



Research Report

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A Brief Discussion of the Potential Vocal Hurdles for Singers Who are Trans and Suggested Vocalises for Navigating a New Voice

by Gerald Gurs

The primary difference between assigned sex and gender identity is biological. One's assigned sex is determined both by the presence or lack of both internal and external sex organs and chromosomal data. One's gender identity is a self-perception centered on the state of being female or male, based on social and cultural norms. One's gender identity may be expressed through a culmination of presentations such as personal style, clothing, make-up, hairstyle, body language, and even vocal inflection and range. Additionally, a person may identify as gender non-binary (or gender-fluid), whereby one identifies between the male and female binary. Finally, a person may identify as agender—lacking a gender identity.

Singers who are trans, like all singers, are unique and require an individualized approach concerning vocal coaching and, in some cases, voice alteration.¹ A good number of classically trained singers who are cisgender engage in voice lessons before, during and after puberty. Those singers encounter only one puberty.

Contrarily, some singers who are trans make the decision to physically transition at some point after their biological puberty.² The effect is that singers who are trans may encounter an entirely new vocal experience as they discover a new instrument that has already undergone their biological puberty once and now is adapting to the introduction of either testosterone or estrogen. The decision to make a physical transition that matches one's internal gender identity happens at various ages depending on the person and can involve introducing the body to opposite-sex hormones. For those assigned female at birth (AFAB), testosterone is the opposite-sex hormone in question, and for those assigned male at birth (AMAB), estrogen. Other singers who are trans make the decision post-puberty; thus, the introduction of opposite-sex hormones in an attempt to cause physical change is coined "second puberty."³ The introduction of testosterone to the body (androgen therapy) results (for a majority of men who are trans) in a lowering of the voice's speaking and

singing pitches.⁴ Based on what is known about the biology of cisgender male puberty, voice pedagogues can, in many cases, successfully put men who are trans on similar vocal exercise tracks as for the adolescent boy's changing voice to keep the voice healthy and to coax the voice through this process.⁵

Women who are trans experience other physiological changes during hormone-based transition due to the introduction of estrogen compounds to their biologically-male bodies. Over time, one sees "softening of the skin, redistribution of body fat, breast development, decrease in muscle mass, cessation of male-pattern hair loss, atrophy of the genitals, and reduction of body hair."⁶ Estrogens rarely cause harm to the vocal folds of some female singers who are trans; however, female singers who are trans might seek speech therapy and voice modification therapy to raise the pitch of their speaking voice.⁷

A variety of possibilities exist for what one could expect of a woman's singing voice who is trans. A woman

who is trans may wish to forego any attempt at singing in an alto or soprano range due to the lack of ability (or interest) to facilitate the skills of biologically-male vocalists who sing in these ranges (i.e., a counter-tenor, falsettist, or a cisgender male soprano). In this case, a woman who is trans may present herself in every way as a woman, yet continue to sing beautifully as either a tenor, baritone, or bass. Other women who are trans, who possesses the skills necessary to sing in the alto or soprano ranges, may choose to both physically and aurally present as a woman, singing as an alto or soprano. One singer in the Translucent Voices survey⁸ reported having phonolaryngeal⁹ surgery and now can successfully perform up to E6 (Figure 1).

One cannot assume that phonolaryngeal surgery is an option for the majority of women who are trans, as it is both a risky and costly procedure (one in which a serious singer should thoroughly weigh the consequences of losing their voice before engaging). Access to healthcare and access to funding is prohibitive for many women who are trans. “One commonality seen in MtF clients who visit speech pathologists is that, for those singers, increasing the upper

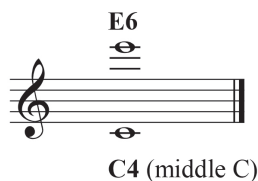


Figure 1

pitch range is a priority. Typically, clients come to speech therapy with a preconceived notion of what their voice should sound like, often based on hearing celebrities’ voices.”¹⁰

