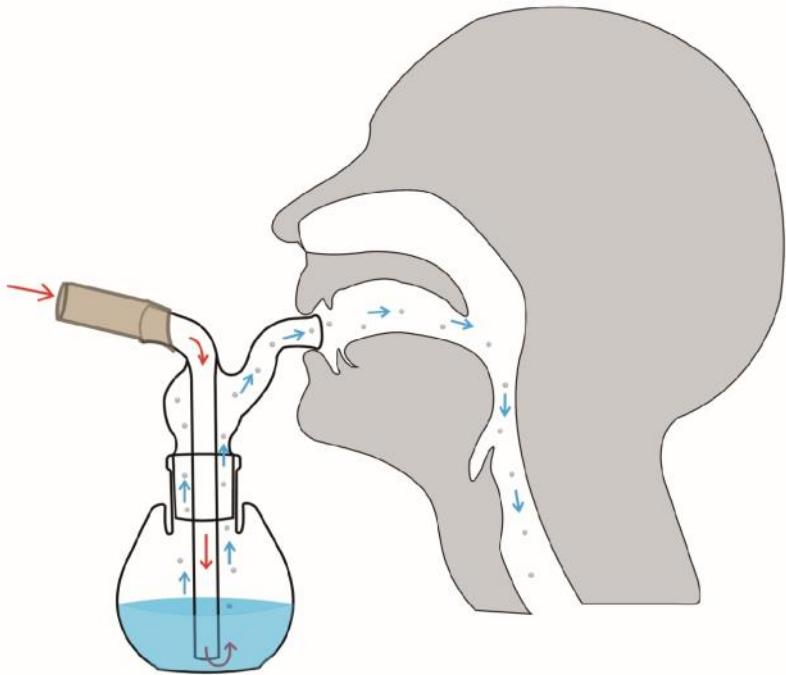


DoctorVox Voice Therapy Technique:

Bridging The Gap Between Theory And Practice

Ilter Denizoglu



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Voice therapy is any kind of method that changes voice in a behavioral way. The main goal of voice therapy techniques is a target voice. Target voice maybe named as 'good', 'normal' or 'natural' voice but not everyone, especially not those who have irreversible neurologic or vocal fold lesions, can achieve a normal voice. The rational, then, is to obtain a target voice that is the best possible voice within the patient's anatomic and physiologic capabilities. Aims of a given therapy method must focus on various physical-physiological or structural-functional issues. These goals may be directly aimed or some indirect outputs of the process can be obtained.

Voice therapy techniques can be classified in two main groups: indirect methods and direct techniques. Indirect methods deal with the causes which have negative effects on voice production such as vocal hygiene, voice rest, posture, breathing, etc. Direct techniques, on the other hand, aim to change the muscular contraction pattern which defines how voice will be produced.

VOICE THERAPY
(A Motor Learning Approach)

1. INDIRECT METHODS

Counseling
 Voice rest (Absolute/Modified)
 Vocal hygiene
 -Elimination of mechanic trauma
 -Laryngopharyngeal reflux management
 -Irritant inhalation
 -Hydration- humidification
 Breath support
 -Abdominodiaphragmatic breathing
 -Schlaffhorst Andersen Method
 -Prosody enhancement
 -Breathing coordination approach
 Posture
 Biofeedback
 -Auditory biofeedback
 -Visual biofeedback
 -Kinesthetic-proprioceptive biofeedback
 Relaxation
 Psychotherapy
 Conscious Medical Hypnosis
 Acupuncture-acupressure
 Phytotherapy
 Neuromuscular electro-phonatory stimulation

2. DIRECT TECHNIQUES

Holistic approaches

Resonant Therapy
 Resonant Voice Therapy (Lessac)
 Chant Talk (Boone)
 Humming approach
 Vocal Function Exercises (Stemple)
 Accent Method (Smith, Kotby)
 Source-force adjustment
 Focusing (muscle specific vocal exercise)
 Vocal tract shaping
 Vertical laryngeal posturing
 Phonetic manipulations
 Semi obstructive vocal tract exercises
 -Consistent backpressure
 -Transitory backpressure
 -Oscillatory backpressure
 -Combined consistent and oscillatory backpressure
(Doctor Vox Voice Therapy Technique)

