muscles in her book.[19]

Resonance

Once the vocal folds have produced a pitch, it remains the province of the resonators to develop that pitch into an intelligible (and, hopefully, beautiful) sound. The resonance of the singing tone is supplied by the pharynx and the mouth, which are collectively known as the "vocal tract".[20] More precisely, within the mouth, the tongue, teeth, lips, and soft palate can greatly enhance or diminish the quality of the singing tone, depending on their collective configuration.[21]

Unlike most instruments, these structures are malleable, meaning that they can be repositioned in order to create an infinite number of configurations, or shapes, for different notes. Much of this repositioning happens as a result of the use of a particular vowel. For example, in the singing of the vowel [i], the front of the tongue is arched far

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[18] Ibid., 59-60

[19] Ibid., 8-26

[20] Ibid., 107

[21] Ibid., 111-125

forward, the soft palate is lowered slightly, and the lips and teeth are relatively close together. However, the singer has a fair amount of recourse in the exact position of these articulators. This topic will be treated at greater length in the next section. For now, suffice it to say that the configuration of the vocal tract must be shaped to the frequency produced by the vocal folds in order to produce a beautiful, full sound.

CHAPTER THREE

Essential Singing Techniques

Breath

Breathing is one of the few skills that is universally agreed to be an important fundamental for singing. Besides being necessary to sustain life, the breath acts as the "actuator" providing power for the vocal folds, and beginning the process of phonation.[1] This process is taught the same for both classical and musical theatre techniques.

Singing operates under distinctly different circumstances than speaking. The level of air pressure needed to sustain a sung tone is higher than that of speaking.[2] In addition, singers modify their breathing pattern in order to sing through longer phrases.[3] Because of these differences, singers have to learn to use the breathing musculature in different ways than when they speak.

The anatomy of the breathing apparatus was discussed in detail in Chapter Two. When the external intercostals raise the ribs and the diaphragm descends, the lungs expand and take in air.[4] When exhausted, or in times of dire stress, shoulder

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[1] Vennard, 16

[2] Doscher, 62-63

[3] Ibid., 19

[4] Vennard, 28

muscles can also be recruited to assist in this expansion.[5] Vennard notes, however, that these muscles don't allow for fine control of the vocal pressure, and are therefore unsuited for musical breathing.[6]

For most singers, manipulation of the diaphragm is recognized as being the most important part of breathing. Beginning students are often encouraged to develop awareness of the diaphragm. However, this is a misconception, as the diaphragm is not under conscious control.[7] The most common image used to teach proper technique is to "breathe down and out".[8] This image is fairly accurate, in that the main sensation of expansion is in the lower part of the abdomen. However, Vennard notes that the actual motion is more complex, with the epigastrium (the area in the center of the thorax just below the rib cage) moving forward and *upward*, rather than downward.[9] Teachers typically avoid this image, as it can cause singers to artificially tense the intercostals and use the shoulder muscles to lift too far. This prevents the epigastrium from moving forward and actually prevents a full, deep breath. This is referred to as "clavicular breathing".[10]

However, some suspension of the ribs is important. Many voice teachers encourage students to keep the ribs raised during exhalation, because it prevents

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[5] Ibid., 26

[6] Ibid., 27

[7] Doscher, 18

[8] Hines, 37 (for example)

[9] Vennard, 30

[10] Ibid., 27

the shoulders from collapsing in.[11] If the shoulders collapse in, the singer may lose control of the exhalation and therefore expend the air too quickly at too high a pressure. This would prevent the singer from producing a usable tone or managing phrase lengths of any useful duration.

One should remain mindful that the concept of breath is intimately related to posture. Proper singing posture incorporates the raised ribs, a mostly straight spine, and a moderate lengthening of the neck.[12] Teachers may use a number of metaphors to describe the correct posture; one common analogy is to think of being suspended by a cable from the ceiling.[13]

Exercises for Breath

Teachers use a variety of exercises to develop fine control of the breathing musculature. As mentioned before, some teachers require students to isolate the abdominal and intercostal muscles by lying on the ground.[14] Vennard gives a few examples of isolating the rise and fall of the abdominals:

> "One simple exercise for developing the right coordination is performed while lying flat on the back of some rigid surface, like the floor or a table. A weight…is placed on the abdomen during the ribs. When the person inhales, he should raise the weight, and when he exhales, the weight should go down…
>
> "Another exercises, similar to the one just described, but much more strenuous requires the use of a small object, about the size and shape of a pint milk bottle. Hold the object against the "breathing muscle," between the