Vocal Hurdles for Transitioning Singers

Singers who are trans and transitioning face similar vocal, physiological, and psychological hurdles, though each individual’s experience is uniquely their own. Physically, something about the voice will change. The physical challenges may be due to the effects of opposite-sex hormones, but hurdles often exist because singers have formed bad habits while trying to raise or lower their speaking/singing voice by imitating the unprofessional advice of nontherapists giving advice online in places such as YouTube. One finds many examples of advice-giving nontherapists on YouTube, such as Miss London¹¹ who has over 97 thousand subscribers. Given its ease of access and absence of cost, the popularity of these video tutorials is understandable. Richard Adler, speech pathologist and contributing author to the book *Voice and Communication Therapy for the Transgender/Transsexual Client: A Comprehensive Clinical Guide*, adds,

Many TG/TS clients come to therapy having already attempted some ‘self-therapy’ through the use of videotapes made by nontherapists as well as following some YouTube video presentations. . . it becomes a matter of safety when

using techniques that have no evidence base or using therapy ideas without the guidance of professionals. . . it is imperative that clients do not unknowingly or unsuspectingly cause phonotrauma to their vocal folds and larynx without realizing the dangerous after effects.¹²

Some singers who are trans not only experience vocal hurdles due to hormone therapy but also due to psychological stressors. If singers who are trans (like most singers) are subject to certain adverse psychological factors, such as fear and stress, the psychological factors will manifest themselves physically in their singing voices. Psychosocial issues can often play a significant role in causing vocal misuse.

While female singers who are trans (excluding those singers who have elected to undergo surgery to shorten the vocal folds or those who took puberty-suppressing medications during their biologically male puberty) do not see a raising of speaking/singing pitch during transition, some speech pathologists can provide training to raise the speaking pitch of the trans woman’s voice. As vocal pitch and quality are important components to one’s identity for the trans female singer, voice feminization may be crucial to the singer’s psychological health. Many female singers who are trans have sought voice feminization through imitating the characteristically female sounds they hear in other speakers/singers. According to speech pathologist Shelagh Davies, one such feminine characteristic is a huskier, “whispy,”

sound. In one video blog, she advocates that the trans female client “work to develop inflection and variance in higher ranges of speaking.”¹³ The client is advised to “reach for a ‘whispy’ sound.”¹⁴ While this characteristic might be feasible for passing as female over the phone or in social conversation, a husky, breathy, sound is rarely desired by singers, as the vocal folds do not fully close during breathy phonation.¹⁵ If a singer is practicing that technique in their speaking voice, muscle memory will carry over into their singing voice, and the breathy tone quality will have to be corrected through a regiment of vocal exercises that help to build cord closure and easy onset utilizing forward vowels.¹⁶

Assisting Transitioning Singers in the Choral Rehearsal: Practical Applications

In the same way that speech therapists work with individuals to improve vocal quality, conductors and educators work in the rehearsal process to optimize the choral sound by instructing individual singers. Vocalists are part of every healthy choral program. This period of the rehearsal, often referred to as “warm-ups,” is vital not only for the ensemble to come together in one concept of sound and style, but it also trains individual singers to listen to the voice, to experiment with and challenge the voice. The conductor-teacher should work to foster a safe environment during warm-ups where all singers feel comfortable to explore their voices, even allowing the voices to crack without embarrassment.¹⁷

To address breathy tone (referred to as hypofunctional phonation), voice pedagogue James C. McKinney suggests the following types of vocal exercises:

- Humming
- Using more energy by increasing volume
- Imitating an opera singer
- Establishing good posture and breathing
- Vocalizing on forward vowels
- Vocalizing with nasal consonants
- Imitating a tight sound as a means to an end¹⁸

Because some female singers who are trans and transitioning choose to sing in their head voice/falsetto, they may essentially be considered beginning singers who are learning to access new parts of their voices, requiring different vocal coordination than their modal voices. These vocalists should avoid imitation of singers in ways that require substantial laryngeal control (i.e., in opera, in florid R&B passages, and at generally loud volumes). For beginning singers, these techniques have the potential to create a new vocal hurdle: hyperfunction of the voice, where the correction of breathiness leads to strain and tightness. For instance, ease of singing in falsetto will take time to develop and should not be encouraged at excessive volume levels during early stages of vocal development.

