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# Introduction

It is estimated that 3 to 10 percent of Americans experience voice problems at any given moment in time. The cumulative frequency over the life-span is much larger. Assaults from the environment - pollution, sudden changes in humidity or exposure to pharmacological agents - can make vocal fold tissues irritated or vulnerable to damage. In other cases, disease or trauma impairs the vocal folds, larynx or surrounding tissues. Genetic factors also play a role; some individuals' vocal folds appear to be naturally more robust than others. Finally lifestyle choices are significant. About 25 percent of the population engages in work that is "vocally demanding." For these individuals, either their jobs require excessive vocalization or their work environments force them to speak above a high noise level. Examples of professionals with heavy vocal demands include: teachers, lawyers, auctioneers, aerobic instructors, singers, actors and manufacturing supervisors.

These factors, or a combination of them, converge on an organ whose primary function is not voice production at all, but airway protection. It should come as no surprise that clinics see an increasing number of patients whose vocal systems are mismatched to the load being placed upon them. Patients often report significant work loss and early abandonment of careers in occupations with high voice use.

Historically, speech-language pathologists and otolaryngologists encouraged their patients to allow their voices to rest. However, sometimes this simple advice isn't feasible. Telling a politician not to talk is like telling a football player not to get tackled or a ballerina not to get on her toes. For this reason, an emphasis should go beyond therapy, or rehabilitation. Training in optimal usage of the voice under less than ideal circumstances, or habilitation, is also a task set before the speech-language pathologist specializing in vocology. [Vocology is the science and practice of voice habilitation (Titze, 1990; 1993; 1996).]

For these reasons, this Guide to Vocology was developed. It was created as a comprehensive overview of the many and diverse approaches to voice management. Suggested reading lists were developed as completely as possible so that interested readers may continue investigations into the described techniques. As this publication goes to press (Fall 1998), some citations in the reference lists are denoted as "in press," "in review," or "in revision." The reader is encouraged to visit the website of the National Center for Voice and Speech to obtain current publication information. The address is: [www.ncvs.org](http://www.ncvs.org).

In Part One, many of the common conditions affecting voice and suggested therapies are described. It is prefaced by a general discussion of voice treatment. Of course, the specific treatment program depends on the patient, his or her condition, and on the clinicians caring for the patient. Information about treatment is meant as a general guide for common situations.

Part Two describes specific voice therapy programs. In addition to more traditional therapy methods, sections such as whole body wellness, theatre voice techniques and training for singers are included. As the recent subspecialty of vocology has evolved, many speech-language pathologists have found that there is much to learn from interdisciplinary investigations.

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## Overall Considerations

**Clinical personnel.** Over the past several years, a subspecialty called “vocology” has progressively evolved. Vocology literally means “study of the voice.” A vocologist is any person who is specialized in voice, including voice disorders and their management. More broadly, a vocologist may be a speech-language pathologist, an ear-nose-throat doctor, a voice teacher or coach, or any other person with a special interest in voice. At many of the premier voice centers, voice treatment teams – an otolaryngologist, a speech-language pathologist and, often, a voice educator – use a cooperative approach to care for their voice patients.

**Success of treatment.** Treatment success for voice disorders depends on many factors, including the condition being treated and the clinicians treating it. However, one of the most important overall factors is the patient. Patients who are interested in their voices and are motivated to make improvements generally are likely to get the best overall long-term results from treatment. This is partly because such patients tend to follow treatment recommendations.

### VOICE THERAPY

**How often, for how long?** In the United States, most voice therapy involves 1-2 therapy sessions weekly, for about 2 months. There are exceptions discussed in Part Two of this booklet, such as Lee Silverman Voice Treatment (4 visits per week for 4 weeks).

**Content of treatment.** Almost all voice therapy addresses at least two issues: (1) *Voice hygiene*, that is, how to take care of the vocal folds by keeping them moist and free from irritants, and (2) *Voice production work*, that is, how to use the muscles involved in voice to create the best possible sound without injury. Additionally, some voice therapy programs also include (3) *Stress counseling*, if relevant. Specific approaches to hygiene, voice production, and stress counseling are described in Part 2 of this booklet.

More and more, voice therapy programs are based on scientific research. Some of the methods borrow from the performing arts in singing and theatre, as arts trainers have dedicated decades – if not centuries – developing effective ways of training the voice.

## VOCAL FOLD SURGERY

**Terminology and general information.** Surgery that is performed to improve voice is called *phonosurgery*. (“Phono—” comes from the Greek word root referring to “sound.”) Phonosurgery is *not* used for all patients with voice problems. Rather, it is reserved for special cases in which the patient, the physician, and the speech-language pathologist feel that it is a good option. Usually, phonosurgery is either preceded by voice therapy, or followed by voice therapy, or both.

**Types of surgery.** Most phonosurgery can be classified as one of two main types: (1) *Laryngeal microsurgery*, which involves the use of a microscope to remove small lesions discussed below; or (2) *Medialization surgery*, which involves moving one or both vocal folds towards the center of the glottis, or injecting one or both folds with material to bulk them up, so that vocal fold contact is good during voicing. A third type of intervention (3) *Botulinum toxin (“botox”) injection*, does not involve surgery *per se*, but is sometimes considered together with surgical interventions. Botox treatments involve injecting a small amount of the toxin into one or both vocal folds to temporarily weaken them if they are overactive.

After microsurgery for the removal of laryngeal lesions, most clinicians ask their patients to be completely quiet anywhere from 3-10 days. Subsequently, patients resume talking gradually under the guidance of their physicians and speech-language pathologists. Note that most patients are physically *able* to talk after surgery; voice rest is required to optimize healing.

Medialization surgery, which is mostly used for patients with vocal fold paralysis or paresis (below), is usually followed by careful voice use under the guidance of a speech-language pathologist. More rigorous voice retraining can usually begin after an initial period of several days or a few weeks.

Following botox injections for “spasmodic dysphonia” (described below), most patients have temporary side effects beginning about 1-2 days after the injection. Typical side effects include breathy, weak voice and mild swallowing difficulties, which usually last about 1-3 weeks. Then, voice usually becomes stronger and relatively spasm-free, and swallowing improves. After a period ranging from a few weeks to several months, voice problems tend to recur and the injections are repeated.

# Nodules and Polyps

## DESCRIPTION

Nodules and polyps are common, benign (non-cancerous) growths that develop at the middle of the vocal folds. Mature nodules are similar to “calluses” within the vocal fold tissue and usually develop on both vocal folds. Polyps tend to be more fluid-filled than nodules, and visible blood vessels may feed into them. Polyps may develop on one or both vocal folds. Typical symptoms for both nodules and polyps include hoarseness, effortful voice, and rapid vocal fatigue.

## CAUSES

Both nodules and polyps are thought to be caused by vocal fold trauma during talking or singing. The reason is that the middle of the vocal folds, where the growths occur, receives the greatest amount of impact during voice production. Other factors may also increase the likelihood that nodules or polyps will develop. Such factors include smoking, alcohol use, caffeine, drying medications, allergies, exposure to noxious chemicals, and gastric reflux.

## TREATMENTS

For nodules, voice therapy is almost always recommended as the first line of treatment. In addition to voice hygiene intervention, voice production is usually addressed using Resonant Voice Therapy, Vocal Function Exercises, Accent Method, Confidential Voice Therapy, Biofeedback, or other methods, discussed in Part Two.

In some cases, after voice therapy has been completed, voice is improved but is not yet back to normal. In such cases, patients may wish to talk with their physicians about laryngeal microsurgery and its possible benefits.

For polyps, voice therapy may be recommended as the first part of treatment, as for nodules. However, in some cases, surgery is recommended first, followed by voice therapy. Voice therapy for polyps is usually similar to therapy for nodules.

# Cysts

## DESCRIPTION

Cysts in the vocal folds are similar to cysts other places in the body. They are essentially fluid-filled sacs surrounded by a layer of “skin.” Often, a single cyst forms at the middle of one vocal fold, where impact stress is greatest. The other vocal fold usually develops a “reactive swelling” caused by the cyst hitting up against it. Although physicians can usually distinguish a cyst from other similar-appearing lesions such as nodules and polyps by regular clinical examination, the final diagnosis can be made only if the cyst is surgically removed and inspected under a microscope.

## CAUSES

No one really knows the exact causes of vocal fold cysts. Because they often form at the middle of the vocal fold, where impact stress is the greatest during voicing, most people think that voice use does play some role in their development.

## TREATMENT

Cysts do not go away with voice therapy alone. However, voice therapy is usually the first treatment approach, for two reasons. First, the cyst may be surrounded by swelling, and the opposite fold usually has swelling as well; voice therapy should be effective for reducing the swelling, and thus, improving symptoms. Second, the results from voice therapy can help to make the diagnosis: If a lesion goes away with therapy, then it probably wasn't a cyst. If it doesn't go away, then it might be a cyst, and surgery may be appropriate.

# Polypoid Degeneration

## DESCRIPTION

Despite the similarity in their names, “polypoid degeneration,” also called Reinke’s edema, looks a bit different from polyps. Whereas polyps are distinct lesions that usually form at the middle of one or both vocal folds, polypoid degeneration involves irregular swelling and “ballooning” along the whole length of both vocal folds. A tale-tell symptom is extremely low speaking pitch, especially in women.

