VOLUME 23, ISSUE 2

The Voice

The Voice

VOICE OF THE EDITOR

Kim Steinhauer, PhD

IN THIS ISSUE:

BREATH IN VOICE EDUCATION AND REHABILITATION

BY KIM STEINHAUER, PHD

Current research reveals a heterarchical interplay among Power, Source, and Filter for voice production; yet, Breath (Power) often leads the way in exercises used in training and treatment. This issue of The Voice Foundation Newsletter is devoted to the role of Breath in Voice education and rehabilitation. Our contributors, Hadas Golan, Diane Gaary, Filipa Lã, and Johan Sundberg provide insights into their application of breathing principles in their respective disciplines. They generously share how deeply they explore strategies and scientific foundations of respiratory function with their students and patients.

Our "Tools for your Voice Box" features expert advice from international opera mezzo soprano, Marianne Cornetti. Not only did she describe her favorite warm-up, but she also shared her daily regimen that epitomizes the effective training habits highlighted in motor control and learning research. It's clear that her *superior* focused and deliberate practice has yielded *superior* performance and longevity in the vocally athletic and demanding world of Opera.

KIM STEINHAUER, PHD

President
Estill Voice International

Voice of the Editor

PHYSIOLOGICALLY OPTIMAL BREATHING IN VOICE TRAINING

By Hadas Golan, MS, CCC-SLP

In recognition of the influence of breathing on vocal function, breathing tasks frequently are included in voice lessons and therapy. Voice professionals do not typically have extensive training in respiratory physiology and disordered breathing, and little attention has been paid to the breathing pattern of the voice client. Dysfunctional breathing (DB) is common but poorly understood and may go unrecognized and untreated by practitioners.

Breathing involves much more than the mechanics of moving air in and out of the lungs to support the voice. We regulate our biochemistry through breathing: therefore, breathing is fundamental to optimal health and physical function. Breathing patterns respond to mental, emotional, and physical states and often change when a person is sick, overly stressed, or traumatized. Changes in breathing can lower CO2 levels and disrupt regulation of pH, interfering with homeostasis and healing in multiple body systems including the autonomic nervous system, postural and motor control, cardiovascular, and stress response regulation[1,2].

DB underlies many disorders including asthma, snoring, sleep apnea, paradoxical vocal fold motion disorder, chronic cough, and anxiety. Common co-morbidities include pulmonary disease, psychological illnesses, and voice problems. Individuals with these disorders may require a different approach to breath training, as deep breathing practice may trigger hyperventilation and worsen their condition. Voice professionals should be aware that dysfunctional breathing can explain clients' lack of response to training or therapy and may underlie reports of dizziness or discomfort. Breathing-based therapies may be of benefit to these populations. Seemingly unrelated symptoms can resolve when breathing issues are productively addressed.

During rest, respiration is through the nose, warming, filtering and humidifying the air. Breath rate ranges between 9-14 breaths per minute, with

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The Voice of the Speech-Language Pathologist

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500 ml of air in each tidal breath, summing to a total of only 4-5 liters of air per minute. A common form of DB is over-breathing or hyperventilation: Breathing beyond metabolic demands eliminates excessive amounts of CO2 (hypocapnia) leading to respiratory alkalosis. This hinders release of oxygen from hemoglobin to tissues, resulting in decreased cellular oxygenation, or hypoxia (suppressed Bohr effect).

"PARADOXICALLY, THE MORE YOU BREATHE, THE LESS OXYGEN IS AVAILABLE TO TISSUES.

Paradoxically, the more you breathe, the less oxygen is available to tissues. Poor oxygenation leads to a myriad of problems. Hypocapnia can cause spasms in bronchi and other smooth muscle tissue, including blood vessels, gut, bladder, and uterus. Lightheadedness, visual changes, numbness, tingling, cold hands and feet, and dizziness are all symptoms associated with hyperventilation and low CO2. Biomechanical and psychophysiological symptoms include an inability to take a deep breath, chest tightness and shortness of breath [3]. People who snore, for example, breathe in ~15 liters per minute: they over breathe.