Below are three types of vocalises for the female singer who is trans: range extension, cord closure, and breath control.¹⁹ The exercises are based on Alexandros Constansis’ experiences as a trained singer who transitioned; they are designed to not be excessively difficult. That way, both beginning and experienced singers can easily grasp the concepts and have early mastery of the goals.²⁰ Constansis says, “there is a certain period of time during which only mild exercises should be followed, since vigorous ones during this time risk damaging the developing voice.”²¹ Both transitioning



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and non-transitioning singers can perform the exercises below. While Constans' experience is that of a man who is trans, and the aforementioned challenges of breathy tone and breath support are addressed in these exercises, thus making them suitable for both male and female singers who are trans.

Range Extension

The first exercise (Figure 2) is for range extension. Davies recommends low to high sirens, beginning with tongue trills first (continued rolling of [r]), then moving to forward vowels such as [i].²² Figure 2 is an example that incorporates Davies' ideas with the flexibility to move the siren pattern up and down throughout the exercise so a singer builds up to increasing pitch capability. The exercise starts in the low-middle voice and proceeds upward. The exercise might not be executed to the extent of an octave if that ability lies outside an individual singer's comfort level. The exact pitch is less important than the vocal cords stretching gently to reach new, higher, pitches, and, of course, the pitch sets or key can be modified to suit the needs of an individual voice/singer.

Adler also advocates the use of glissandi/sliding as a range-extension and vocal stretching exercise.²³ He suggests working on the vowels [a] and [u] while working up and down, repeated, in middle-level octaves. When experimenting with glissandi/slides, exact pitch is less important than clarity/smoothness of tone and consistency of phonation. Allow singers to focus on phonation (vocal fold approximation) and range

extension, rather than pitch accuracy. This will be facilitated by the use of closed vowels such as [i] and [e].

Strengthening Vocal Fold Closure

Breathiness is a vocal hurdle that singers who are trans both female and male face. Many women who are trans will speak without support—trying to imitate a stereotypically-feminine sound.²⁴ While men who are trans and transitioning encounter breathy tone due to the thickening of the vocal folds. McKinney advocates the use of a combination to forward vowels with nasal consonants to bring clarity to and correct that phonation.²⁵ The exercise below (Figure 3) incorporates both the nasal consonant [n], and the forward vowel [i]. Its design is intended to both work the middle-voice upward through descending patterns while gradually increasing the duration the vocal folds vibrate without the aid of an initial consonant. Both the [i] vowel and the nasal consonant encourage the feeling of

forward singing. Strengthen vocal fold closure by gradually removing more of the initial consonants.

Another exercise to effectively coax cord closure is shown in Figure 4. The use of [hŋ] not only brings the vocal folds together in a hum, it also raises the soft palate for proper space when opening to a vowel. This exercise also benefits trans male singers, as those singers often struggle with vocal fold approximation.²⁶ The exercise begins with a sole [hŋ] so that singer can feel the sensation of complete cord closure throughout the pattern. Once the singer has performed the exercise on [hŋ], the teacher graduates the singer to [hŋi] where the forward vowel [i], is sustained after initiating cord closure with the hum-inducing [hŋ].



Figure 2. Range Extension Exercise



Figure 3. Vocal Fold Strengthening Exercise 1



Figure 4. Vocal Fold Strengthening Exercise 2

Building Breath Control and Releasing Jaw Tension

Finally, like all singers, singers who are transitioning should be working to create stable breath support. The exercise in Figure 5 is useful for building breath capacity and stamina. The exercise begins with short

bursts that engage the diaphragm, then slowly build to longer, sustained hissing. The next phase of this exercise begins when the teacher asks the singer to perform the same exercise on [ts]; more breath will escape during the exercise, thus demanding more of the singer's breath control.

