A Systematic Approach to Voice

The Art of Studio Application

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Preface

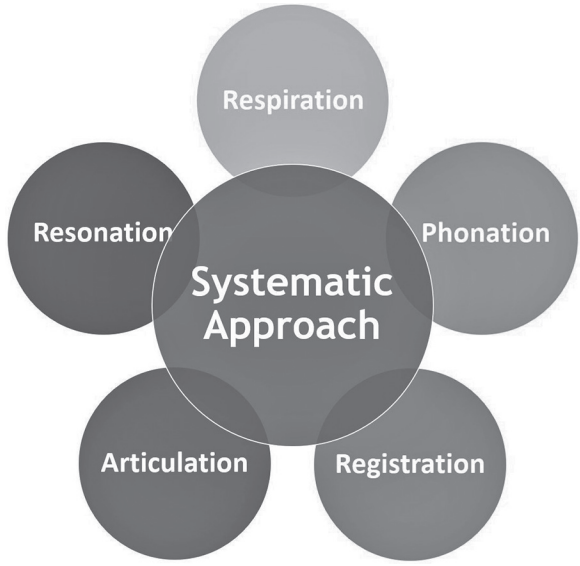
I began teaching singing more than 35 years ago during my sophomore year of college. I am certain that I was far too young and inexperienced to be doing so and have often joked that those early students deserve a refund. My wonderful first college voice teacher at Pacific Lutheran University, Mrs. Barbara Poulshock, had faith that even as a young singer, I was capable of providing some insights to a group of students at a local high school. I could not have known the course that experience would set for my life. In the hubris of youth, I was going to be a SINGER, not a teacher—of that I was certain! And yet, through college, as a young emerging professional opera singer, and still today, I continue to passionately and gratefully make a living by teaching singing.

It is the essence and totality of those years that has led me to dare to write this book, a daunting task indeed. Before undertaking such a journey, one must ask what can possibly be contributed to the existing abundance of knowledge on teaching singing? I offer only this, through years of study with renowned voice teachers; earning a BM, MM, and DMA in vocal performance from prestigious universities; countless hours in lessons, coachings, and practice rooms; professional singing experience; relentless pedagogical study; extensive teaching experience (on average, 36 contact hours a week) both at the university level (graduates and undergraduates) and in independent studios (classical and CCM genres; teenagers, professionals, and avocational); and working in affiliation with a medical voice team to rehabilitate singers with injuries and pathologies, I have acquired a great deal of education, experience, and insight that I hope is useful. There is an ongoing need within the voice teaching profession to disseminate voice science knowledge by providing a pedagogic framework within voice studio application.

Some of what inspired the approach of this book can be attributed to Scott McCoy's seminal work, *Your Voice: An Inside View*.

I first discovered his book at a National Association of Teachers of Singing (NATS) conference shortly after its publication. As an Indiana University trained singer (BM and MM), I had previously taken a pedagogy course using Dr. Ralph Appleman's book *The Science of Voice Pedagogy*. However, with eyes on a singing career, I was not yet passionate about voice science since I did not understand the correlation to its application. Over the years, I read other influential pedagogy books. *Your Voice: An Inside View* uniquely resonated with me due to its structure, organization, and layout. The book presents science-informed principles of acoustics (resonance), respiration, phonation, articulation, and registration in an organized and accessible fashion. Its structure provides fact-based information without personal interpretation, philosophy, or teaching methodology. The lack of fixed teaching ideology was empowering because it allowed me to augment years of practice-based experience with fact-based information. It was neither in conflict to my teaching approach, nor did it require me to mold it into another's methodology. Instead, it provided evidence for answers I had been seeking. This enabled me to expand my knowledge, intuition, and creativity as an experienced teacher.

A Systematic Approach to Voice: The Art of Studio Application presents an organizational template integrating science-informed principles of voice production and pedagogical application in the training of singing artists. Of its eight chapters, five focus on the systems of voice production: respiration, phonation, registration, articulation, and resonance. Each of these voice system chapters contains an overview of the mechanics of its designated system and key points for teachers: "teacher takeaways." The unique focus of the book is to provide strategies for studio application by means of vocal exercises framed within a systematic approach.