## CAUSES

Often, polypoid degeneration is seen in persons who have used their voices heavily, and who have also been exposed to irritants such as smoke, chemicals, or gastric reflux. Heavy alcohol use may increase the likelihood of this condition.

## TREATMENT

Treatment depends on the patient’s needs, and the severity of the lesions. If the swelling is so large that it starts to obstruct the airway, surgery is indicated. If, instead, the swelling is slight, then voice therapy is usually used as a first approach. Therapy is often successful at reducing the swelling and improving symptoms.

# Hemorrhage

## DESCRIPTION

Hemorrhaging within the vocal folds involves bleeding into the tissue. Small vessel ruptures can cause tiny, visible capillaries sometimes called “varices” (varix, singular) or “capillary ectasias.” Larger bleeds involve a broader perfusion of blood into the tissue.

## CAUSES

One cause of hemorrhaging in the vocal folds is extremely loud voice use, for example, screaming. Other types of heavy voice use can also cause broken capillaries in the folds. Sometimes visible blood vessels feed into vocal fold lesions and help to maintain them. This occurs sometimes for polyps and often with cancerous tumors.

## TREATMENT

The treatment of vocal fold hemorrhage depends on the cause. If the bleed is new and extensive, the treatment of choice is usually complete voice rest for several days or even a few weeks. More commonly in Europe than in the United States, medications may also be prescribed, which are thought to assist in blood absorption. Patients are advised to avoid blood thinners including aspirin and alcohol when possible. If prominent vessels persist, or if they are due to benign or cancerous lesions, surgery may be undertaken to both remove the lesions and cauterize the vessels.

# Sulcus

## DESCRIPTION

Sulcus literally means “groove.” In the most general sense, a vocal fold sulcus is a groove that forms in the vocal fold tissue. Many clinicians use the term “sulcus vocalis” to refer to any type of groove in the vocal folds. Other clinicians distinguish between different types of grooves and “sulci” (plural of “sulcus”). A “physiologic sulcus” is a shallow groove running from the front to the back of a vocal fold, which is seen in many people and may not cause any trouble for the voice at all. “Sulcus vergeture” is a somewhat deeper groove, and may produce voice symptoms. True “sulcus vocalis” is a deep pit in the vocal fold tissue, which goes all the way to the muscle, and can severely impair voice. Common complaints of sulci are voice weakness, fatigue, and a “reedy” or “veiled” sound.

## CAUSES

There is debate about the cause of vocal fold sulci. In some cases, they may result from a cyst that has ruptured. In other cases, they may be present from birth.

## TREATMENT

Although voice therapy may help to improve some of the symptoms of sulcus, usually therapy does not make the symptoms go away entirely. In such cases, surgery may be used. The type of surgery depends on the type of sulcus; the outcome of surgery is variable, ranging from distinct improvement to, unfortunately, little change in symptoms.

# Bowing

## DESCRIPTION

Bowed vocal folds are literally folds that look like two bows joined at the front and back. The back and front of the vocal folds may come together, but the middle part stays open. Typical symptoms are weak voice and vocal fatigue.

## CAUSES

The most common cause of bowing is “presbylarynx,” which literally means “old larynx.” However, bowing can also occur in young persons. In many cases, bowing at any age comes from a subtle lack of “nerve” input to the vocal folds. The result is a lack of closure in the middle part of the vocal folds, and over time, also a loss of muscle bulk in the vocal folds adding to difficulty with closure. There is also speculation that bowing might be caused by muscular over-use, especially if seen in young adults.

## TREATMENT

Almost always, the first line of treatment for bowing is voice therapy. Therapy can be used to exercise the vocal folds and to bulk them up to get the best vocal fold closure possible during voicing. Therapy can also help to reduce the over-activity of other muscles that often occurs as a compensation for poorly closing vocal folds. Specific voice therapy programs that address these goals include Vocal Function Exercises, pushing exercises, Lee Silverman Voice Treatment, Resonant Voice Therapy, or Accent Method (Part Two). In extreme cases of bowing or with persons too cognitively impaired to successfully use behavioral methods, one or both vocal folds may be injected with material to add bulk.

# Granulomas

## DESCRIPTION

Granulomas are comprised of grainy tissue that builds up in the larynx, usually at the back of the vocal folds near the cartilage called the “vocal process.” Sometimes, a granuloma is seen on one vocal process, and a ulcerated pit is seen on the other vocal process where the granuloma hits up against it. This combination is referred to as a classic “cup and saucer” appearance.

## CAUSES

Many granulomas are clearly caused by the reflux of stomach acids onto the back of the vocal folds. Otherwise, granulomas can be caused by the insertion of airway tubes during surgery, the prolonged use of airway tubes after surgery, and some disease states such as tuberculosis and HIV+. There is some evidence that a low pitch and overactivity of the back part of the larynx may also contribute to granulomas in some cases.

## TREATMENTS

Gastric reflux treatment is almost always part of the treatment program for granulomas, even if a person is not known for certain to have reflux. This treatment usually involves a combination of medication and dietary regulations. If the lesions are very large or do not respond to medication, then treatment may proceed with either microsurgery or voice therapy, or both. Because granulomas often recur, the treatment program is usually comprehensive in order to address several of the factors known to increase the risk of recurrence (ongoing reflux treatment and change of voice use patterns).

# Vocal Fold Paralysis and Paresis

## DESCRIPTION

Vocal fold paralysis is a condition in which one or more nerves to the vocal folds work poorly, and the vocal fold does not move or deform normally. In most cases, the vocal folds do not close, or do not close well. Also, the vocal folds may not elongate normally to produce high pitches. In other cases, which are more rare, the vocal folds do not come apart properly, and breathing can be difficult. Paresis is a similar condition, only less severe.

## CAUSES

Vocal fold paralysis and paresis can be caused by many different things. One of the most common causes appears to be viral: A person gets a cold or upper respiratory flu, resulting in a temporary laryngitis that then does not resolve normally. Other common causes are surgery (chest, neck or shoulder surgery), heart problems, and more rarely, tumors or brain diseases.

## TREATMENT

Before treatment plans can be made, an attempt is usually made to determine the cause of the paralysis or paresis. If the condition followed a respiratory infection and laryngitis, or if no cause can be found, the condition is usually assumed to be viral. Special tests may be conducted to determine if the paralysis or paresis is new or old, and if it is getting worse or getting better (“laryngeal electromyography”). Further treatment will be planned based on the initial findings. Clearly, if the patient is having difficulty breathing, surgery may be performed first to improve the airway. Otherwise, in some cases a “wait and see” approach will be taken, especially if symptoms are not severe. Or, voice therapy may be started to help improve vocal fold closure using programs such as Vocal Function Exercises, pushing exercises, Resonant Voice, Accent Method, or Lee Silverman Voice Treatment. Finally, in some cases microsurgery is used to mechanically reposition the affected vocal fold so that it gets good closure with the other one, thereby improving voice and even swallowing.

# Spasmodic Dysphonia

## DESCRIPTION

Spasmodic dysphonia (SD) is a type of “focal dystonia.” In general, a focal dystonia is a condition in which movement is abnormal in an isolated body part, especially during meaningful tasks (such as speech). In spasmodic dysphonia, which affects voice, vegetative functions such as coughing, laughing, and even singing may be normal. Two types of SD are recognized. In adductory SD (AD-SD), the more common type, the voice shuts off as the vocal folds spasm shut abruptly at irregular intervals during speech. In abductory SD (AB-SD), the voice feels as though it “gives way” during speech, as the vocal folds themselves may fail to come together and maintain normal contact.

## CAUSES

The exact causes of SD are unknown. However, in many cases, the cause appears to involve a minor nerve or brain abnormality that is unrelated to any other disease. The abnormality does not cause any other problems besides speech problems. For AD-SD, one set of research findings suggests that the cause may involve abnormal reactions to stimulation of the vocal fold nerves.

Rarely, SD or at least a condition that sounds like it, may be caused by stress.

## TREATMENT

Currently, the main treatment of choice for SD involves the use of a very small amount of “botulinum toxin” (also called “botox”) injected into one or both vocal folds or in other muscles near them. With these injections, the treated vocal fold is temporarily weakened and the spasms are reduced. When the effect wears off, usually within about 3-5 months, spasms tend to recur and the patient returns for another injection. There is some evidence that a limited number of voice therapy sessions, aimed at minimizing the force of vocal fold contact (for AD-SD), may enhance the effect of the “botox” and make it work longer. Confidential Voice Therapy and yawn-sigh therapy are examples of treatments that are often used in voice therapy for AD-SD (Part Two).

When SD-like symptoms are related to stress, voice therapy is the treatment of choice. In such cases, therapy may focus on stretching and relaxation (Part Two).

# Parkinson Disease

## DESCRIPTION AND CAUSES

Parkinson disease affects a large number of elderly adults, and occasionally develops in young adults as well. The disease is caused by a deficiency of a brain chemical, “dopamine.” Over time, a typical result is that many movements – including walking and handwriting – become very small and weak. For most patients, at some point, voice and speech become weak and slurred as well.

## TREATMENT

Parkinson disease is treated with medicines and sometimes surgery. The exact types depend on the patient and his or her physician. For speech and voice problems associated with Parkinson disease, the most effective treatments appear to be intensive ones that involve daily therapy or nearly daily therapy for a few weeks. The most studied treatment – and the one with the best results so far – is called Lee Silverman Voice Treatment, described in Part Two.