DB can be both the cause and the result of voice disorders. Abnormal respiration has been implicated in muscle tension dysphonia, and patients commonly complain of phonatory dyspnea. Vibratory pattern irregularities or incomplete closure of the glottis are often present in voice disorders. Both interfere with the efficient valving of airflow and promote over-breathing, i.e., women with vocal nodules use higher lung volumes during syllable train production [4]. In addition, over-breathing through the mouth may result in dehydrated and inflamed tissues throughout the airway, as well as excessive mucus. These symptoms early in the morning are sometimes attributed to acid reflux but may be caused by mouth breathing during the night. Mouth breathing has been found to significantly increase phonation threshold pressures[5].

People who are overly stressed typically exhibit dysfunctional breathing. Acute hyperventilation during a panic attack is obvious. More prevalent, but commonly unrecognized are the following behaviors typical of DB:

- Habitual or occasional mouth breathing
- Excessive sighing, yawning, sniffing, throat clearing/coughing
- Fast respiratory rate or breathing without a pause
- Audible breathing
- Taking large breaths and visible movement in the upper chest and/or abdomen
- Breathlessness while speaking or singing
- Hyper inflating the upper chest when speaking or singing
- Speaking to the end of the out breath, followed by a gasping inhalation

Most singers I see confess to "not using enough breath support." In my experience, voice patients use too much breath. Both straining with excessive respiratory effort and guarding using a soft breathy style of speaking trying to spare the voice, are common maladaptive compensations. Many injured singers push breath, sometimes confusing it with "breath support." Using low, gentle, quiet nasal breathing for vocal tasks will help maintain autonomic stability, and proper function of all body systems and increase phonatory efficiency. The following tips should help:

- The training baseline should not depart from physiologically correct breathing and natural functioning of inspiratory and expiratory muscles[6]
- Over use of chest, shoulders, and neck muscles interferes with effective diaphragmatic excursion.

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•Explore Resting Expiratory Level (REL): Passive forces acting on breathing return the system to REL effortlessly, and inspiratory checking action counteracts the relaxation pressures to promote the steady lung pressure necessary for phonation. Many speakers and singers use too much effort for inhalation and/or exhalation.

•Subglottal pressure is determined by the degree of expiratory force and by the resistance against airflow provided by the glottis. The extent to which the vocal folds close, and the length of time they remain closed will influence subglottal pressure, directly influencing loudness. **To get through longer phrases without having to take a breath in the middle, and to project the voice more efficiently, clients should learn that monitoring the glottal "valve" is as important as the size of the breath.**

Simple phonation tasks such as counting or reciting the alphabet can be used to put all this information to practice:

1)Sit in a tall comfortable posture. Maintain the tongue, jaw, neck, eyes, shoulders, and chest muscles relaxed.

2)Count slowly aloud, "One, two, three, four, five."

3)Pause for breath. Keep the mouth closed and allow some air to come in slowly, quietly and passively through the nose. The volume should be no more than tidal volume. Avoid sucking the air in and taking more air than is necessary for only 5 numbers.

4)Continue, "Six, Seven, Eight, Nine, Ten." Pause for breath. Go on. Next, add to the number of numbers before the pause.

5)Practice quiet nasal breathing with reading, 5-note scales, and progress to conversational speech or singing tasks.

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I Teach Voice and Speech, but I Don't Teach Breathing:

Breath Awareness, Control, and Choice in Theatrical Voice Training

By Diane Gaary, MFA

An efficient and controlled breath is essential to all healthy vocalizations; but, when I teach performers in theater training programs, I don't teach breathing. In their careers, my students will be expected to use their voices in a variety of athletic situations; they will speak for hours on stage to 800 seat houses, and for minutes into microphones on movie sets. They will be asked to talk, whisper, cry, and scream in a variety of language and performance styles ranging from commercials to Shakespeare. Many of my students will be asked to sing everything from cabaret crooning, to rock operas. While a speech pathologist works to restore an injured voice to normal functioning, my work is to train performers' voices to healthily function on an athletic super-normal level. In essence, I train the triathletes of the vocal world. But I don't teach breathing.

It's not as though my students don't need to know about breath. Breath speed, pressure, and quantity directly effect vocal ease, expressiveness, duration of phonation, resonance, range, and volume. Breath use so directly effects vocal production, that breath awareness and control are essential to the athleticism required of a vocal performer. But, I don't teach people how to breathe because a healthy nervous system knows how to breathe far better than anything I could teach. With no training at all, most of us coordinated breath and voice quite efficiently in our first minutes of life as we emerged

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I TEACH VOICE AND SPEECH , CONTINUED

"THROUGH SELF-EXPLORATION AND OBSERVATION, STUDENTS DISCOVER THAT BREATH AND POSTURAL USE ARE INSEPARABLY CONNECTED AND, FOR MOST OF US, COULD USE IMPROVEMENT."