The history of voice pedagogy is compelling; it is a field fraught with misinformation and folklore. Yet, many historical pedagogues set a course for a singing technique that still holds, even if some of the semantics require translation through a fact-based approach. It is a privilege to carry on the legacy of great teaching artists. My ideas are the synthesis of so many extraordinary teachers, singing colleagues, voice scientists, laryngologists, speech-language pathologists, and authors to whom I am indebted. Most importantly, I am deeply grateful to each student who has collaborated with me on the journey to efficient and artistic singing!

Chapter 4

A Systematic Approach to Phonation

Voice is our primary means of expression. In combination with our face and hands, it signals who we are, what we want, and how we feel. . . .Throughout life, voice continues to change, reflecting our culture, personal habits, conditions of health, and age.

—Ingo R. Titze, *Principles of Voice Production* (1994), p. xvii

Overview of Phonation

Phonation is the production of vocal sound. A basic overview of the phonatory system requires a broad understanding of vocal fold structure, principles of oscillation, and laryngeal framework. Vocal folds (sometimes called vocal cords) consist of structured layers of tissue: epithelium, lamina propria (superficial, intermediate, and deep), and the thyroarytenoid muscle (Figure 4–I). Each layer has a different degree of viscosity and density that allow the surface (referred to as the cover) to move independently of the deeper layers (referred to as the body) (Fujimura, 1981; Hirano, 1974, 1977). It is this structured composition that enables the vocal folds to oscillate in a wavelike fashion, creating what is often referred to as the mucosal wave.

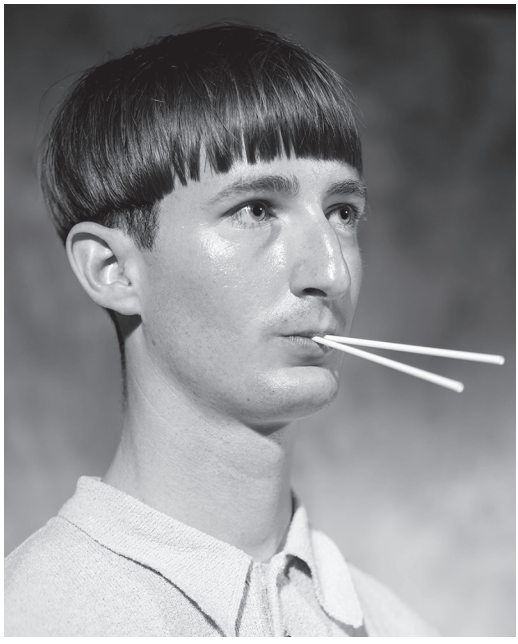
Oscillation, or vibration of the vocal folds occurs due to muscle activity that initiates adduction (closing of the glottis), biomechanics

3. **Vocal Tract Inertance**
   Vocal tract inertance describes a condition in which increased acoustic pressure above the vocal folds during the opening phase of vibration and decreased acoustic pressure during the closing phase help to create a push–pull dynamic of the vocal folds. This facilitates sustained oscillation with lower subglottal pressure (Titze, 2006); in other words, less effort. Inertance also impacts acoustic output since the vocal tract posture either boosts or dampens the harmonics produced by the vocal folds. To facilitate sustained vocal fold vibration and amplify the acoustic output, singers want to achieve a lot of inertance at a wide range of frequencies. When singing with the vocal tract in the shape of a semi-occlusion, this acoustic inertive effect is created and therefore vocal tract resonances are lowered. The inertive reactance maximizes interaction between the vocal folds (source) and the vocal tract (filter) as sound waves are reflected back to the source, encouraging a boost in acoustic energy across a wide range of pitches (Sundberg, 1987; Titze & Laukkanen, 2007; Titze & Verdolini Abbott, 2012).