[11] Jack Coldiron, survey response

[12] Melissa Malde, MaryJean Allen, and Kurt-Alexander Zeller, *What Every Singer Needs to Know About the Body*. San Diego, CA: Plural Publishing, 2009

[13] Best, Julianne, Survey Response

[14] Boyter, Judy, Survey Response

> ribs, and lean so that the other end of the object presses against a wall. Stand on tiptoe, with feet far enough back so that a good deal of weight is converted into pressure on the epigastrium. Release the breath, but do not exhale abdominally; rather, let the bottle, or whatever is being used, expel the air by pushing in below the ribs. Inhale, pushing the weight of the body away from the wall."[15]

Vennard notes that this second exercise should not be used for extended periods of times; instead it may be employed as a test only. Both of these exercises are intended to reinforce the idea of exhalation as a controlled relaxation, not as a forceful expiration. Many singers in *Great Singers on Great Singing* corroborate this idea of keeping the musculature as relaxed as possible[16].

In order to ensure that the singer is expelling appropriate quantities of air, some teachers use a raspberry or lip trill technique.[17] The thinking is that if the air flow is enough to move the lips myoelastically, it is more than sufficient to move the vocal folds.

Another type of activity sometimes employed in lessons is panting. This becomes a sort of endurance exercise for the relaxed antagonism between the abdominals and the diaphragm. Vennard claims that inhalation and exhalation should be effective—"the student should be able to continue panting indefinitely."[18]

Once singers have internalized the basic mechanics of a singer's breath, teachers begin working on management of the muscular function. A common exercise is a controlled expiration. After an inspiration—either controlled or

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[15] Vennard, p. 29

[16] Hines

[17] Julianne Best, survey response

[18] Vennard, p. 32

quick—the student expels the air, sometimes to a count[19] or throughout a long phrase[20].

Some other imagery often used by teachers include balloons, rubber bands, barrel shapes, jumping on a trampoline, or a ball on a water jet.[21] These all relate to the sensation of relaxed exhalation described above, and the visual imagery of the expanded ribcage remaining expanded throughout expiration.

Resonance

Resonance is a difficult term to define. In the scientific literature, *resonance* has a specific definition, but teachers use it in a variety of ways. Generally, it seems to be a combination of focus (brightness from high overtones) and depth (darkness from lower overtones).

As explained in Chapter Two, resonance is created by the sympathetic vibrations of the various surfaces of the pharynx and oral cavity.[22] Vennard notes that the nose is often mistakenly considered a resonant cavity, but proper technique prevents the sound from resonating there.[23] Most experienced singers corroborate this fact: the tone should not feel like it comes from the nose.[24]

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[19] Pam Moore, Survey Response

[20] Vennard, p. 34

[21] Survey responses; Deborah Williamson, e-mail conversation

[22] Doscher, 107

[23] Vennard, 93

[24] Hines, 22

Singers often speak of "placing" the resonance. This is a sensation where a certain portion of the body is felt to be the focus of vibration through sympathetic resonance. This point is often placed in the "mask"—the upper portion of the cheeks. This helps emphasize upper overtones and gives the brightness and "ring" to the sound.

Too much ring, however, robs the sound of any dimension, and it simply becomes a yell. Though the singer must focus the sound toward the front of the mouth, they must also allow resonance to occur in the back portion of the mouth. The primary way to do this is to raise the back roof of the mouth, called the soft palate. This serves the double function of opening the oral cavity to greater vibrations and closing the nasal passage to prevent resonance there. In addition, many teachers speak of lowering the larynx, giving more room to resonate and feeling relaxed. The combination of these two sensations causes the singer to feel wide open and resonant for singing. Common terms used to describe this sensation are "nasal" and "whiny" for the first stage, then "space" or "lifted" for the second.

Exercises for Resonance

There are only a few techniques used to teach resonance. Dr. Jerry Gordon (retired) suggested activities taken from *Sounds of Singing.* Using a small synthesizer to produce a tone, he would place it in front of the student's mouth and ask them to close the glottis and form a vowel. The student would modify the vowel in minor ways in order to find the one that best resonated with that pitch. This would be the variant, or slight configuration, of the vowel used by the singer when

that vowel was desired on that particular pitch.[25] Coffin's *Sounds of Singing* contains a chart with reminders for approximately what shapes seem to work for various voices.