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from the womb and lustily let out our first belting cry. How can you train a vocal performer to make athletic choices about breath use without interfering with their innate breath/voice coordination? My approach teaches performers an understanding of how breathing and voice work, a moment to moment awareness of how their own breath is functioning and interacting with the vocal mechanism, and access to choices that take advantage of cause and effect relationships between breathing, posture, and vocal production. I teach people to unlearn acquired habits that interfere with breathing, and to learn how to work with their natural coordination.

Performers deserve to know the basic anatomy and principles of their vocal instrument. It's surprising how many problematic tension habits can be eliminated with a little information and understanding. Common misconceptions such as "I need to breathe into my stomach," "I shouldn't move my ribs," "My lungs are in the front of my body", "I need to take in as much breath as I can to get to the end of a phrase," "I need to relax everything to be healthy", or "I need to use a lot more air to get louder or to sing the high note," result in unproductive tensions which inhibit the free functioning of breath and voice. In class, we discuss how breathing works and how it interacts with the vocal mechanism. We use pictures, work with the skeleton, and watch simple short videos. Then we get up on our feet and act out the mechanics of breath, how sound travels through vibrations, and how breath effects the vocal folds.

After we cover the basic concepts of the breath/voice interaction, we run experiments on ourselves to develop accurate kinesthetic awareness of the highly responsive nature of breathing in our own bodies. Through self-exploration and observation, students discover that breath and postural use are inseparably connected and for most of us, could use improvement. I teach many awareness exercises that highlight relationships between posture, breathing and easeful vocal resonance We do observational homework and vocal explorations that highlight different posture and breath choices. We focus on cause-effect relationships rather than on right or wrong to bypass tendencies to increase amounts of effort and tension to "get it right." Exploration of the responsive relationship between posture, movement, resonance, and breath teaches students that they don't need to take in large amounts of air and provides them with methods of releasing any interference of the reflexive inhalation process. Allowing freedom of movement in the Primary Control enables the natural process of appropriate inhalation to happen on its own.

Since effective inhalation is an issue of providing structural sup-

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I TEACH VOICE AND SPEECH , CONTINUED

port for a natural process and removing interference from that natural process, breath training for vocal athleticism focuses on making choices which control the exhale. Exhalation control adheres to what I call, "The Goldilocks Principle" – to operate at it's healthiest, the voice needs not too much breath and not too little. The voice operates at it's best with just the right amount of breath to vibrate freely for each vocal demand. In speaking or singing, breath acts like the gas that powers a car's engine. Common vocal tensions in the tongue, jaw, throat, and shoulders are usually involuntary reactions to an imbalance between breath quantity, speed, or pressure, and the size, shape, and texture of the vocal mechanism. I teach students to view jaw, neck, tongue, throat, and shoulder tensions as invaluable symptoms that their breath use and/or postural support need adjustment. This approach is rather like using the speedometer on your car to know when to take your foot off the gas pedal. If too much air is used, the structures of the vocal mechanism will start to brace. The symptoms of using too little air are also recognizable. I teach students to monitor their breath by developing their awareness of how the larynx, throat, jaw, tongue, soft palate, lips, Primary Control, and vibratory experience are responding to breath use.

Yes, I don't teach breathing; but, I do teach performers how to accurately feel, and how to use awareness of *cause and effect* to work with their natural vocal coordination. I do teach performers to confidently make choices that result in flexible, powerful, and expressive coordination between breath, body, emotion, and voice. I teach people to be aware of their choices, so that they can effectively and beautifully express themselves with honesty and health.

TALKING ABOUT BREATHING IN THE VOICE STUDIO

By Filipa M.B. Lã, PhD
Johan Sundberg, PhD

Breath management is essential in building up a voice. Awareness of how the breathing apparatus functions facilitates the acquisition of breath control. The basic components of such control are the diaphragm muscle and the muscles in the rib cage and in the abdominal wall. These determine the air pressure in the lungs, i.e. the subglottal pressure (Psub), which is a key factor in controlling phonation. There are both inhalatory and exhalatory muscles in the rib cage, expanding and contracting it, respectively. The diaphragm, an upward-vaulted muscle that constitutes the bottom of the rib cage, is an inhalatory muscle; when contracting, it flattens and thus increases the volume in the ribcage and thus also in the lungs. The abdominal wall muscles have the antagonistic function. When they contract, they move the abdominal content toward the ribcage and so restore the upward-vaulted form of the diaphragm.