Diameter of Straw or Tube

The most frequent questions when considering SOVTs that utilize a straw or a tube pertain to the diameter, length, and material. The diameter of the straw is the most important consideration. The smaller the diameter of the straw, the greater the flow (air) resistance, which means the higher the intraoral pressure (Story, Laukkanen, & Titze, 2000). Choosing the correct size is critical to a positive outcome. Singers may want to begin with a 6-mm straw (drinking size) and, over time (one session to a few months), move to a 3 to 4-mm straw. Two small 3 to 4-mm straws work well during the transition (Figure 4–IV). One study noted that the larger 6-mm straw provided more stability in men than women (Maxfield, Titze, Hunter, & Kapsner-Smith, 2014). This outcome may be explained by the different dimensions between the male and female vocal tract and glottis. It appears that the resistance to the airflow provided by the semi-occlusion must be at a level similar to that produced by the glottis. Anecdotally, most women progress to a smaller 3 to

A



B

Figure 4–IV. Images of 6-mm drinking straw (**A**), two 3 to 4-mm straw (**B**), and one 3 to 4-mm straw (**C**) used in straw phonation. *continues*

C

Figure 4–IV. *continued*

4-mm straw while men continue to use the larger 6-mm straw to achieve the desired outcome. Singers are advised to carry a variety of straw diameters since voice demands and voice quality vary from day to day. Singers must implement daily self-assessment to determine the appropriate size of the straw needed each practice session.

Length of Straw or Tube

There does not seem to be a significant difference in the length of the straw or tube on vocal efficiency (Mills, Rivedal, DeMorett, Maples, & Jiang, 2018). A longer straw or tube creates slightly more acoustic inertance when the diameter is larger because the flow resistance occurs at both the entry and partially throughout the implement. However, because the straw already creates a semi-occluded vocal tract, the effect is negligible (Titze, 2018a). In a narrow straw, there is so much resistance created just from airflow

entering the straw that resistance along the length of the straw makes little difference.

Material of Straw or Tube

A discussion about the straw or tube material centers around scientific evidence, hygiene, convenience, and personal preference. Glass, metal, and plastic tubes all have greater wall stiffness than the soft tissue within the vocal tract, so these materials do not produce or absorb much energy (Titze, 2018a). Therefore, the material of the tube matters very little. For purposes of hygiene, some singers prefer glass or metal tubes since they can be washed. The challenge with glass tubes is that the material is more fragile, less convenient, and more expensive. For environmental considerations, compostable straws could be considered. It must be noted that the sensory experience of sympathetic vibrations alters as a result of the various material. The singer's perception of the sensory feedback will help guide the selection. Plastic straws are becoming outlawed in some U.S. cities, which means an alternative plan may be inevitable. Until that time, they remain the most accessible and this author's preferred option.

Straw or Tube in Water (Water Bubble Phonation)

Resonance tube phonation in water, sometimes called water bubble phonation or cup bubbles, is an SOVT vocal exercise that was first introduced as a method for voice therapy by Antti Sovijärvi in 1965 (Enflo, Sundberg, Romedahl, & McAllister, 2013). By submerging one end of a tube in the water while voicing through the other end, a semi-occlusion is achieved. As with other SOVT exercises, phonating with a tube immersed in water creates high flow resistance, which leads to an increase in intraoral pressure and, therefore, a decrease in phonation threshold pressure. The deeper the immersion in water, the more flow resistance increases (Wistbacka et al., 2018). One study compared a glass resonance tube (RT) and silicone Lax Vox tube (LVT) while submerged in water. The researchers observed that flow resistance differed slightly (lower with LVT than with RT) and that high intraoral pressure oscillation

with LVT immersed in 2 cm of water may offer stronger massage effect on the vocal folds (Tyrmi, Radolf, Horáček, & Laukkanen, 2017). Although scientific observation offered slight differences, singer's varying sensory feedback was an important consideration.

Another study noted significantly increased collision threshold pressure (CTP; the minimal pressure required to initiate vocal fold collision). Although the reason is not clearly understood, a plausible explanation is the potential for biomechanical property changes on the vocal tract walls, including the vocal folds, due to the pulsating intraoral pressure changes (static and oscillating components of back pressure) from the water bubbles that may have a massagelike effect (Enflo, Sundberg, Romendahl, & McAllistera, 2013). According to this study, a resonance tube in water also tended to cause audible improvement of perceived voice quality as evidenced by perceptual ratings of expert listeners. In particular, singers who either did not practice singing daily or those who were rated as less experienced had a more pronounced improved perceptual effect.

Although Titze has not yet studied the effect of the bubbles from water immersion in reference to laryngeal function, he states, "the unsteadiness of the pressure associated with the air bubbles does propagate to the larynx, producing a low-frequency modulation that may, or may not, have therapeutic value" (Titze, 2018a).