# Muscle Tension Dysphonia

## DESCRIPTION

Muscle tension dysphonia, also called MTD, is a condition in which one or more laryngeal muscle sets are overactive, causing voice fatigue and discomfort. Sometimes MTD accompanies another organic condition, although often it occurs on its own. A typical finding with MTD is that the vocal folds do not come together during voice production, especially in the back by the vocal processes. Although incomplete posterior closure is a common finding for many females, in MTD the finding is exaggerated. Sometimes the false vocal folds are also overactive during voice production.

## CAUSES

The cause of MTD is over-activity in some laryngeal muscles, and perhaps under-activity in other muscles causing muscular imbalances. Generally, the over-activity is assumed to be non-organic and can be changed with voice therapy.

## TREATMENT

Voice therapy is the treatment of choice for MTD. A variety of approaches may be used. Laryngeal massage is one approach that may be particularly effective.

# Paradoxical Vocal Cord Movement

## DESCRIPTION

Paradoxical vocal cord movement (PVCM) is not a voice disorder *per se*, but sometimes voice disorders do co-occur with it. PVCM involves occasional attacks of breathing difficulty, whereby the vocal folds tend to close during inhalation and/or exhalation, keeping air from normally entering or exiting the lower airway (lungs). Patients may become panicked by the difficulty breathing and are sometimes hospitalized; however, in PVCM the problem is behavioral and usually can be nicely treated with breathing exercises. Sometimes, PVCM co-occurs with asthma, which it not infrequently mimics. While PVCM most often occurs with adults, cases have been documented with infants and children. Presentation of PVCM may vary from mild dyspnea to total respiratory obstruction.

## CAUSES

There is no known cause for PVCM; however, it is commonly induced by exercise, reflux, postnasal drainage, cough and/or panic (Swift et al., 1997). “Triggers” for the PVCM behavior may include any combination of the items listed. It may also co-occur with asthma. PVCM may also be related to pharmacological agents, occupational hazards, or generalized laryngeal dysfunction.

## TREATMENT

Behavioral therapy, usually provided by a speech-language pathologist in combination with medical management of physiological “triggers” (e.g., reflux, nasal drainage) and, in some cases, psychological/psychiatric support for anxiety, is effective treatment for PVCM. In most cases, this comprehensive approach leads to complete resolution of the behavior in a short period of time.

# Repetitive Strain Injury

## DESCRIPTION

Repetitive strain injury (RSI) appears to be one of the most rapidly growing occupational disorders. It involves extremely rapid fatigue and pain of the affected body part, or even inability to use the body part due to repetitive use. Often, RSI is first manifested in the fingers, hands, and arms due to repetitive motions such as typing or piano playing. People who work with computers – and who have difficulty continuing to use their hands due to RSI – may use “speech recognition systems” to operate their computers. In some cases, RSI then manifests in the voice and requires voice treatment.

## CAUSES

Although there is no agreement about the exact causes, most clinicians who frequently work with RSI concur that the condition is organically based. Hypotheses about the condition include suggestions that it is a “thoracic outlet syndrome,” in which nerves and blood vessels going to the upper limbs are restricted due to postural problems. In some cases, RSI may be similar to carpal tunnel syndrome only more pervasive and persistent. Some studies have identified changes in sensory processes with RSI.

## TREATMENT

There is no consensus about a single treatment approach to RSI. Medications may be used (of varied types). Sometimes, behavioral therapy is offered. This may include physical therapy and/or voice therapy, depending on the body part affected. Many patients report marked improvements with the Alexander Technique (Part Two: Body Awareness and Movement Training) and massage.

# Puberphonia

## DESCRIPTION

Puberphonia involves the persistence of adolescent voice after puberty, especially in the absence of organic causes. The condition is most commonly seen in males who continue to use a high pitch in speech. Occasionally, puberphonic voice is encountered also in females who use a high-pitched “little girl” voice.

## CAUSES

The causes of puberphonia have not been systematically studied. It is assumed that either “learning” or psychological causes contribute to the problem.

## TREATMENT

Usually, puberphonia can be successfully treated with voice therapy. Typical approaches include reassurance that there is no physical problem causing the high pitch, and laryngeal massage. A normal-pitched voice often can be elicited during the first or second therapy session. The main challenge at that point is for the patient to accept and habituate the new “adult” sound or role.

# Transgender Voice Problems

## DESCRIPTION

Transgender voice problems occur when a person of a given biological gender (male or female) wishes to appear as a person of the opposite gender. Such problems are more commonly encountered in biological males who strive for a female image than the reverse.

## CAUSES

Transgender voice problems are caused by anatomical differences between male and female voice production systems, and a mismatch between biological capabilities and social propensities. Additionally, cultural factors tend to influence voice inflection and language in gender-specific ways. Thus, a mismatch between voice inflection and language on one hand, and intended gender on the other hand, also cause confusion in gender identification.

## TREATMENT

Transgender voice treatment may include behavioral, medical, and surgical interventions. Behavioral intervention refers to voice and speech therapy, and is a critical component of treatment success. Medical interventions sometimes involve hormone treatments in conjunction with other aspects of transgender management. The success of surgical interventions for voice is varied; sometimes observable voice changes are attained and sometimes not. Voice therapy is often key in helping to optimize a surgical outcome.

## Vocal Hygiene

As indicated in Part One of this booklet, voice therapy usually involves two types of interventions: (1) voice hygiene intervention, and (2) voice production work. Voice hygiene intervention teaches patients how to take care of their vocal fold tissue in general, independent of how they talk. Usually, this involves learning how to keep the vocal fold tissue moist and free from irritants. Voice production work teaches patients how to use the vocal mechanism in a way that produces the best possible sound and that helps reverse or prevent injury and disease. In the next pages, specific treatment information is provided about voice hygiene and voice production programs used in voice therapy.

# Hydration

## APPLICATION

Hydration treatments may be used for almost any type of voice disorder. The reason is that moist vocal folds appear to vibrate with the least amount of effort or “push” from the lungs. Also, moisture may protect the vocal folds from injury and help to reverse existing injury. However, it should be cautioned that some patients have medical contraindications to hydration treatments. In particular, patients with fluid retention problems (congestive heart failure) or kidney problems may not do well with large amounts of water consumption typically required in hydration treatments. Some patients with mold allergies should not be exposed to humid environments.

## DEVELOPERS

Hydration is so widely used in voice therapy that it would be misleading to identify specific clinicians or researchers who have promoted it more than others have. However, some of the authors who have written the most about the importance of hydration for voice include Dr. Van Lawrence, Dr. Robert Sataloff, Dr. Ingo Titze, and Dr. Katherine Verdolini.

## DESCRIPTION

Hydration treatments usually include two or three types of intervention. One involves trying to moisten the body’s cells internally by drinking lots of water and avoiding substances that dry out the body’s internal environment such as caffeine, alcohol, and diuretic medicines that are not medically needed.

A second type of hydration treatment involves moistening the surface of the vocal fold tissue with steam or vapor. A direct steam inhaler may be used by placing the face over a warm steam source for several minutes at least twice a day. Also, a hot-water vaporizer may be used in the bedroom or elsewhere in the home or workplace. Substances that dry out the vocal fold surface should be avoided, including smoke and decongestants or other drying medications that are not strongly indicated for medical reasons.

A third approach to hydration involves taking medicines that fluidify bodily secretions. Fluid secretions can bathe the vocal folds tissue and help keep them moist. The most common prescription medication is Humibid. The active ingredient in this medicine is guaifenesin, which is also found in less concentrated form in the non-prescription medication Robitussin. If Robitussin is used, care must be taken to take the “pure” type, with no “initials” after the name (Robitussin DM, Robitussin CF, etc.). These medicines not only contain guaifenesin, but also drying substances, which are counterproductive if the main goal is to moisten the vocal fold tissue.

## MECHANISM

Hydration treatments might be good for vocal fold tissue and for voice in two ways. First, moist vocal folds appear to require less drive from the lungs to vibrate as compared with dry folds. Therefore, voice production should feel easier when the folds are well hydrated. Second, moist vocal folds may provide some protection against injury during voice use, and may help to reverse injury that already exists. Both of these possibilities are based on theoretical work (Titze, 1981; 1988) as well as on published studies in human subjects (Verdolini-Marston, Titze, & Druker, 1990; Verdolini, Titze, & Fennell, 1994; Verdolini-Marston, Sandage, & Titze, 1994). There is some evidence that benefits from hydration treatments may be due to a combination of both internal and surface moisturizing (Verdolini et al., in review; Jiang et al., in revision).

## EFFICACY STUDIES

Several studies have looked at the effect of hydration and dehydration on vocal fold function in healthy humans and in animals (Jiang et al., in revision; studies by Verdolini and colleagues). The studies have shown that hydration reduces the amount of lung pressure needed to vibrate the vocal folds; the pressure reduction is by far the greatest at high pitches (Verdolini-Marston et al., 1990; Verdolini-Marston et al., 1994; Verdolini et al., 1994). One study has looked at the effect of hydration treatments for adult women with nodules. The results showed that hydration treatments did produce an overall benefit for the vocal folds and voice for these patients that was greater than benefits from a placebo treatment (which also helped). Specifically, hydration treatments consisting of 8-12 large glasses of water daily, two hours of steam exposure daily, and the use of a “mucolytic drug” (Robitussin) that is supposed to fluidify secretions produced an overall improvement in voice effort, voice quality, and vocal fold appearance (Verdolini-Marston et al., 1994). However, it is important to point out that the benefits lasted only so long as the patients continued the hydration treatments.