The figure consists of four musical staves, each starting with a double bar line and a 4/4 time signature. The first staff shows four quarter notes, each followed by a quarter rest, with the syllable 'ts' written below each note. The second staff shows four quarter notes, each followed by a quarter rest, with the syllable 'ts' written below each note. The third staff shows two quarter notes, each followed by a quarter rest, with the syllable 'ts' written below each note. The fourth staff shows two quarter notes, each followed by a quarter rest, with the syllable 'ts' written below each note.

Figure 5. Breath Control Exercise

The figure consists of three musical staves, each starting with a double bar line and a key signature of one sharp (F#). The first staff shows eight quarter notes, each followed by a quarter rest, with the syllable 'je' written below each note. The second staff shows four quarter notes, each followed by a quarter rest, with the syllable 'je' written below each note. The third staff shows four quarter notes, each followed by a quarter rest, with the syllable 'je' written below each note.

Figure 6. Jaw Tension Release Exercise

The figure shows a musical staff starting with a double bar line and a key signature of one sharp (F#). Above the staff, the tongue positions are labeled: N, S, E, W, N, S, E, W, N, S, E, W, and neutral. The staff contains a series of notes corresponding to these positions, with the syllable '[ae]' written below the first note.

Figure 7. Tongue Tension Release Exercise

Because the larynx does not develop further while the vocal folds lengthen and thicken in men who are trans,²⁷ many transitioning singers who are male may incorrectly substitute low laryngeal singing and breath support with jaw tension and retracting the tongue.²⁸ Below are some exercises that can help male singers who are trans release tongue and jaw tension. A mirror is helpful for these exercises, as the singer will be able to see when the jaw is clenching or dropping out and downward (jaw tension), or when the tongue is retracting dorsally into the mouth (tongue tension). To assist in releasing jaw tension, singers may practice two simple exercises: massaging the jaw and massaging the jaw while engaging in other vocalises and practicing a yawn while the head is tilted back. Yawning while tilting the head backward will simulate the sensation needed for successful jaw opening when the head is upright—the jaw dropping down and backward. The first exercise in Figure 6 is designed to keep the jaw from being static while employing the forward vowels. The exercises in Figure 6 are progressively designed so that the jaw moves less frequently as the student masters each section of the exercise. Teachers should start this exercise in a low-middle range, and work up to a high-middle range.

The exercise shown in Figure 7 is designed to reduce tongue tension; it does not focus on beautiful tone. Rather, the focus is on a freeing of the tongue when it might otherwise pull back into the mouth. The singer will sing on the vowel [æ] while imagining the inside of their mouths

as having the NSEW points like a compass. When a note changes, the singer changes the position of their tongue, starting with North (top alveolar ridge), then South (lower alveolar ridge), then East (right cheek), and finally West (left cheek). This rotation repeats throughout the exercise.

External and Psychological Factors Contributing to Vocal Struggles

Conductor-teachers should be aware that the vocal hurdles associated with singers who are trans are not always directly related to hormone therapy. As with all singers, external influences such as lifestyle choices and mood can also manifest in the voice as vocal maladies. What one does outside the rehearsal has an impact on the voice in rehearsal. Adler states, “The human voice is

an instrument that can never be put away in its case, so to speak. Whatever we do with our entire body, day and night, has the potential for affecting the voice.”²⁹ For example, some male singers who are trans, may choose to wear a binder—a restrictive garment that compresses the breasts against the torso to give the illusion of a flat torso. The binder may be so restrictive that the rib cage is not allowed to expand freely during inhalation, thus resulting in a shallow breath and, ultimately, poor overall breath support.

Mental health influences vocal health. Psychological factors contribute to vocal hurdles for all singers. One can expect that the vulnerable trans community is more susceptible to having to fight psychological hurdles than cisgender singers, and data reveals that people of color who are trans are at an even higher risk of circumstances leading to negative-

ly impacted psychological health.³⁰ Conductors who foster a welcoming rehearsal space should hope for their singers who are trans to have a reprieve from the outside world during that time of music-making. Adler adds, “Psychosocial issues can often play a significant role in causing vocal misuse. Depression, fear, guilt, embarrassment, and anxiety are often etiological culprits when dealing with TG/TG [transgender and transsexual] clients.”³¹ Adler outlines five prominent psychosocial-associated emotions that contribute to vocal problems in singers: fear, guilt, rage/anger, denial, and depression/anxiety (see Table 1).³²