Specific approaches

Techniques used in hyperfunctional voice disorders
 Yawn and sigh (Boone)
 Laryngeal massage (Aronson)
 Confidential voice therapy (Casper)
 Chewing approach (Froechels)
 Stretch and Flow Technique (Stone)
 Register glide
 Softening glottal attack
 Techniques used in hypofunctional voice disorders
 Lee Silverman Voice Therapy Technique
 Phonation by swallowing
 Lateral compression
 Isometric contraction (Push-pull)
 Pitch management techniques
 Manual manipulation
 Pitch gliding
 Ear training for pitch awareness
 Using vegetative functions
 Head repositioning
 Techniques for psychogenic aphonia
 Paradoxical vocal fold motion therapy
 Vocal granuloma therapy
 Ventricular dysphonia therapy
 Transgender voice therapy

Phonating into glass tubes one end submerged into water is known to be started in Finland in 1950s by Antti Sovijarvi as a therapy approach for velopharyngeal incompetency then for voice therapy. The glass tubes were then called as resonance tubes. Finnish Voice Pathologist Marketta Sihvo then presented the silicone LaxVox Tube (35 cm long and 9-12 mm diameter) and her method. The LaxVox Tube[®] is dipped into a bottle containing water (3-5 cm deep) which provides a practical use. These exercises were modified and expanded by Denizoglu into DoctorVox Voice Therapy Technique (DVT). DoctorVox Therapy is developed for clinical and pedagogical practice combining medical, pedagogical and physical principles. New devices are additionally being devised by Denizoglu (doctorVOX[®], pocketVOX[®], maskVOX[®]) for DVT applications.



Doctor Vox Voice Therapy Technique is a direct technique which directly changes vocal mechanism. It is a holistic approach combining phonation, resonance and breathing in voice therapy. Artificially elongated vocal tract and backpressure (continuous and alternative) are the main physical factors which intuitively balance the several simultaneous functions included in voice production. Various devices provide multichannel biofeedback and enhance treatment adherence in DVT applications.

DVT is *not* the practice of phonating into a tube dipped in a certain amount of water. DVT is not an exercise; it is a multidimensional-multilevel treatment strategy and an integrative approach for a given voice patient. Three levels of DVT survey are distinguished through practice: ***clinician's action plan, exercise patterns and the patient's motor learning state.***

DVT has a dynamic algorithm; there are no exercise templates which fits for all. The clinician has an action plan and use various predefined exercises in order to formulate the treatment program of an individual patient. Exercise, here, is not the goal, it is the tool; it is not a device or a certain exercise which makes the treatment by itself. DVT provides action plan and tools to be used; the clinician decides for each step according to the patient's clinical condition (pathology, clinical survey, motor learning state, state of change, motivation, personal capabilities, etc) throughout the treatment process. The ultimate goal of DVT is to provide healthy and functional voice to the patient. In other words, the target voice is a resonant voice with flow phonation under proper abdomino-diaphragmatic respiration in DVT practice.

DVT principles can be applied to pedagogical vocology as well; it is especially suitable for training the professional voice and sustainability of the vocal performance. The method provides cognitive and motor data for vocal performers who want to learn and understand vocal mechanism and ergonomics. Moreover, it is a method for the daily voice care of anybody.

DVT exercises are muscle-specific; professional vocal performers (singers, actors, etc) may benefit from DVT exercises for vocal muscle development and use them as a vocal fitness program. In addition to physical fitness in the name of sportive performance; vocal economy and safety are crucial for a sustainable vocal performance. Vocal trainees may also use DVT method as a combination of a resonance tube and semi-occluded vocal tract exercise to blend the registers, to develop a stable laryngeal position, to build an optimum tessitura and improve the stamina.

DVT is a therapy of choice for various functional and organic voice disorders such as muscle tension dysphonias, vocal fold nodules, habitual and psychogenic dysphonia-aphonia, unilateral vocal fold paralysis, presbiphonia, puberphonia, preoperative and postoperative phonosurgery.