# Gastric Reflux Treatment

## APPLICATION

Over the past several years, it has become clear that many voice problems at least partially arise from the spillover of stomach acids into the airway and into the larynx. Often called “gastric reflux,” in fact when the acids spill onto the larynx the more proper term is “laryngopharyngeal reflux” (LPR). Thus, the header to this section should be, perhaps, entitled Laryngopharyngeal Reflux Treatment. Any person with a voice problem who shows evidence of LPR should be treated for it.

## DEVELOPER

Many clinicians have contributed to our understanding of LPR and its possible effects on the vocal folds. The most work in the past decade has been conducted by Dr. James Koufman.

## DESCRIPTION

As already noted, LPR involves a spillover of stomach acids up through the esophagus onto the larynx. The most precise way to diagnose LPR involves a “24-hour double pH probe” test. In this test, two little tubes are placed in the throat for one day. However, in some cases, when the vocal folds appear swollen especially at the back, and there are other signs of LPR in the larynx, physicians may proceed to treat it without confirmation from the probe. If the voice problem gets better with treatment, then it can be assumed that LPR was a factor. Most treatments for LPR have few, if any, side effects so many physicians consider this a safe and conservative approach.

Treatment of LPR takes three forms. These may be used alone or in combination, depending on the patient.

The first – and most conservative form of LPR treatment – is behavioral. This involves avoiding spicy foods, drinks containing alcohol or caffeine, and fatty foods. Patients sleep with their heads elevated from the waist up to help keep stomach acids from spilling into the airway during the night. No food should be taken for at least four hours before lying down. If the patient is heavy around the waist, weight loss is advised. Sometimes these precautions are enough to reduce voice symptoms from LPR.

A second form of LPR treatment involves medicines. Different types of medications can be used. One type, called H2 blockers, blocks histamine, which is one element involved in acid formation in the stomach. However, acid blockage is not 100% with this approach. Examples of H2 blockers are Tagamet and Zantac. Another class of medicines is the proton pump inhibitor. These medicines block the formation of acid secretions altogether by blocking hydrogen ions, which allow the

acid to be formed. With proton inhibitors, there is 100% suppression of stomach acids. Examples include Prilosec (omeprazole) and Prevacid (lansopracole). A third class of anti-reflux drugs, “motility drugs,” increases lower esophageal sphincter tone and increases gastric emptying. Therefore, acids are less likely to be moved through the esophagus onto the vocal folds. Examples include cisipride (Propulsid) and metoclopramide (Reglan).

A third and final form of LPR treatment is usually reserved for more persistent cases, especially those that do not get better with behavioral treatments and medicines. This approach involves very delicate surgery called “fundoplication.” In this surgery, a tiny scope is inserted through the belly button. There are different methods, but basically a part of the stomach called the “fundus” is wrapped around the lower part of the esophagus, to construct a tight sphincter that keeps acids from entering the esophagus.

## EFFICACY STUDIES

Many studies have been published about the relationship between gastric (or laryngopharyngeal) reflux and voice disorders. Although there is some controversy (e.g. Kjellen & Brudin, 1994), almost all the studies report a relationship indicating that reflux may indeed be a cause of laryngeal irritation in many patients. Some authors believe that reflux may cause voice problems in a large percentage of patients (e.g. Koufman, 1991). Although most physicians who suspect reflux in patients with voice problems do treat it, and patients as well as physicians report success, relatively few formal studies have actually assessed the treatments’ effectiveness in reversing voice problems. The publications that can be found describe positive findings. For example, one group of authors reported that most patients with reflux symptoms and hoarseness had improvements in voice with a 12-week regimen of dietary regulations and omeprazole, a proton pump inhibitor (Shaw & Searl, 1997; Shaw, Searl, Young, & Miner, 1996). (See also Koufman, 1991).

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## Voice Production Work

For centuries, voice teachers, voice coaches, and more recently voice therapists and scientists have discussed and argued about best way to produce voice. There has been much debate, and discussions continue. The long and the short of it is that there are probably many different ways to produce “good voice,” depending on how this is defined. Over the past ten years or more, several speech-language pathologists have developed cohesive therapy programs for voice production that are used with different types of patients. Some of the programs have been tested in controlled scientific studies. In this final subsection of the booklet, some of the more widely used approaches to voice production training are discussed.

# Resonant Voice Therapy

## APPLICATION

Resonant Voice Therapy (RVT) is used for patients with many different types of conditions: vocal fold lesions, bowing, paralysis, and functional voice problems. The therapy goal is to achieve the strongest, “cleanest” possible voice with the least effort and impact between the vocal folds to minimize the likelihood of injury.

## DEVELOPERS

Several performing arts trainers as well as speech-language pathologists have developed approaches to resonant voice training. In theatre, one approach has been developed by Dr. Arthur Lessac. In speech-language pathology, pre-eminent therapists including Dr. Daniel Boone and Dr. Morton Cooper emphasize “resonant voice,” sometimes called “forward focus.” Also in speech-language pathology, Dr. Katherine Verdolini has developed a systematic, programmatic approach to resonant voice therapy partly based on Lessac’s work.

## DESCRIPTION

Resonant voice, or voice with “forward focus,” usually refers to *easy* voice associated with *vibratory sensations* in facial bones. In the Lessac approach, the consonant “y” and nasal consonants (“m,” “n,” and “ng”) are used to facilitate training of this vibratory “resonance.” Cooper’s approach utilizes the utterance “m-hmmm” during conversation as a guidepost for resonant voice during ongoing speech. In Verdolini’s approach, the Lessac work is used as a springboard for a systematic, programmatic training program. In this program, therapy is usually provided once weekly for 8 weeks. Each therapy session involves work on the “basic resonant voice training gesture,” a special type of humming, and application to functional phrases and ultimately conversation or singing. This approach to RVT emphasizes attention to sensory information and exploration rather than analytic explanations about physiology.

## MECHANISM

Several studies now indicate that easy, resonant voice tends to be produced with vocal folds that are barely touching or barely separated. This posture appears to produce the strongest, clearest voice output for the least amount of vocal fold impact stress. This posture also requires the least amount of lung pressure to vibrate the vocal folds. Therefore, resonant voice is a relatively strong, clear voice which appears to provide some protection from injury and is physically easy to produce.

The approach to learning in RVT as described by Verdolini and colleagues is based on current mind-brain models of skill acquisition, according to which feeling, hearing, and seeing are more important in learning new skills than analytical explanations.

## EFFICACY STUDIES

Thus far, one controlled study has provided some evidence that an intensive form of Resonant Voice Therapy, as described by Verdolini and colleagues, may be beneficial in the treatment of vocal fold nodules. Thirteen adult females with nodules received either Resonant Voice Therapy + Vocal Hygiene Treatment, Confidential Voice Therapy + Vocal Hygiene Treatment (see next subsection), or Vocal Hygiene Treatment alone for nine therapy sessions in two weeks. Two weeks after therapy ended, greater benefits were seen from both Resonant Voice Therapy and Confidential Voice Therapy as compared to Voice Hygiene treatment alone. The success of Resonant or Confidential Voice Therapy did not depend on which of the specific therapies patients had received. Rather, success depended on whether the patient reported actually *using* the voice therapy technique outside the clinic. Patients who reported using either Resonant or Confidential Voice techniques in real life tended to show benefits from treatment. Patients who reported not using the techniques did not show benefits.

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# Vocal Function Exercises

## APPLICATION

Vocal Function Exercises, which are specific exercises aimed at exercising the laryngeal muscles, can be used for most voice disorders involving hyperfunction (too much muscle activity) or hypofunction (too little muscle activity). Examples of conditions for which Vocal Function Exercises may be useful include benign laryngeal lesions (e.g., nodules, polyps, cysts), laryngeal paralysis or weakness, and functional voice disorders without any known organic basis.

## DEVELOPERS

In the 1950s, Dr. Bertram Briess described voice therapy techniques based on specific laryngeal exercises. More recently, Dr. Joe Stemple and colleagues have developed a cohesive laryngeal exercise program, formally known to as “Vocal Function Exercises” (called VFE in this booklet).

## DESCRIPTION

The notion behind VFE as described by Stemple and colleagues is this: It should be possible to treat laryngeal muscles just as any other muscles of the body are treated in physical fitness programs. That is, it should be possible to increase the bulk, strength, and coordinated interaction of laryngeal muscles through a program of systematic exercise. In the VFE approach, specific exercises are practiced twice daily. Exercises include maximum vowel prolongation and pitch glides. The patient records the results from each session and, thus, is able to track progress.