The other common activity suggested by teachers is a direct appeal to the mechanics of the voice. As noted above, teachers often speak of lowering the larynx and raising the soft palate. This happens automatically during the first part of a yawn. In fact, this characteristic "yawn" sound is sometimes used as a model for the sensations the singer should feel.

Vowel Shape

Vowel shape is one of the biggest differences between classical and musical theatre style. The shape of vowels has a major acoustical effect on the voice. As a general rule, classical singers look for the most acoustically ideal vowel for any given note. Theatre singers, on the other hand, place naturalism and style ahead of acoustics.

One major reason for this difference, as noted in Chapter One is that classical singers are typically unamplified. They rely on a working knowledge of acoustics to gain maximum sympathetic resonance from the vocal tract (see previous section). Berton Coffin has done an in depth study of these physics, and explains: "The pitch of the vowels involved [in singing] must also be harmonic with sung pitch or there will be a weakening and/or distuning of vocal cord vibrations."[26]

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[25] Jerry Gordon, interview with the author

[26] Coffin, *Sounds of Singing*, p. 59

Each vowel has its own acoustic properties. One important characteristic is their formants or resonating frequencies in the mouth. Of the pure vowels, [i], [e], and [E] have one low and one high formant, while [o] and [u] have two low formants. The vowel [a] is closest to neutral and, Vennard notes, contains little modification of the original timbre.[27] This is due to the two resonating cavities formed by the tongue in the mouth, as noted in Chapter Two.

In the extreme upper registers, singers are acting against the physics of their voices. This means that they have to modify vowels in order to prevent strain on the voice. The interested reader can pursue these topics further in Coffin's *Sounds of Singing* and *Overtones of Bel Canto*.

Exercises for Vowels

Because the theatre singer does not strive for acoustic perfection but for naturalism, they tend not to use many exercises related to vowels. All the books consulted for research focused on the classical voice.

Most teachers simply use their own voices or recordings to demonstrate what they want the student to do.[28] They may use words like "brighten", "darken", "round", "tall", or other words related to light or shape. Most techniques are kinesthetic to some degree.

The activities from *Sounds of Singing* as described above in the section on resonance are the most scientific activities found for the training of vowels.

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[27] Vennard, p.135

[28] Survey responses

Registration

In an 1841 letter, Manuel Garcia defines a *register* as

> a series of consecutive and homogenous tones going from low to high, produced by the development of the same mechanical principle and whose nature differs essentially from another sries of tones equally consecutive and homogenous produced by another mechanical principle.[29]

Barbara Doscher points out that this definition has remained largely unchanged, quoting Garcia (in an 1894 revision) Raymond Colton (1988) side by side. *Registration* is simply the choice of when and how to employ these different mechanics and sounds throughout the range.

Registration is a surprisingly contentious issue, not only between classical and musical theatre styles, but even between individual teachers. Throughout history, teachers have disagreed about the number and quality of registers.

The physiological foundations of registers are fairly well understood. The registers are a result of a balance between the thyro-arytenoids and crico-thyroids. The heavier mechanism is dominated by the bulking action of the thyro-arytenoids. The light mechanism is dominated by the contraction of the crico-thyroids, resulting in thinned vocal folds and a lighter sound.

Registration is one point of study in which terminology is very confusing. As previously noted, the heavy mechanism is called "chest voice" for both men and women. The lighter mechanism is called "falsetto" for men and "head voice" for women. This is likely due to the fact that the light mechanism is the modal register for women, and the element of the original Italian *falsetto* that means "fake" is not

[29] Manuel Garcia, A Complete Treatise on the Art of Singing, Part 1, translated by Donald V. Paschke

applicable. In men, the term "head voice" is sometimes used to refer to the mixture of light and heavy mechanism also called "mixed voice".[30]

Manuel Garcia, one of the most influential teachers of the 19th century, identified three registers: chest voice, falsetto, and head voice.[31] Vennard describes two distinct, overlapping registers with room to blend them,[32] and refrains from taking sides.[33] Even today, some teachers choose not to speak of registers at all, or to suggest that each note should be treated as its own register (an outgrowth of vowel modification *a la* Coffin).