Students profit from becoming conscious of how these components work and experience how it feels to use them. For instance, pronouncing a soft /s/ consonant while straining the abdominal wall is an exercise for wilful contraction of the diaphragm, as only contraction of the diaphragm can prevent the high pressure below the diaphragm to enter into the ribcage. Contraction of the diaphragm is typically associated with an abductory component in the larynx, which reduces the risk for over-adducting the vocal folds, i.e. pressed phonation. Habitual exaggeration of glottal adduction tends to result in voice disorders.

Science Voice

Voice Science

Voice Scientist

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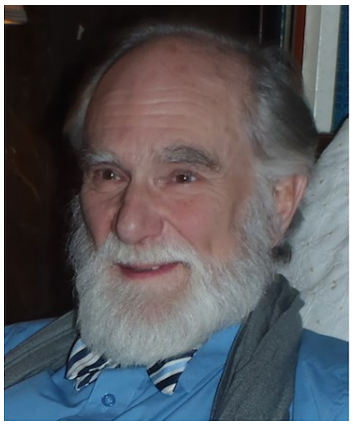

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TALKING ABOUT BREATHING… (CONTINUED)

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Also lung volume tends to affect glottal adduction. At high lung volumes, i.e. after a deep inhalation, glottal adduction is typically less than at low lung volumes, at the end of long phrases. Hence, descending exercises are often beneficial for students that tend to run into pressed phonation at high pitches, since that places the high notes at high lung volumes. Conversely, for students that tend to use breathy phonation at high notes, ascending exercises can help them to reduce glottal leakage at high pitches.

The breathing apparatus possesses elasticity. At high lung volumes, the elasticity is an exhalatory force while at low lung volumes it is inhalatory. This means that elasticity alone produces a quite high Psub after a deep inhalation, prone to produce loud phonation. As we phonate, lung volume constantly decreases and hence, also the elasticity contribution to Psub. To gain full control over Psub at high lung volume, students need to activate inhalatory muscles , i.e. the diaphragm and/or those in the rib cage ("inhalare la voce"). **To train this ability, it can be helpful to sing exercises that require soft phonation after a deep inhalation.** Also *messa di voce* exercises may contribute to an efficient way of developing a perfect synchronisation between Psub and changing of elasticity forces.

As the elasticity forces are exhalatory at high lung volumes and inhalatory at low lung volumes, they are zero at a certain lung volume. This lung volume is