## MECHANISMS

Good maximal vowel prolongation requires several muscular capabilities. First, the vocal folds must close well during each cycle of vibration. Second, the respiratory muscles must work to provide enough airflow for the vocal folds to vibrate, but not so much that the folds are “overblown,” causing air losses. These activities require not only strength and endurance of the laryngeal muscles, but also exquisite coordination between these muscles and the muscles of respiration. Thus, practice on maximal prolongations should improve the strength and endurance of the vocal folds muscles and also the coordination of respiratory and laryngeal muscles. Further, the vocal fold closure pattern required for maximum prolongation – the barely adducted laryngeal posture – is the same one already discussed for Resonant Voice, which tends to produce the strongest, cleanest voice for the least amount of vocal fold impact and the least amount of respiratory effort.

High pitches – also included in the exercises as part of the pitch glides – require the contraction of other muscles besides the vocal folds themselves (the “cricothyroid muscles”). Activation of these muscles causes the thyroid and cricoid laryngeal cartilages to rotate relative to one other, stretching the vocal folds and making them vibrate faster. On the other hand, low pitches require the contraction of the vocal fold muscles themselves. By practicing pitch glides to high and low pitches, the cricothyroid and vocal fold muscles should be exercised, increasing their strength, bulk, and perhaps endurance.

## EFFICACY STUDIES

Thus far, the published studies on the effectiveness of VFE have been conducted on healthy subjects. In one study, 35 female adults with no histories of voice disorders performed either VFE, placebo exercises, or no exercises over a four-week period. After the four-week period, maximum vocalization time and pitch range did improve in the VFE group. In contrast, no significant changes were noted in these functions in the placebo or control groups (Stemple et al., 1994). Similar findings were shown in another study which assessed singers who performed VFE, versus a control group who did not (Sabol et al., 1995). Studies formally assessing the effects of VFE in patients with voice disorders are underway.

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# Confidential Voice Therapy

## APPLICATIONS

This type of therapy is most useful when voice conservation is required. That is, Confidential Voice Therapy is most used when vocal fold injury is recent, or the patient has just had surgery on the vocal folds.

## DEVELOPERS

Confidential Voice Therapy or similar types of therapies have been used by clinicians for many years in Speech-Language Pathology. However, Dr. Janina Casper appears to have been the first to use “Confidential Voice” in print (Colton and Casper, 1990, 1995) to refer to an easy, quiet, breathy voice, as if speaking confidentially to someone at close range.

## DESCRIPTION

Confidential Voice Therapy does not necessarily involve a single procedural protocol from start to finish for all patients. Rather, clinicians adapt CVT to the particular situation. Usually, the clinician starts off by showing the patient how to produce quiet, easy, breathy voice. Most patients are able to mimic this production relatively quickly and carry it over to conversation without much further training at all. The main challenge is remembering to do it. Because Confidential Voice is quiet, by definition, it is usually used in therapy for only a few weeks following an acute injury. After some recovery has been achieved, therapy may progress with the training of stronger - but safe - ways of talking.

## MECHANISMS

The likely reason that CVT helps to protect the vocal folds is quite simple. When voice is produced quietly and breathy, the vocal folds have small amplitudes of vibration and they don't strike each other very forcefully when they vibrate. As a result, the vocal folds should be protected from injury during a period of intensive healing.

## EFFICACY STUDIES

The main efficacy study that has been conducted for Confidential Voice Therapy (CVT) compared it to Resonant Voice Therapy (RVT), as described in the previous pages. In that study, 13 adult females with nodules were randomly assigned to receive either Confidential Voice Therapy + Voice Hygiene Treatment, Resonant Voice Therapy + Voice Hygiene Treatment, or Voice Hygiene Treatment alone. Treatments were provided intensively over a two-week period. Two weeks after treatment was

finished, the group of patients who had received CVT and RVT showed signs of improvements in the combination of voice and vocal folds. Patients who received Voice Hygiene Treatment alone did not show the same signs (Verdolini-Marston et al., 1995). Confidential Voice Therapy and Resonant Voice Therapy produced approximately equivalent benefits, provided that subjects actually *used* the techniques outside the clinic.

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# Accent Method

## APPLICATIONS

Accent Method can be used for many different types of voice disorders. Many therapists who use the method, which is common outside the United States, feel that it can be used for most voice disorders and also stuttering.

## DEVELOPERS

Dr. Svend Smith of Denmark is credited with the development of the Accent Methods. Other colleagues have continued his work, notably Dr. Kirsten Thyme-Frøkjær and Dr. Borge Frøkjær-Jensen, and Dr. M.N. Kotby.

## DESCRIPTION

The Accent Method involves a very specific, programmatic approach to voice therapy. Basically, the method involves training patients to produce voice with easy, abdominal breathing movements alternating contraction and release, and a relaxed throat and vocal folds. Early training uses rhythmic movements of the whole body to assist in the easy production of voice in this way on nonsense syllables. Later, speech is introduced, ultimately to the conversational level. Rhythmic swaying movements are faded as therapy progresses.

## MECHANISMS

There are many reasons why the Accent Method should be effective in treating many voice disorders. First, the training of new motor patterns may be assisted by the emphasis on steady, rhythmic body movements. The reason is that *timing* appears to be one of the most - or even the most - fundamental aspect of skilled behavior. By emphasizing timing, the rhythmic body movements in training may help new “motor programs” in the brain to be assembled and executed in a coordinated fashion. Second, at least according to informal observations, the vocal fold posture that is trained in the Accent Method is similar to the posture trained in Resonant Voice Therapy. This posture, which involves vocal folds that are barely touching or barely apart, should maximize voice output while at the same time protecting the vocal folds from injury (Berry et al., in revision; Verdolini & Titze, 1995).

## EFFICACY STUDIES

Kotby and colleagues studied patients with lesions on the vocal folds, functional (non-organic) voice disorders, and vocal fold weakness. The authors reported that at the end of treatment, patients had an improvement in their complaints about voice, and their voice quality was specifically improved. Patients with nodules achieved a reduction in the size of the nodules. Smith and Thyme reported that high harmonics increase in the voice with Accent Method, which could lead to improved intelligibility.

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# Lee Silverman Voice Treatment

## APPLICATION

LSVT has been most researched for persons with voice and speech problems from Parkinson disease of unknown cause (“idiopathic Parkinson disease”). However, LSVT may also be useful for patients with atypical Parkinson disease, other types of neurological (brain/nerve) disorders, and possibly for patients with weak vocal folds in general.

## DEVELOPERS

Dr. Lorraine Ramig and her colleagues have developed the LSVT. Prior to LSVT, a small number of clinicians had also developed techniques for voice and speech problems with Parkinson disease, which shared some similarities with LSVT (Scott and Caird, 1983; Robertson and Thompson, 1984).

## DESCRIPTION

LSVT is a very specific, intensive treatment program that emphasizes “loud” speech. In LSVT, therapy sessions are held daily for four days a week, for four consecutive weeks. Patients are also asked to practice therapy exercises outside the clinic. Every therapy and practice session involves work on loud sounds and phrases, and high and low notes. The new “loud” voice is then applied to functional tasks including conversation, talking on the telephone, shopping, lecturing, etc. A critical aspect of treatment is that patients are taught to “recalibrate” (get used to) a new loudness level, because the loudness that they think is normal is actually too quiet. By getting used to the new loudness level, patients not only reacquire a louder voice than before, but their pronunciation and inflection also tend to improve as well.

## MECHANISMS

When patients talk loudly, both vocal fold closure and articulatory precision in speech tend to improve. There seems to be something special about voice in the brain’s hierarchy of speech control: Loud voice generates improved pronunciation, but the reverse is apparently not true. In fact, by talking “loudly,” patients not only tend to be heard and understood better due to stronger voice and articulation; for many patients, facial expressiveness also tends to improve. Therefore, patients who have received LSVT often seem more involved in communication than before treatment.

## EFFICACY STUDIES

LSVT has been the most studied of all types of voice therapy. Several excellent studies have been conducted and reported. In one study, 45 adults with Parkinson disease received either LSVT or respiration therapy for four weeks. At the end of

treatment, patients in the group that had received LSVT had more improvements in voice and speech than patients who had received the respiration therapy (Ramig, Countryman, Thompson, & Horii, 1995). Further, only patients who received LSVT perceived an improvement in the effect of their disease on communication. In a follow-up study, 35 adults with Parkinson disease were studied immediately after LSVT or respiration therapy, and 6 and 12 months later. This study indicated that patients who had received LSVT were still louder than before therapy one year after therapy had been completed. Instead, patients who had received respiratory therapy were not louder, or were even quieter than before therapy had begun (Ramig, Countryman, O'Brien, Hoehn, & Thompson, 1996).

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# Laryngeal Massage

## APPLICATION

Laryngeal massage can be used for any voice condition involving tension in or around the larynx. It is probably most often used for patients whose voice problems are not based on any known lesions or disease (“functional” voice problems).

## DEVELOPERS

Dr. Arnold Aronson developed, used, and described a specific technique for laryngeal massage. Also Dr. Murray Morrison has promoted massage of the laryngeal area. Dr. Nelson Roy has formally studied the effect of laryngeal massage for patients with functional voice problems. Finally, Dr. Jacob Lieberman of Great Britain has developed a relatively deep massage technique for the larynx partly based on his training as a Doctor of Osteopathy.