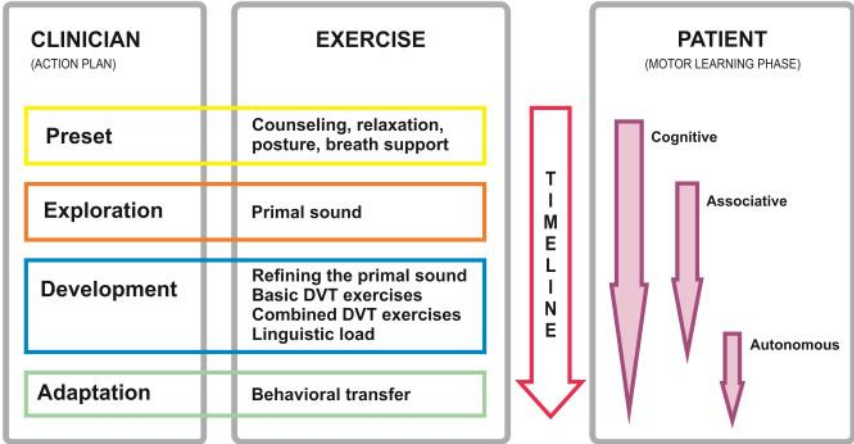
Direct and indirect goals of Doctor Vox Voice Therapy Technique (DVT) are as follows:

1. Tissue healing
 - a. Mucosal lesions (nodules, polyps, edema, etc)
2. Functional efficiency (proper vectoral force distribution at the end effector organ)
 - a. Effective glottal closure
 - i. Proper glottal attack/vibration/damping
 - ii. Stamina and tissue safety
 - b. Effective source-filter relations
 - i. Supraglottal resonator shape
 - ii. Vertical laryngeal position
 - iii. Velopharyngeal valving
 - iv. Formant tuning
 - c. Effective distribution of muscle activity for the *forced* expiration
 - i. Posture and action of the head and neck for laryngeal posturing
 - ii. Posture and action of the body for the major muscular forces of expiration during phonation
3. Motor learning process
 - a. Motor cortex programming for a certain (phonatory) movement pattern and forming a basic motor schema
 - b. Cognitive transfer of motor behavior
 - i. Transferring the basic phonatory motor schema to linguistic activities and/or vocal performance
 - ii. Change in the vocal personality

DVT is an integrative voice therapy approach, the technique and applications refer to only one side of treatment. One important factor should be kept in mind as in other medical treatment methods in general: *technique is a tool, not the goal*. The treatment process should be regarded not only by the clinician’s approach and applications but also the patient’s condition and therapeutic advancements. In this way of multidimensional/ multi-layered thinking, the clinician must have the knowledge and insights about: mechanisms of the exercises, stages of behavioral treatment, phases of motor learning, stages of voice therapy and steps of the technique at the end.

METHOD

DVT does not provide a fixed template or a standard algorithm like ‘one for all’ program. It is a muscle specific, dynamic voice therapy procedure. Therapy program is not composed of vocal exercises solely; the whole system is to be considered at once.



There are three main factors in clinical programming of DVT:

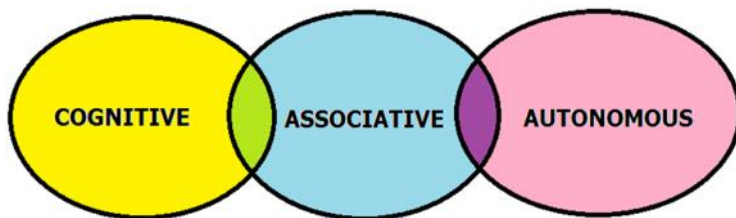
1. Patient (stage of change, monitoring through motor learning)
2. Clinician (action plan)
3. Exercise (tools and devices)

I. PATIENT (Patient based DVT programming)

The voice therapy process differs from surgical treatments by high demands for patient's condition and adherence to treatment. The clinician must consider the motor learning level of the patient while developing a new skill and creating a new vocal behavior instead of the former unhealthy one. Additionally, stage of change is a critical factor for defining the action plan.