Based on the LGBT Task Force survey of over 6,000 personas who identify as trans in the United States, statistics exist to support the fact that a high percentage of drug and alcohol abuse exists in the trans community, thus singers who are trans may

Table 1. Five Psychosocial-Associated Emotions that contribute to Vocal Problems in Singers

Emotion	Possible Cause	Possible Outcome
Fear	Losing job, being outed, losing family/friends	Chronic cough leading to damage to the laryngeal tissues, hysteric aphonia ³³
Guilt	Family strife, rejection by family, religion	Vocal polyps/nodules, spasmodic dysphonia, chronic throat-clearing ³⁴
Rage/Anger	At God/religion, family, “the system,” peers, or self	Severe vocal misuse/abuse, poor singing range, obtrusive yelling/screaming, vocal polyps/nodules
Denial	“I don’t need help.” “My voice always gets this way.”	Poor singing range, excessive throat-clearing
Depression/Anxiety	“I’m afraid to sing.” “Nobody will help me.”	Whispering, lack of motivation to speak/sing

turn to drugs/alcohol in an effort to numb the stressors in their lives.³⁵ Drug and alcohol abuse both create vocal problems and intensify preexisting vocal problems.³⁶ The primary adverse effect of drugs and alcohol is the drying out of the vocal folds, resulting in hoarseness and extensive coughing. A more severe outcome of substance abuse is the loss of muscle sensation concerning the vocal folds, thus losing the ability to feel when the voice is being misused.

While the conductor-teacher can create an inclusive environment in their rehearsals to reduce the potential that singers who are trans are having experiences leading to possi-

ble adverse vocal afflictions, the conductor-teacher has little control over the experiences of singers who are trans outside the classroom. Some singers who are trans carry emotional burdens that impede their vocal progress. These singers may require a combination of approaches including solid vocal pedagogy in the rehearsal, working sessions with a speech pathologist, and the help of a mental health professional. Adler recommends that singers who are trans be matched with speech pathologists who possess:

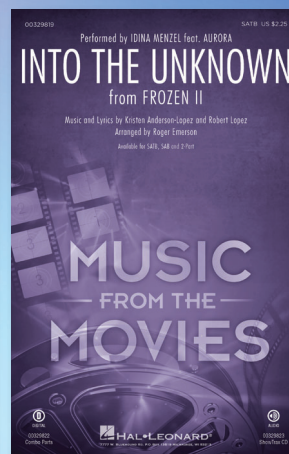
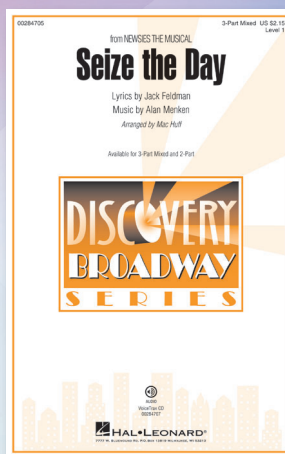
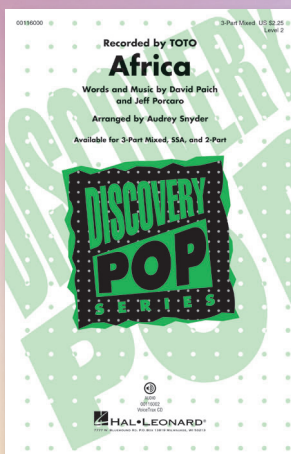
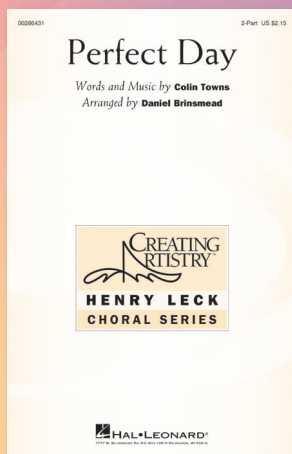
- knowledge and experience as a singer,

- the ability to sing in tune, without the aid of accompaniment,
- the ability to read music, in both treble and bass clefs,
- an understanding of the keyboard and music notation system,
- the ability to identify, describe, and demonstrate differences in vocal resonance within their own vocal range,
- an understanding of the concept of passaggio, and

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- an ability to demonstrate vocal exercises, using easy onset of vowels.³⁷

Conductor-teachers should also refer trans singers to health care professionals who are either known to be allies of the LGBTQ+ community or who can perform professional responsibilities to the client without bias or prejudice based on personal beliefs about the transgender community.