Many teachers, however, follow the Vennard model. Beginning singers are taught that they have two registers: the low, heavy "chest voice" and the higher, lighter "head voice" or "falsetto". Vennard notes that these names seem to come from a misconception about the nature of their sounds:

> The late nineteenth and early twentieth century theoreticians were preoccupied with resonance…
>
> As an outgrowth of the fallacy that the voice at various pitches is augmented by resonance from various cavities, there developed an unfortunate theory of *registers*. There was a "head register" and a "chest register,"…In spite of the fact that Garcia said, "These names are incorrect" (p. 7), and associated the whole manner with laryngeal function, the idea gained currency that some tones are sung straight out of the top of the head, and others reflected off the "sounding board" of the chest. The effect of this ideology was that students sang their upper tones in one "voice", and their lower tones in another, and in the middle there was a regrettable problem of "blending the registers." In revulsion from this vocal schizophrenia, some

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[30] Robert Best, interview with the author, 11/1/2013

[31] Garcia, p. xlvii

[32] Vennard, p. 63

[33] Doscher, p. 172

> contemporary teachers discredit the whole idea of "registers" and are almost afraid to use the word.[34]

Regardless of their origin, these are the two terms most commonly used today. The terms *head voice*, *chest voice*, and *falsetto* will be used as defined above, and the terms *heavy* and *light mechanism* will be used when the two registers are contrasted in general.

The heavy and light mechanisms are a product of antagonistic forces in the larynx. As noted in Chapter Two the thyroarytenoids, or vocal folds, are lengthened through the action of the cricothyroids. The main action of the thyroarytenoids is to increase in thickness, rather than exclusively to shorten. When the thyro-arytenoids are more bulked, the heavy mechanism is more active. When they are more relaxed, the light mechanism is. The experienced singer is constantly working to find a balance between these two tensions that results in an easy, blended sound.

Because the light mechanism and heavy mechanism overlap by approximately an octave[35], the singer can more smoothly blend the two sounds. The elastic limits of the thyro-arytenoids are the reason the fuller heavy mechanism cannot be employed in the extreme high range.

Theatre and commercial singers, as a rule, employ more pure heavy mechanism farther up in their range.[36] In fact, there is a special technique used primarily by females in the theatre called "belting". This is a controversial technique that consists of carrying the fuller sound of the chest register into the middle and

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[34] Vennard, p. 17

[35] According to some; see Vennard, p. 63

[36] Pam Moore, survey response

upper portions of the treble clef to some degree. This added tension in an unusual range is worrying to many teachers. However, some teachers who specialize in theatre singing maintain that belting can be done healthily if the singer relies on the resonance adjustment more than the tension on the vocal folds. Barbara Doscher explains that the mechanics of belting are still not fully understood, and voice teaching can only go so far until it is.[37]

Exercises for Registration

Many teachers fold registration in with other techniques listed here. Pam Moore notes that theatre and commercial music techniques are paying more attention to register use than they may have in the past.[38]

Most classical teachers try to blend the registers across the overlapping range.[39] Some approach this by trying to bring the light mechanism down, while others work up from the heavy mechanism. Both techniques can be used for both men's and women's voices.

These different approaches work in mostly similar ways. In order to "bring the light mechanism down", teachers begin vocalizing in a range that requires the use of light. As they come down, the teacher encourages them to sustain the feeling of light mechanism as long as possible. Then, during rehearsal, the teacher asks them to recall that feeling of lightness in the use of the mixed voice. This results in a

[37] Doscher, 189

[38] Pam Moore, Survey Response

[39] Survey responses

mix that is typically more balanced toward the head voice. The technique to blend up from the chest voice works similarly, but skips the first step above. Instead, teachers work to lighten as they go up, which results in a blend that is balanced toward the chest voice.

AFTERWORD

The Voice as a Gestalt

The purpose of this thesis has been to dissect the mechanism and technique of singing and how it's taught. This was done in the context of the variety of styles employed today, with a focus on classical and commercial/musical theatre styles.

However, it is important to remember that all of these elements are simply parts of the whole. Singing is more than just breath, just phonation, just registration. Instead, it is the complex interactions of all of these phenomena that form the technique of singing. Barbara Doscher puts it this way:

> "When the voice works as a function unit, it allows singers to develop an extended range with an even scale, a seamless legato, secure intonation regardless of vowel, tessitura, and dynamic, sufficient transmission or projection of sound, and a wide palette of colors. These are the sensuous building blocks of their art. With these basic components, mastery of that art is possible. Without them, it is not. Ultimately, to achieve the gestalt or functional unity of the singing voice is the goal of all singers."[1]

Although it is necessary to understand the various components of the voice and vocalization, the true mastery of singing is only managed when all of these elements are employed in tandem. After long enough study, most of these elements become somewhat unconscious, and singing simply becomes an activity one can perform relatively effortlessly, like running, speaking, or playing a sport.

[1] Doscher, p. 213

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