## DESCRIPTION

Laryngeal massage in the context of voice therapy usually refers to a specific technique or approach to massage rather than just a general rubbing around the larynx. The most completely described type of massage, developed by Aronson (1990), is called the “manual laryngeal muscle tension reduction procedure” (Roy & Leeper, 1993). In this procedure, the clinician massages the laryngeal area, starting with the hyoid bone at the angle of the chin, and moving to the thyroid cartilage. The larynx is moved from side to side as well as downward, and various types of rotary and other movements are used. Depending on the clinician, laryngeal massage may be relatively shallow or deeper. Only clinicians with excellent knowledge of head-and-neck anatomy and familiarity and experience with laryngeal massage should attempt the deeper approaches in particular.

## MECHANISMS

Laryngeal massage should help to reduce muscular tension in and near the larynx for the same reasons that massage helps to reduce muscular tension in general. If a muscle is too tense, it is too contracted—or shortened. By placing the fingers into the muscle belly, the muscle is lengthened and it should relax. Often, this type of mechanical relaxation is faster to achieve - and more effective - than relaxation which the patient attempts to achieve by him- or herself. Massage may also help to loosen joints which hold muscles too taut, and such loosening may be of great functional benefit as well (Barassi, personal communication). Although there are many, many benefits of massage in general, the direct stretching of laryngeal muscles is probably one of the more important mechanisms for benefits seen with voice disorders.

## EFFICACY STUDIES

The most direct studies about the efficacy of laryngeal massage have been reported by Roy and colleagues. In one study, 17 patients with functional voice problems (no organic involvement) were seen for a single treatment session involving an interview and laryngeal massage. Most patients achieved a notable improvement in the sound of their voices within the session (Roy et al., 1993). In another study, 25 patients with functional voice problems were assessed before and after a laryngeal massage treatment session. That study showed that most patients had marked improvements in their voices with treatment. Most patients (68%) did experience some relapse in their symptoms afterwards, but this tended to be relatively brief (usually less than 4 days) and tended to resolve on its own (Roy et al., 1997). Finally, although the treatment of choice for most cases of spasmodic dysphonia is botulinum toxin, Roy and colleagues have explored the role of laryngeal massage in the treatment of this condition as well (Roy et al., 1996).

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# Facilitating Techniques

## APPLICATION

Although the “facilitating techniques” are often used for patients with hyperfunctional (“overactive muscles”) voice disorders, in fact they can be used for almost any type of voice problem. They do not constitute a single, cohesive, programmatic approach to voice therapy. Rather, the techniques are used singly and in combination to obtain various target behaviors in voice therapy.

## DEVELOPER

Dr. Daniel Boone has systematically compiled the most recognized - and most used - facilitating techniques, some of which were originally described by other clinicians.

## DESCRIPTION

Boone lists 25 classic facilitating techniques, which are used by many speech-language pathologists. The techniques include: (1) altering tongue position; (2) changing loudness; (3) chant talk; (4) counseling (explanation of problem); (5) digital manipulation; (6) ear training; (7) elimination of abuses; (8) elimination of hard glottal attack; (9) establishing a new pitch; (10) feedback; (11) focus; (12) glottal fry; (13) half-swallow, boom; (14) head positioning; (15) hierarchy analysis; (16) inhalation phonation; (17) masking; (18) nasal/glide stimulation; (19) open-mouth approach; (20) pitch inflections; (21) relaxation; (22) respiration training; (23) tongue protrusion; (24) warble; (25) yawn-sigh.

The designation “facilitating techniques” describes the techniques aptly. They are used to facilitate the production of good voice, however this is defined in the particular case at hand.

## MECHANISM

The techniques are diverse, and there is no single mechanism that underlies potential benefits for all of them. One of the more studied techniques has been “yawn-sigh.” Both published studies and clinical observation indicate that yawning tends to drop the larynx and widen the space between the vocal folds (Boone & McFarlane, 1993; Xu et al., 1991). For patients who press their vocal folds together tightly when they talk, the yawn often helps to loosen the pressing if performed during speech. The result should be an increase in comfort and ease of voicing, and also a reduction of impact stress between the vocal folds during voicing.

## EFFICACY STUDIES

One of the facilitating techniques, digital manipulation, has been described and studied by several authors. As described in greater detail elsewhere in this booklet (“Laryngeal Massage”), Roy and colleagues have reported a remarkable, formally documented improvement in “functional” hoarseness (without known organic basis) after one session of digital manipulation or laryngeal massage (Roy & Leeper, 1993). The same authors reported that although many patients do tend to experience a relapse of their symptoms at some point after treatment, recovery tends to be relatively rapid (Roy et al., 1997).

Although not explicitly listed as a formal “facilitating technique,” also “vegetative maneuvers” such as coughing and gargling may be used as *de facto* facilitators in cases of “functional” voice loss, due to stress or other unknown causes. Formal efficacy studies have not been conducted, but most clinicians agree that these gestures, in the hands of an experienced clinician, generally re-establish normal or near-normal voice in one or two therapy sessions if the voice loss is truly functional. Anecdotal published reports support this impression (Aronson, 1969; Boone, 1965).

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# Cognitive-Behavioral Therapy

## APPLICATIONS

This type of treatment is most often used for patients with functional voice disorders (without known organic cause) whose voices do not get better with other types of treatment.

## DEVELOPERS

Professors Butcher, Elias, and Raven in the United Kingdom have developed this approach to voice therapy, which unites psychotherapy methods with traditional voice therapy methods for patients with stress-related voice disorders.

## DESCRIPTION

Cognitive-behavioral therapy in general arises from relatively recent traditions in psychotherapy. According to the *cognitive* therapy framework, some psychological disorders including depression are tightly linked to thought processes. In particular, people with depressive disorders are often found to focus on negative thoughts, especially those that cause them to see themselves in a negative light. Depressed patients may also tend to over-generalize negative conclusions. Cognitive therapy focuses on getting patients to notice irrational thought processes that preferentially focus on negatives and helps them to readjust these processes. Behavioral therapy, on the other hand, focuses on strengthening desired behaviors through what is called “classical” and “operant” conditioning - in brief, pleasant events are associated with desired behaviors, so that the desired behaviors are likely to occur again. Cognitive-behavioral therapy in voice, as developed by Butcher and colleagues, helps patients to notice characteristic thought patterns surrounding voice problems, and to apply cognitive and behavioral strategies to alter them if appropriate. Relaxation training is also provided.

## MECHANISMS

If a voice disorder is at least partly caused by depression, stress, or anxiety, there is good reason to think that a cognitive-behavioral approach should help. First, in psychotherapy, serious, well-conducted studies have indicated that cognitive therapy (and its cousin rational-emotive therapy) can be effective in the treatment of depression and anxiety. Thus, it is entirely reasonable to attempt a similar approach when treating voice disorders caused by depression or anxiety. The logic is as follows. There is evidence that depression and anxiety can be seen as “thought” disorders. If the thought processes can be improved, then so should depression and anxiety be improved. If depression and anxiety in turn cause muscular tensions which cause voice problems, then an improvement in the depression and anxiety should improve

voice as well. An important aspect of cognitive-behavioral therapy for voice problems is that the thought processes addressed in therapy mostly relate to voice rather than to other psychological issues, which are best treated by a qualified psychologist. Also, in cognitive behavioral therapy for voice problems, actual voice work is added to the cognitive work, to assist in a change in voice patterns.

## EFFICACY STUDIES

Several articles have been written on this approach to voice therapy for stress-related voice disorders. In one study, 6 of 12 patients who had not gotten better with prior voice therapy did improve with cognitive-behavior therapy (Butcher et al., 1987; 1993).

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# Body Awareness and Movement Training

## APPLICATIONS

Body awareness and movement training are traditional aspects of voice training in theatre. Clinically, the training may be relevant for any person wishing to engage in voice enhancement, whether as the result of a voice disorder or not. More information about theatre voice training may be found on pages 54-58.

## DESCRIPTION

There are many different approaches to body awareness and movement training. Two of the more widely used are Alexander Technique and Feldenkrais Method. Both are approaches to movement education that help people to become aware of how they habitually “use” themselves and offer alternative, more effective choices for use. “Use” in this context can be thought of as referring to how one moves the body from moment to moment. Although use is commonly described through static terms such as “posture,” “alignment,” or even “manner of breathing,” in these traditions it is considered counterproductive to address poor physical habits by forcing the body into a correct “position” or even attempting to “breathe correctly.” Rather, self-awareness and kinesthetic sensitivity are the essential training tools. Alexander and Feldenkrais teachers undergo extensive training and can be located through the respective professional associations: Feldenkrais Guild of North America or North American Society of Teachers of the Alexander Technique (NASTAT).

## MECHANISMS

There are many reasons why movement training should enhance vocalization. First, voice production is an essentially physical event integrated into a whole-body system. It is logical that attention to the biomechanical whole should favor the function of the biomechanical parts specifically dedicated to voice. Moreover, Alexander and Feldenkrais body training traditions not only focus on “which” movements may be biomechanically favorable, but also on “how” movements can be conceived and executed to maximize both physical achievement and ease. The “how” of body training may be an extremely relevant adjunct to almost any type of voice training program described in this booklet.

## EFFICACY STUDIES

Although both Alexander Technique and Feldenkrais Method are widely used in many arenas including voice training, the primary efficacy studies indicating possible or likely benefits have been conducted in other domains of physical medicine. Examples include eating disorders, low back pain, and depression associated with Parkinson disease (Cottingham and Maitland, 1997, Laumer et al., 1997; Stallibrass, 1997).