Stages of motor learning help for determining the applications of DVT and the clinical survey as well. The tricky point in voice therapy process is to know what to do next. The answer partly lies in the motor learning principles: the patient's condition determines what to do next (not the exercise on the list). Treatment plan ought to be designed for each patient in an *haute couture* fashion. Therapy adherence is a major factor in treatment of voice disorders. Task orientation, motivation and attentional focus are important factors for motor learning.

In order to gain a motor skill, three phases can be distinguished throughout the whole therapy process: cognitive, associative and autonomous phases. However on the timeline they are not completely separated but interrelated and interdependent processes. In other words, the cognitive phase continues through the associative phase, even may extend to the autonomous phase and so on.



Phases of motor learning through DVT process can be explained in detail as follows:

a. Cognitive phase

The first process to learn when starting a new exercise is what to do and to understand the goal or purpose. In the cognitive phase, answers to some questions are given; what caused the voice disorder, how it is developed, how it will be

managed, what kind of tools will be used and how they affect the voice. While processing the information of etiological mechanisms, the patient is also given declarative knowledge about vocal exercise as well. An effective treatment plan begins with convincing the patient. In this phase, the patient's attention needs a lot of concentration with intensive feedback by clinician. The patient must focus and this is why distractions should be at minimum during therapy sessions in the beginning.

The primary concern of a beginner is how to be sure whether he/she is doing the correct exercise at home. Clinician should provide clear information and detailed knowledge for the output of a given exercise. Multichannel biofeedback (visual, kinesthetic, auditory) during DVT is helpful for verification of a correct pattern at home. It is easier for the subject to program a new basic movement pattern with its simplest form. It is the *primal sound*, a phonatory pattern in vocal pedagogy which is related to reflexive vocal behaviors (cough, laugh, etc.). It is a simple vocalise, seems easy, but it may not be so easy to execute the task on will. Feedback should be given in a helpful way since many errors will occur. Eventually they will be able to monitor their own performance and various biofeedback tools can be used to self-check for the home exercises. Phonating into a tube seems to be extremely simple; but when it comes to details, patient can be confused. Duration of the sessions may be more than 45 minutes and session rate may be as often as 2-5 times a week.

b. Associative phase

Exercise is the main tool for motor learning. The second stage is the associative stage, in which a new vocal skill is developed. Motor cortex is now supposed to formulate the new muscle pattern and the muscles of the end organ are being strengthened and coordinated enough for the given vocal pattern. This process is a translation of declarative knowledge into procedural knowledge (i.e. transformation *what to do* into *how to do*). Fine tuning (glottal attack and damping, correct registration, efficient glottal closure, etc) is worked on by concentrating on producing the most consistent and efficient vocal pattern. Performing the movements or task under different conditions forces the patient to use problem solving when errors do occur.

The basic vocal pattern is now extended to various conditions/tasks that is to phonate in different/changing pitches and loudness levels. Starting from the simple (basic tonal exercises) to the complex (combined tonal exercises and linguistic load), movement program is developed by gathering the pieces together. Using the auditory, visual and kinesthetic feedback, the patient understands how it feels, how it's heard and seen to phonate healthy including posture and breathing issues. Less feedback is required during this phase. The duration of the sessions in this phase may be between 30-45 minutes. The session rate may be once or twice a week.

c. Autonomuos phase

The skill which was gained in the associative stage is to be converted to a behavior. The autonomous stage involves less and less attention from the patient so that they can do other tasks at the same time. They should be able to easily adapt to variations and increasing complexity in vocal exercises. Starting from primal sound through tonal exercises, the patient is supposed to transfer the new vocal pattern to reading a text, singing a song or conversation. Unless great mistakes are done, the voice patient has very little feedback demands during this stage of motor learning. The time between therapy sessions may be more than a week or a conversation may be made on the phone or better by an audiovisual internet communication.

II. CLINICIAN (Clinician based DVT programming)

DVT has four steps from the clinician's perspective: Preset, exploration, development and adaptation. These are the stages that the clinician is supposed to advance sequentially. Each and every skill must be established with a modular fashion on the former one. The clinician is supposed to control and guide the patient for retaining an acquired skill when a new exercise is started. Before having the patient understand the rationale and correct pattern of a given exercise, it will not be rational to expect a favourable result from the home exercises.