The studies that have researched the effects of water immersion on the voice tend to use a larger diameter tube, between 8 and 12 mm. While the larger-diameter tube still lengthens the vocal tract, it offers no air resistance by itself when voicing. By placing one end in water, singers receive the benefits of SOVT exercises due to the weight of the water, while still allowing a larger mouth opening necessary for singing. Gaining the benefits of SOVT exercises with a mouth shape closer to that needed for singing makes water bubbles an excellent tool in the voice studio. Practice-based experience and singer feedback make water bubbles one of this author's favorite SOVT exercises.

A singer's self-perception of vocal well-being cannot be underestimated. It is commonly reported that there is a sensation of a laryngeal massage effect immediately following water bubble vocal exercises. The sensory feedback reveals that the larynx feels more relaxed, which may indicate lower vocal effort and thereby improve efficiency in their singing. The production of the

water bubbles is also extremely useful in providing a singer with audible and visual feedback. This is helpful in assessing vocal production and exploring the vital dynamic between the systems of respiration and phonation.

Hardware stores have an excellent supply of flexible silicone tubes with a variety of diameter options. Guided by the above-mentioned studies, begin with approximately a 9-mm diameter silicone tube cut at 10 to 12 in. in length. The depth of immersion in the water will vary depending on the diameter of the tube and the singer's individual needs. A water depth of 1 to 3 in. seems to be a viable starting point with potential modification to deeper or shallower immersion based on the singer's feedback. A water depth that does not produce excessive resistance is desired, yet the tube or straw must be immersed to some degree to receive the benefits. The advantage of making a purchase from a hardware store is that the tube may be individually cut at a longer length than that of a typical straw. The longer length tube is often easier to navigate in the water bottle. Most importantly, the longer tube encourages proper neck alignment and posture while performing water bubbles, whereas with a shorter straw, singers may tend to pull their neck to a forward, misaligned position. A water bottle or container that is narrower at the top than the bottom and that is only half-full of water is best for practical reasons. A larger diameter straw such as a regular drinking size or even larger bubble tea straw may also be used. The choice of straw will require alterations in the depth of water immersion as a result of the diameter.

Semi-Occluded Vocal Tract (SOVT) Exercises

- Position and shape the vocal folds for efficient voicing
- Encourage balanced vocal onsets (gentle adduction) and discourage hard glottal onsets (forceful and abrupt closure)
- Prevent vocal fold hyperadduction (squeezing too firmly together)
- Provide a sensation of having had a laryngeal massage

- Create stability in laryngeal height, neither unnecessarily raised (elevated) or lowered (depressed)
- Elicit sensorial feedback of sympathetic vibrations of facial tissue, which singers associate with voice production that optimizes a resonant vocal tone
- Encourage an intermediate state of adduction that leads to a lower phonation threshold pressure; this aids in developing "mixed" registration as a baseline of sound production from which to build on
- Maximize acoustic energy while minimizing vocal fold collision force
- Aid in training register transitions and expanding the vocal range

The Use of an Anesthesia Mask to Facilitate an SOVT Posture

An anesthesia mask is another option for facilitating a semi-occluded vocal tract posture (Figure 4–V). The benefit of an anesthesia mask is that it allows singers to use connected speech, something not afforded by a straw or tube. The anesthesia mask provides a firm seal around the nose and mouth, and the fingers (or palm) placed over the opening of the mask provide a great deal of control in the amount of occlusion that can be achieved. Singers may place their fingers over the mask opening and spread them to the degree needed to comfortably create the occlusion; this additionally allows for the singer to inhale without the need to move the hand. A recent study using anesthesia (ventilation) masks to ascertain benefits with dysphonic subjects and normal voice subjects concluded that immediate positive effects could be produced by connected speech phonatory tasks (Frisancho et al., in press). The ventilation mask seemed to produce a more efficient phonation and easy voice production.

Anecdotally, this author has used the ventilation mask with singers and thus far garnered mostly positive feedback. Some singers perceive extreme benefits and others are uncertain. As more practice-based evidence is acquired, the anticipation is that it becomes a regular tool in the studio since it enables the production