Summary

In summary, singers who are trans and transitioning need three categories of fundamental exercises to both build their new voices and maintain good vocal health. First, exercises for both male and female singers who are trans should be purposed toward the development of proper diaphragmatic breathing. Second, both male and female singers who are trans should work with forward, closed vowels and humming to encourage full vocal fold approximation. Lastly, for male singers who are trans, great importance lies in vocalizing from the head voice downward on descending patterns to create a smooth vocal line without cracking or breaks.

Risky surgical procedures to shorten the vocal folds can change the speaking and singing ranges (making them higher) of post trans female singers. Many female singers who are trans will neither want to risk that sometimes-dangerous surgery nor will have the financial means to afford such a procedure. Most often, conductor-teachers will

be working with female singers who are trans and whose voices fall within the tenor/bass categories. For some female singers who are trans, singing tenor or bass poses no cognitive dissonance to the outwardly female presentation. For other singers, matching their outwardly female presentation to a stereotypically female sound is important. In addition to helping a student with healthy vocal exercises, the conductor-teacher can assist by choosing repertoire that is neither gender nor romantically/sexually specific, thereby allowing individual singers to contextualize the text to their own narratives. Stereotypes exist in Western culture about the highness or lowness of the voice in conjunction with masculinity or femininity. Conductor-teachers can avoid those stereotypes. Additionally, conductors need not unnecessarily project gender onto choral sections (e.g. addressing the alto section by “ladies,” or the bass section by “men,” for example). Since 2015, the *Choral Journal* has featured articles regarding transgender singers. Given that the *Choral Journal* specifically targets choral scholars and educators, the prominence of transgender issues in its publication provides clear evidence of public interest in knowing more about creating healthy, inclusive, environments for transgender singers, as well as singers who do not fit into gender stereotypes rooted in older choral traditions. In 2017, Earlham College hosted the Transgender Singing Voice Conference at Earlham College in Richmond, IN. Former professor of vocal and choral studies, Danielle Steele, orga-

nized the conference. Steele offered a succinct summation of the importance of this topic: “Trans issues are important because they represent someone’s life, and safety is universal.”³⁸ It is hoped that this article has offered perspectives and techniques purposed toward enhancing Trans representation within the safety of the choral rehearsal environment. ◻

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NOTES

- ¹ An example of voice alteration is when a trans woman meets with a speech pathologist to train the voice to speak at a higher pitch in an effort to sound more stereotypically feminine.
- ² Jamie M. Grant, Lisa A. Mortet, Justin Tanis, Jack Harrison, Jody L. Hermon, and Mara Keisling, “Injustice at Every Turn: A Report of the National Transgender Discrimination Survey,” Washington: National Center for Transgender Equality and National Gay and Lesbian Task Force, 2011: 26.
- ³ “Information on Hormone Therapy,” University of California, San Francisco, accessed December 11, 2019, <https://transcare.ucsf.edu/article/information-estrogen-hormone-therapy>
- ⁴ Christie Block, “Masculine Voice,”