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# Biofeedback Training

## APPLICATION

Biofeedback training is a method of treatment that can be used for any type of voice problem. It may be especially useful for patients who have difficulty hearing and feeling subtle differences in voice production that are targets of voice therapy. It may also be useful when the clinician would like clearer information about what the patient is doing with his or her vocal folds than is possible based on the sound of the voice.

## DESCRIPTION

Biofeedback involves the use of an external device to indicate some aspect of body function. Biofeedback has been used and studied for many different medical problems, including tension headache, muscle weakness after stroke or spinal injury, swallowing problems, sleep disorders, and anxiety. Many biofeedback systems use visual information provided to the patient by an external monitor about a biological function of interest. Other biofeedback systems involve auditory “beeps” or other sounds to signal that a biological function is approaching - or not approaching - a target state. In voice disorders, biofeedback systems have included electromyography to monitor muscle activity near the vocal folds, video images of the vocal folds as they move during voicing, and acoustic information indicating pitch, loudness, and voice quality. For paradoxical vocal fold movement (PVFM), videoendoscopic biofeedback of vocal fold behavior during breathing is often a critical component for patient success. Essentially, the clinician’s role is to identify and set up the equipment, explain and demonstrate the appropriate task to the patient, and help the patient interpret the signals as needed. Because of the very nature of this method of training, however, patients fundamentally train themselves.

## MECHANISM

The basic idea behind the use of biofeedback for any problem is that often people are not aware of important body functions such as heartbeat, blood pressure, muscle tension, etc. By using an external device that provides clear, simple and reliable information, the patient may be able to stabilize complex physical changes and maintain them after the device is withdrawn. There is evidence that biofeedback increases patients’ sense of their own internal ability to control biologic functions (for example, Rocicki et al., 1997). The whole notion of biofeedback seems so sensible that it is hard to imagine why it is not routinely used in all voice treatment, especially because many aspects of voice production (including vocal fold movement) are not visible and therefore the actual goal in treatment sometimes seems vague. It is likely that biofeedback will be increasingly used in voice therapy over the coming years.

However, one concern is whether patients can *maintain* what they learn with biofeedback once the biofeedback device is withdrawn. Systematic introduction and withdrawal of the device may be important for carry-over to real-life situations.

## EFFICACY STUDIES

A relatively small number of studies have been conducted on the efficacy of biofeedback for voice disorders. However, most of them are encouraging. In one study by Stemple and colleagues (1980), men and women with nodules received seven sessions of electromyography (EMG) biofeedback treatment over a four-week period. This treatment involved the placement of electrodes over the surface of the neck muscles to indicate general laryngeal muscle activity. One no-biofeedback session was also included during the treatment period (possibly an important detail). At the start of the study, patients tended to show abnormally high laryngeal tension in both silence and speech. Two weeks after treatment, patients' laryngeal tension had improved to normal or near-normal levels. Most of the patients had an improvement in their nodules as well. Another EMG study by Andrews and colleagues (1986) also showed positive results from EMG biofeedback in patients with hyperfunctional voice problems (although the results with more traditional progressive relaxation were just as good). (See also Schliesser, 1987).

In another venue, Bastian (1987) reported that patients who did not use their vocal folds to produce voice learned to do so with the use of videoendoscopic biofeedback, which involved the use of a camera showing vocal fold movement. Furthermore, the patients retained the improvements after the biofeedback was withdrawn. Again in this study, an important experimental feature for long-term carry-over was the systematic alternation of biofeedback and no-biofeedback trials during training. In fact, in another study looking at video biofeedback for voice disorders, when this type of alternation was not used, patients did not maintain any benefits of training when the biofeedback was taken away (Verdolini, Barkmeier, Rubin, & Miller, 1997).

Finally, some studies have indicated that carry-around biofeedback monitors may be useful in reducing loudness, if this is a problem (e.g. Holbrook et al., 1974; Lodge & Yarnall, 1981).

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# Transgender Voice Treatment

## APPLICATIONS

This type of treatment is appropriate for persons genetically members of one gender, who prefer to function as the other gender. Male-to-female transgender work is more common than the reverse.

## DESCRIPTION

Transgender treatment in voice involves work on many aspects of voice, and indeed communication in a broader sense. In male-to-female transgender work, the more common type, the goal of treatment is not necessarily an increase in pitch in speech. Although sometimes increased pitch is a by-product of treatment, in fact researchers have found that voice *quality* is as important or even more important for gender identification than voice *pitch*. Most patients are taught to use a gentler, breathier voice than is common for most males. Patients are also taught to use greater inflection than the typical male. Gentler articulation, hand gestures and posture, and even certain gender-specific choice of words and sentence structure are also typically addressed.

## MECHANISMS

It is quite clear to anyone who has worked in the transgender domain that gender identification goes far beyond the most obvious gender-specific voice or speech characteristic: pitch. Gender communication styles involve far broader issues. Thus, it makes sense that treatment should be approached from a broad perspective including work on voice quality, inflection, articulation, hand gesturing, and posture.

## EFFICACY STUDIES

We are not aware of efficacy studies that have been conducted on transgender voice treatment, *per se*. However, several excellent treatises have been published. Also video training materials exist that can be valuable references for persons with transgender issues and their clinicians.

## REFERENCES

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# Relaxed Throat Breathing Techniques

## APPLICATIONS

These techniques are useful for persons with “Paradoxical Vocal Cord Motion (PVCN).” This condition is not strictly a voice disorder, although sometimes people with PVCN also have hoarseness. PVCN involves an involuntary closing of the vocal folds while attempting to inhale, in the absence of any physical cause (disease or obstruction). The airway closure prevents air from getting into the lungs. Patients can become quite panicked and even hospitalized. Often, the condition is confused for asthma, especially because it sometimes occurs in people with asthma.

## DEVELOPERS

Dr. Florence Blager, Dr. Diane Bless and Edie Swift, MA, CCC-SLP, are among the foremost clinicians to have written and spoken about treatment techniques for PVCN.

## DESCRIPTION

An important aspect of any treatment for PVCN is reassuring the patient that nothing is physically wrong with him or her, and he or she will be able to learn how to control breathing so that the breathing attacks do not occur. The patient is taught to breathe in and out with deep, relaxed belly movements, sometimes called “abdominal breathing.” Then, the patient is taught to breathe in relatively deeply and quickly (sniffing) through the nose with a relaxed and slightly expanded throat (as for a yawn) and exhale slowly through the mouth. It is critical that the inhalation is achieved without shoulder elevation or tension. Visual feedback via videoendoscopy is a common tool used to establish the therapeutic breathing pattern. The procedure may be repeated for several minutes, once or more daily. If a breathing attack does occur, the patient is instructed to cough lightly, or laugh lightly, perhaps swallow, and then start Relaxed Throat Breathing. The cycle can be repeated if needed to interrupt the breathing problem. Other techniques may be added, but these are usually the basic ones that patients learn in order to stop an attack. The interruption of the breathing attacks are very important, so that the patient is not inappropriately and even aggressively treated for asthma or another breathing problem that may co-occur with PVCN but is actually different from it.

## MECHANISMS

The basic mechanisms underlying the success of this treatment involve (1) the fact that the patient is actually able to control his or her vocal muscles, even though it may feel as though this is not possible before training; (2) deep sniffing in through the nose,

with a relaxed or yawning throat helps to open up the vocal folds and lower the larynx, so that they do not block off the air from entering the lungs. Once the patient feels that he or she is breathing normally, panic subsides and normal spontaneous breathing takes over.

## EFFICACY STUDIES

Several clinical papers have been published on this type of approach to PVCN. In one study, 40 patients who had received treatment for PVCN were described. Some of these patients had asthma along with the PVCN. Ninety percent of the patients indicated that they had strong improvement in controlling their breathing attacks following therapy using Relaxed Throat Breathing techniques.

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# Voice Training for Singers

## CLASSICAL (OPERA)

The operatic style of singing requires maximizing vocal output through coordination of breath, phonation and resonance. Premiere singers of the opera stage are truly the “Olympic athletes” of voice use. Historically, many technical approaches have been used to achieve the operatic ideal, often based on regional or national preferences. We now, however, increasingly hear a truly international sound that is based on current knowledge of voice physiology and acoustics.

Breath is the power source of the operatic voice. Singers increase breath efficiency and control through the coordinated use of the muscles of in- and exhalation. While emphasis in this process can be given to different anatomical regions, such as the chest, back or abdomen, most singers tend to rely on a sense of muscular balance exemplified in the Italian concept of *appoggio* (leaning on the breath), which uses the muscles of the abdomen to exert a counter-pull against the muscles of the ribs and the diaphragm, helping to regulate breath pressure and flow.

Operatic phonation requires crisp and complete glottal closure, which helps to insure that sufficient high-frequency overtones are present in the sound. The larynx is held in a relaxed or somewhat lowered position with minimal tension in the neck, throat, tongue and jaw. Singers tend to maximize the size of the vocal tract by lowering the jaw, lifting the palate and gently lowering the larynx, maintaining a position that is often compared to the “beginning of a yawn.”