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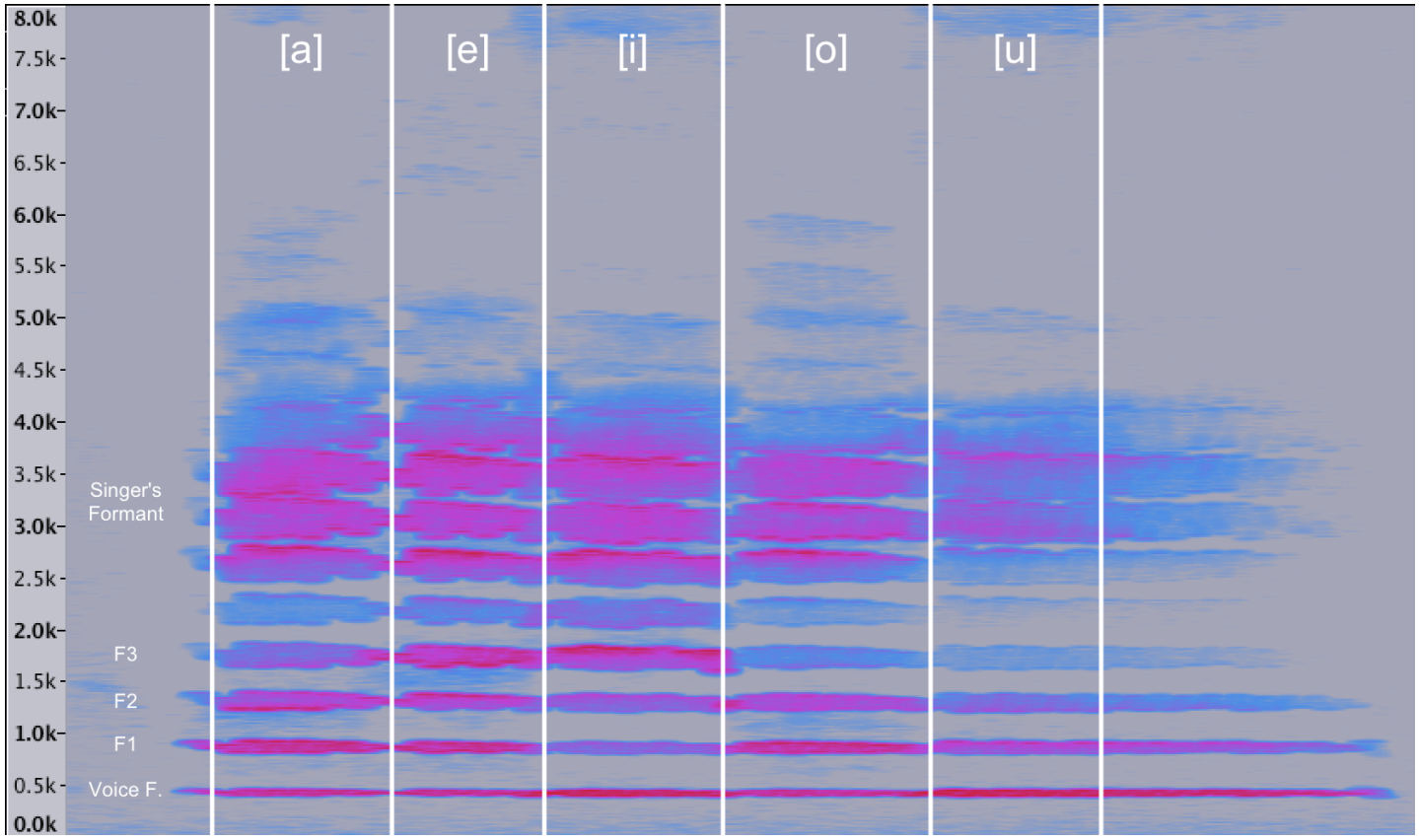

TALKING ABOUT BREATHING… (CONTINUED)

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referred to as the resting expiratory level (REL), which is affected by several factures, including posture. In passive breathing, inhalation is started from REL so inhalation is driven by contraction of inhalatory muscles and exhalation is driven by elasticity. Phonating above and bellow REL feels comfortable and uncomfortable, respectively. The latter is typically associated with increased glottal adduction, at least in untrained voices. Thus, it is important to plan the depth of inhalation by taking into account the air consumption needed for the musical phrase.

Air consumption depends on several factors: glottal leakage, vocal loudness and type of phonation. Pressed phonation consumes less air than neutral and flow phonation; however, as mentioned, habitual use of pressed phonation should be avoided. **Acquaintance with and control of phonation therefore is crucial in voice training.** Louder tones consume more air than soft tones; vocal loudness is directly dependent on Psub. Thus, practicing exercises of different lengths and degrees of vocal loudness are useful.

Psub must be tailored to pitch, i.e., the fundamental frequency (F0); the higher the pitch the higher Psub is needed. Thus, before starting a phrase, singers need to be prepared with the Psub needed for the coming tone. To develop this skill of tuning Psub to pitch, one can practice staccato exercises on the same and on different notes. An ascending/ descending triad in legato, and then repeated in staccato, is another useful exercise, as this requires quick and accurate change of both pitch and Psub.

TOOLS FOR THE VOICE BOX

AN EXPERIENCED DRAMATIC MEZZO: WHAT WORKS FOR ME

BY MARIANNE CORNETTI

The warm up and practice session that I have used for the past 17 years is absolutely vital to my singing.

Every day for an hour and a half I use this routine. There is *never* a time when I sing, whether it is for a lesson, coaching, rehearsal or a performance that I don't warm up. The routine that I've developed for my singing is very *simple and regimented*.