1. *Preset*

Preset includes counseling, relaxation, posture and breathing issues.

a. Counseling: For a voice patient, the problem to be solved in this early stage, is understanding what to do, how to do it and why. The information of the nature of the pathology (for a given case, hourglass shape glottal closure, lets say), why and how it is supposed to be solved, what to do and how to do the task (vocal exercise) safely and correctly and the expected goals or purpose. They also learn what it feels like to phonate correctly and often their attention needs a lot of concentration in this phase especially because phonation is mainly monitored by auditory feedback. One important factor in the very beginning of the therapy is patient's stage of change. If the patient is not aware of the vocal problem, even does not want to change the voice, treatment means nothing.

b. Relaxation: In order to provide a proper posture and breathing during exercise, it is mandatory to relax the muscles which interfere especially with the extrinsic laryngeal muscles. Relaxing is not a slouched state, it is a balance or resetting to the factory settings. Consciously, relaxing the shoulders, neck and jaw will help a lot.

c. Posture: With some practical instructions, it is possible to provide a better posture in a short time; of course more time is needed to develop a behavior. Noble posture is a well known also used in singing pedagogy. Ingredients of the noble posture are: high sternum, relaxed shoulders, balanced head and a dynamic spine.

d. Breathing: The philosophy of breathing instructions is relaxing secondary breathing muscles and redirecting the effort from upper chest and shoulders. This can be done in front of a mirror and placing one hand under the belly button to feel the direction of exhalatory effort. In this step, blowing into tube without phonation provides breath monitorization by controlling (estimation of transglottic airflow) the bubbling.

2. Exploration

The door to reach the target vocal behaviour is the maximum economy and safety. This step is dedicated to find a reflexive voice which is defined as primal sound () in vocal pedagogy. This vocal pattern can be achieved by some probing therapy techniques using: forced adduction, ranting (exaggerated articulation), trills, chewing, yawn and sigh or pitch glide. It is also possible to use the sounds made instinctively such as coughing, laughing, moaning, humming, etc. The primal sound is supposed to be a neutral vowel (schwa), which has no meaning and does not relate with the linguistic brain activities. This probably helps for free functioning of vocal organs.

3. Development

Once a primal sound is achieved, it is time to develop and stabilize that vocal pattern. Development term contains two goals: acquisition and retention of the new vocal skill; reorganization and development of muscles which are included in the voice system. But the primal sound is the basic phonatory pattern for further developments; exercises are structured on that proper (safe and efficient) basic (reflexive) phonatory pattern.

Voice is a major part of the self image. We not only hear our own voices but also feel it by tactil and kinesthetic biofeedback by the vibrations and muscular contraction pattern during phonation. During skill acquisition and retention, the patient must be prepared for a new vocal image. Psychological adaptation to the phonatory biofeedback (auditory and kinesthetic) is an important consequence which is supposed to start in development phase of DVT.

The first step is to refine the primal sound then the tonal exercises are started. In order to make a ‘fine tuning’ in the primal sound, first step is establishing balanced glottal attack and glottal damping. This will enhance safety and efficiency in the beginning.



The vocal exercise program in DVT process does not have to include all of the tonal exercises. For example, only sostenuto and glissando exercises may be enough for a given case of vocal nodule. One important step is to add linguistic meaning to the sound. As mentioned above, primal sound is *free from meaning* which allows using the vocal organs without functional complexity of language. Linguistic load may be performed by a specially designed oral mask (maskVOX) or while the tube is in mouth the user instantly takes the tube out and continues phonating a vowel with the same vocal pattern.

This step is critical for behavioral transfer of the new vocal pattern.