- speechvoicelab.com (blog), accessed January 25, 2020, <https://www.speechvoicelab.com/masculine-voice>.
- ⁵ Alexandros Constansis, "The Changing Female-To-Male (FTM) Voice," in *Radical Musicology*, Vol. 3 (2008): 32 pars., May 17, 2009.
- ⁶ Richard Kenneth Adler, Sandy Hirsch, and Michelle Mordaunt, *Voice and Communication Therapy for the Transgender/Transsexual Client: A Comprehensive Clinical Guide*. 2nd edition (San Diego, CA: Plural Pub., 2012): 105.
- ⁷ *Ibid.*, 116.
- ⁸ The Translucent Voices Survey was part of the author's dissertation research. The author surveyed over 150 trans and cisgender singers from the United States and Canada.
- ⁹ Phonolaryngeal surgery is a process whereby the vocal folds are shortened to attempt to raise the pitch of the voice.
- ¹⁰ Adler, et al, 130.
- ¹¹ Miss London, "Vocal Training for Transgender Women (How I did It)," YouTube (vlog), accessed January 25, 2020, <https://www.youtube.com/watch?v=CuebZ3uHk8Y>.
- ¹² *Ibid.*, 139.
- ¹³ Trans singers must take precaution when using voice feminization video blogs such as YouTube videos. In some cases, the creators of the video blogs are not professional speech pathologists and, therefore, have no training in voice therapy.
- ¹⁴ Shelagh Davies, "Daily Voice Training," <https://vimeo.com/channels/310588>.
- ¹⁵ Richard Miller, *The Structure of Singing: System and Art in Vocal Technique* (New York: Schirmer Books, 1996), 3.
- ¹⁶ The vocal folds are closest together during vibration when speaking/singing on closed vowels. The [i] vowel creates the most closure of the vocal folds.
- ¹⁷ Terry J. Barham, *Strategies for Teaching Junior High & Middle School Male Singers: Master Teachers Speak* (Santa Barbara, CA: Santa Barbara Music Publishing, 2001), 13.
- ¹⁸ James C. McKinney, *The Diagnosis and Correction of Vocal Faults: A Manual for Teachers of Singing and for Choir Directors* (Long Grove, IL: Waveland Press, Inc., 1994), 86.
- ¹⁹ The exercises are notated in the treble clef; however, the specific octave of their practice is singer-dependent.
- ²⁰ Alexandros Constansis is a speech pathologist and operatic singer who is a trans man. He attributes his vocal success largely to choosing to take doses of testosterone, which most closely follows the timeline of cisgender male puberty. In contrast, many trans men desire a quicker transition and receive doses of testosterone at high levels, thus creating disregard for the singer's ability to gradually gain facility of the changing voice.
- ²¹ Alexandros N. Constansis, "The Changing Female-To-Male (FTM) Voice" *Radical Musicology*, Vol.3 (2008), 32 pars, (May 2009)..
- ²² Shelagh Davies, "Daily Voice Training," <https://vimeo.com/channels/310588>.
- ²³ Richard Adler et al, 429.
- ²⁴ Shelagh Davies, "Daily Voice Training," <https://vimeo.com/channels/310588>, Accessed September 2017.
- ²⁵ McKinney, 86.
- ²⁶ Male singers who are trans and transition post-puberty commonly struggle with cord closure because the introduction of testosterone affects the size of the vocal folds but does not enlarge the larynx to the capacity to handle the larger vocal folds as is the case with cisgender male puberty.
- ²⁷ If testosterone is introduced to the vocal folds of a man who is trans after biological puberty, the vocal folds will thicken and lengthen; however, the larynx will not grow with the folds, as is the case with biological male puberty. Because of this, Constansis calls the "entrapped larynx."
- ²⁸ During cisgender male puberty, the cartilage of the larynx expands to provide room for the longer, thicker vocal folds.
- ²⁹ Adler et al., 417.
- ³⁰ Grant, et al., 46.
- ³¹ *Ibid.*, 141.
- ³² *Ibid.*
- ³³ Aphonia is the disability to speak or sing.
- ³⁴ Spasmodic dysphonia is confusion of the adductor/abductor muscles controlling the vocal folds caused by a central nervous system disorder.
- ³⁵ Grant, et al., 7.
- ³⁶ "Advice for Care of the Voice," Texas Voice Center, 2002, Accessed, December 11, 2019, <http://www.texasvoicecenter.com/advice.html>
- ³⁷ Adler et al, 413-414.
- ³⁸ Danielle Steele, Transgender Singing Voice Conference at Earlham College in Richmond, IN, 2017.