The operatic sound is characterized by a distinct ringing timbre, which is the result of particularly strong overtones in the region between 2,400 – 3,200 Hz. This “singer’s ring” (singer’s formant) provides brilliance in the sound and enables the voice to be heard over the sound of a symphony orchestra without electronic amplification. Vibrato in the operatic voice is usually apparent at all times and occurs at a remarkably even pace. Normal vibrato oscillates approximately 4.5-6.5 times per second; slower speeds often sound heavy or wobbly, faster speeds often sound nervous or tremulous (although light *coloratura* sopranos frequently sing with very rapid vibratos, enabling them to negotiate runs and scales with remarkable agility).

## POPULAR (ROCK, BROADWAY, FOLK, ETC.)

The popular style of singing displays an enormous range of sounds and styles. Individualism is prized in timbre, style and interpretation; indeed, what would be heard as a serious vocal defect in a classical singer might be the very quality that makes the pop star famous (e.g. the hoarseness of Janis Joplin or the breathiness of Michael Bolton).

Pop singers - especially women - often rely on a technique referred to as *belting*. The belt voice is usually produced with a lifted larynx supported by very high breath

pressure, resulting in a clear, strong sound that borders on stridency at the highest pitch levels. Vibrato is used in moderation, often appearing exclusively at the end of long, sustained pitches. Belting can be accomplished in a healthy manner through careful attention to breathing and muscular relaxation in the neck and throat; however, it can also lead to vocal problems, such as nodules or chronic hoarseness.

Few pop singers receive the rigorous vocal training experienced by their classical counterparts. Sometimes this is the result of concern that formal training will rob the singer of his/her individuality. Singers such as Elton John, whose career was saved by voice therapy and training following a serious voice disorder, prove that this concern may be ungrounded.

Singers in popular genres who have vocal problems often benefit from the same corrective measures used with classically trained singers, including paying better attention to breathing, breath control and posture, remaining free from tension in the vocal mechanism, and maintaining an appropriately resonant sound.

## SUGGESTED READING LIST

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# Theatre Voice Training

Voice and speech training is a key element of theatre training. Actors must know how to use their voices in many different ways, some potentially dangerous, without hurting themselves. They must also be able to express themselves and communicate their thoughts, feelings and emotions through the voice. For most people, this ability requires training.

Why is this relevant to people who are not in theatre? Because the material and techniques taught in theatre classrooms are, actually, applicable to anyone who uses her/his voice. Some speech pathologists specializing in voice rehabilitation use theatre-training techniques in the therapy room. Others refer patients to theatre voice trainers for more extensive voice work once injury is healed. The two fields (theatre and speech pathology voice training) share many elements and have a lot to offer one other.

The overarching goal of most theatre voice and speech training is to “open” and free the voice, and to eliminate restrictions that stop us from vocally expressing ourselves freely. Many theatre voice trainers believe that we are all born with perfect voices, but a lifetime of habits can constrict the voice in a way that decreases its flexibility and strength. These constricting habits can come from a variety of sources, be they physical, emotional or even psychological.

Different types of theatre voice training do not lend themselves to the categories used for discussion of voice therapy methods in this booklet. Theatre training methods are usually named after the person who systematized the techniques. Also, there is to date little research on specific voice training methods. Therefore, this section will be organized by themes that are common in theatre voice and speech training. The themes were originally enumerated in an article by Kate DeVore and Katherine Verdolini entitled “Professional speaking training and applications to speech-language pathology” (1998).

## EXPERIENTIAL TRAINING

Experiential (hands-on) training is a key element in theatre voice and speech training. So much so, in fact, that written work about the techniques is relatively rare. Learning by apprenticing with advanced teachers and attending workshops with master teachers is a common way for advanced training to take place. So the teachers themselves learn by doing, and they pass this style of learning on to their students. Many advanced theatre training programs have up to three years of voice and speech work, so students are often able to discover truths about their voice and how to use it through guided explorations, rather than being told what to do. These explorations usually involve attention to physical, sensory information. Increasing awareness of

physical sensations is a good tool for actors to learn to focus on the present, and also has the benefit of keeping the analytic mind from interfering with learning a motor skill.

## TRADITION OF MASTER TEACHERS

A second theme relates to a common method of sharing information in the theatre tradition. Some pioneers in theatre voice training have been acknowledged as master teachers, many because they authored some of the first and most influential books in the field. Many theatre voice trainers study with these master teachers, or with designated teachers of their methods. This discussion will touch on some of the widely recognized master teachers and their training methods.

**Arthur Lessac** began his career as a singer. His first book dedicated to voice was “The Use and Training of the Human Voice” (1967). Lessac’s system of voice training is one of the first that was distinctly American (British theatre training employed voice and speech teachers before American training programs did, and much voice and speech training in the U.S. has come from England). Lessac’s work focuses on increasing awareness of potentially numbing habits, then changing them to habitual awareness and “active” relaxation.” Lessac focuses on three “actions”: structural action, tonal action and consonant action. Structural action relates to lengthening the vocal tract and releasing tension from the mouth and face to promote easy, free voice. Tonal action focuses on the physical sensations of vibrations in the bones of the palate and skull, creating sound that projects effortlessly and without the likelihood of vocal injury. Consonant action assigns a musical instrument, along with its vibratory characteristics, to each consonant sound. The speaker explores speech sounds in such a light, and then brings the fruits of this exploration to the act of communication. Used together in varying concentrations, the three actions can lead a speaker to wide vocal variety, creativity and flexibility. There is some research on the Lessac system, and the references are noted following this section (Verdolini-Marston et al., 1995; Verdolini et al., 1998).

**Kristin Linklater**, a student of British master teacher Iris Warren, brought her method of teaching to the United States in the 1960s. The core of Linklater training is summed up by the title of her first book, “Freeing the Natural Voice.” She believes that we all have perfect voices, many of which are “hidden” behind physical and psychological constrictions. Thus, her work is intended to help uncover the underlying gem of a voice by releasing these unwanted tensions. Fostering a strong connection to breath is a trademark of her work, as she believes that the breath is connected to the (vital) impulse to speak. The Linklater method helps students release tension from the vocal tract and surrounding areas (jaw, shoulders, neck, and eventually the whole

# Theatre Voice Training

body), and explores the different resonance chambers in the human body as a tool for expression and communication. Another major focus in her work is a connection to the meaning of the text that is being spoken. Linklater has designated teachers other than herself to teach her method; designated Linklater teachers have gone through a specific training program approved by Ms. Linklater.

**Edith Skinner**, a student of Australian phonetician William Tilly, began teaching in the United States in the first decades of the 20<sup>th</sup> century. Her work is based largely on the International Phonetic Alphabet and phonetic transcription, and she taught “good American speech”. While the thrust of her work was pronunciation and articulation (instead of voice), many teachers have found that resonance and voice can be trained and freed through work on speech. Her method of training is very precise, requiring much drill and repetition. While the skill of people trained in “good American speech” is immense, the resulting sound is sometimes perceived as no longer desirable, and is often relegated to classical theatre. Unlike the Lessac system and Linklater method, speech pathologists are unlikely to use the work of Skinner in the treatment of voice disorders. For the serious voice and speech student, however, there is the potential for wonderful “ear training” and skill development with Skinner’s work.

There are many other master voice teachers, some who have written one of more books on the topic. Patsy Rodenburg, Cicely Berry, Clifford Turner and Evangaline Machlin fit into this category. The reader is encouraged to read about their work in books noted in the reference section that follows.

## BODY/VOICE CONNECTION

Many voice students find that physically-based training can be helpful. The Feldenkrais and Alexander techniques, described elsewhere in this booklet, make use of the intrinsic connection between body and voice to open and free the voice. Thus, we see that the emphasis on physical sensations in training is not the only connection between voice and the body.

A third theme that emerges in theatre training is indeed this connection between the voice and the body. Many theatre voice trainers believe strongly in an integration of voice and movement, as the production of voice and speech is a physical act and the body is the instrument. Some teachers even train voice and movement in one class, finding that opening one area enhances growth in the other. Regardless of whether they choose to merge the training, however, most teachers agree that the body enters into voice training to a very high degree, otherwise the student might end up sounding like a “talking head,” not connected to their physical selves as they speak.

## CONNECTION TO MEANING AND EXPRESSION

A fourth theme regards a connection between voice, speech, language and expression. Much advanced voice training is done while working on meaningful text, and connection to the meaning of what is being spoken is key. Voice and speech are clearly related, and some teachers prefer to train them together instead of separately so that articulation is connected to the emotional expression through voice. Likewise, language and the understanding of all that is being said is vital to communication and therefore to theatre voice training. And expression, finally, is why we do this work in the first place. Voice training is viewed as part of something more meaningful than just producing a beautiful tone.

## CRITICAL IMPORTANCE OF VERBAL COMMUNICATION

Indeed, the final point of discussion relates to the critical importance of the spoken word in theatre voice training. Most theatre voice trainers believe that the ability to express ourselves through spoken language is an essential part of the human experience. Perhaps it is this dedication to the monumental importance of voice and speech to existence that has spawned the remarkable degree of creativity apparent in the field of theatre training.

Anyone can benefit from voice training. If the reader feels that continued training for the non-disordered speaking voice would be helpful, most university theatre departments have voice teachers who can serve as a referral source. Local theatres and theatre organizations can also provide information about voice and speech training. More information about voice and speech training is available through the Voice and Speech Trainers Association (VASTA), whose website is at [www.vasta.org](http://www.vasta.org).

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