I am a Mezzo, and my routine is as follows: 30 minutes of lip trills followed by 30 minutes of the /i/ vowel. Then, I sing "In Questa Reggia," the aria from Turandot! I sing it phrase by phrase at a mezzo forte dynamic and very slowly, much like a vocalise. Then, I sing through an aria from the opera I am doing at the time, starting from the beginning of the opera. For example, in Il Trovatore, the role of Azucena begins with "*Stride la vampa*". I sing through this aria first (not the second, heavier aria *Condotta*), because if I start with the second aria, it could really interrupt the bel canto style of singing "*Stride la vampa*". **I believe the throat memorizes and warms up correctly if you continually repeat**

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TOOL BOX… (CONTINUED)

the exact, same preparation all the time.

My actual vocalise starts in the F below middle C and I sing lip trills from F to F#, G, G# etc., clear up to the C above middle C and then back down to the starting F. Then two notes of lip trills starting on the same F going up chromatically to the C above middle C, and back down again to the F below middle C. I repeat that on three notes, then five notes, then an octave. All very slowly and at a mezzo piano. It takes about 30 minutes.

The next 30 minutes, I do the same exercise on the /i/ vowel. The exact same way. As I ascend the octave, I must allow the vowel to be modified ever so slightly. And, the tongue is always in the high position of a pure /i/ vowel. The modification happens at the very top around A, B flat, B and C, but the modification is on the tongue and the open space within the back of the throat. The voice has to turn as it goes in to that higher register. Again, I always so this *mezzo forte and slowly*.

For the final 30 minutes I use the aria "*In Questa Reggia*" as a vocalise, breaking up each phrase and singing it slowly. I sing at mezzo forte - until the really high section that becomes louder - because of where it lies in the upper register. After I sing through the aria, then I slowly start to sing from the beginning of the opera that I am preparing, or the aria that I am working on with my teacher or coach. My throat must memorize the positions of the music, whether an aria or a duet, from the very beginning. For example, I would never try to sing the ending of Lady Macbeth (Macbeth) without singing everything from the beginning of the opera. My throat simply can't adjust!

This daily practice is part of my preparation as a singer. No one runs a marathon without warming up. Well, the same goes for singing an opera. Warming up is a must. I also do not believe in ***marking*** down the octave in rehearsal to save your voice. I believe you MUST mark in voice and on pitch because, again, the throat memorizes the position of each aria and the entire opera. Marking down the octave only confuses the throat; one might tend leave the tones unsupported. Conversely, I find that when I mark in voice on the pitch, I *must* support the sound. I recommend singing it at a dynamic level of mezzo piano to mezzo forte.

I hope my routine will help someone develop their own *best practice*.

MARIANNE CORNETTI

Dramatic Mezzo-Soprano
International Opera Singer

VOICE FOUNDATION NEWS

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MAY 30—JUNE 3, 2018 PHILADELPHIA PENNSYLVANIA

Wednesday, May 30

Basic Science Tutorials
Presentation Coaching
Accent Reduction Coaching

Thursday, May 31

Science Sessions
Quintana Awardee: Luc Mongeau, PhD
Keynote Speech - Boris Alexander Klebe, PhD

Friday, June 1

Special Session: Exercise and the Voice

Nancy P. Solomon, PhD

Young Laryngologists Study Group
Vocal Workshops

Voices of Summer Gala

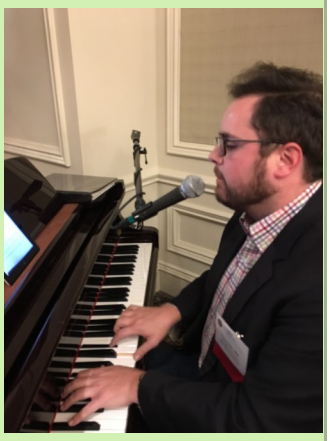
Saturday, June 2

Medical, SLP Session
Panels

G. Paul Moore Lecture: Nicholas Maragos, MD

Vocal Master Class with Simon Estes

Sing Along with Grant Uhle



Sunday, June 3

Medical Session

Panels

Voice Pedagogy Session

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WORLD VOICE DAY IN INDIA
16th April 2018

The following events were conducted at Guntur in Andhra Pradesh State of South India

Television Interview: What is New in the Management of Voice Disorders?

Prof.Phaniendrakumar Valluri

Director Sri Sathya Sai Institute of ORL & Research center for voice disorders
Founder: The Associoation of Phonosurgeons of India

A meeting about Voice Awareness for Lecturers and Lawyers