Vocal development exercises

- a. Refining the primal sound
 - i. Glottal attack and glottal damping
 - ii. Comfortable vertical laryngeal position (suprahyoid relaxation)
 - iii. Supraglottic
 - iv. Focusing (balanced glottal closure feeling the vibrations on the face; *i.e. mask feeling*)
- b. Basic exercises
 - Pitch based exercises
 - ⇒ Sostenuto, Glissando, Portamento, Portato, Staccato, Legato
 - Loudness based exercises
 - ⇒ Stable (Piano, forte)
 - ⇒ Variable (Crescendo, Decrescendo)
- c. Combined exercises
 - Vocal play
 - ⇒ Descending glissando – sostenuto at a low pitch
 - ⇒ Monotone staccato – sostenuto at a low pitch
 - ⇒ Descending staccato – glissando (descending-ascending pitch)
 - ⇒ ***More combinations may be formulated by the clinician***
 - Messa di Voce
 - Melodies with primal sound (happy birthday song, etc.)
- d. Linguistic load
 - From primal sound to meaningful vowels (start with [u], [o] by laxvoxing)
 - Melodies with a single vowel (songs which patient knows well)
 - Various vowels phonated with the same tone using the *maskVOX*
 - Phonating vowels out without device

4. Adaptation

Adapting the new muscle technique (vocal pattern) to daily life starts with taking the tube out and maintaining the same vocal pattern in syllable-word-sentence-reading-conversation hierarchy. Psychological adaptation is the second major goal of the last phase of DVT practice. Patient may need to be motivated by the clinician, the new vocal image is better to be discussed with the patient and his/her social environment as well. The maskVOX can be used as a transfer device between phonating and speaking/singing.

- i. Phonating correct syllables-words-sentences (Counting, monotone speech, ranting may be used)
- ii. Reading books, newspapers (highlighter pen can be used to indicate wrong phonated words, phrases, etc.)
- iii. Conversational speech
 - a) Starting from intended scenarios or planned subjects in the therapy room to unintended subjects
 - b) Speaking with a friend or relative in the therapy room (like a role play) or calling someone on the phone
 - c) Transferring the pattern to natural environment of the patient (clinician may make on-site observations).

III. VOCAL EXERCISES

Before starting any exercise, the clinician/pedagogue is supposed to explain the problem, the therapy/training process clearly. A proper posture is of utmost importance to voice production mechanism during laxvoxing. Breathing, as well, relates to posture and needs to be observed. The preset step of DVT is mandatory before giving exercises. The vocal exercises (or use of devices) are to be constructed on the pre-set process of DVT. It doesn't make sense to give a tube or device to the patient for bubbling and expect the pathology recover.

a. Refining the primal sound

- i. Glottal attack and glottal damping are about the glottal impact stress before and after the vibratory act. Subjects may first start with a breathy attack by exhaling and blowing into water. During bubbling, voice can be added. Specifically, the subject is supposed to focus not to pause bubbling anytime and by this way vibration of vocal folds are started by Bernoulli forces without any prior contact. Similarly, at the end of the phonation, the vocal folds should not close or contact; the breath should be stopped via diaphragmatic activity [hUUUh].

h h a a a a	BREATHY ATTACK
h a a a a	SOFT ATTACK
h a a a a	BALANCED ATTACK
? a a a a	HARD ATTACK

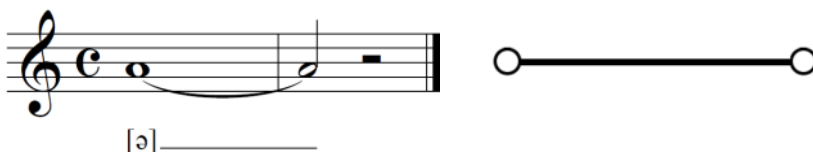
- ii. Comfortable vertical laryngeal position (suprahyoid relaxation)
- iii. False vocal folds (FVFs) are ready to occlude the supraglottic space: it is their job!
 Double-valve system: VFs: out-in valve, FVFs: in-out valve. So; keep the FVFs open (needs effort): *Feel the AC/DC backpressure constantly in the throat, silent laugh (like Mutley the cartoon character) and negative exercise may work.*
- iv. Focusing: balanced glottal closure increases the higher harmonics which result in feeling the vibrations on the face (*i.e. mask feeling*) by resonance process.

b. Basic vocal exercises

Pitch based DVT exercises

Notes on scales may be used for explaining various pitch based exercises. If the subject has not enough knowledge about written music, then the clinician can use descriptive graphics in order to make them understand. A sustained tone may be defined by a longer line compared to a short line of the staccato. The circle at the beginning of the line may be used to indicate a soft glottal attack.

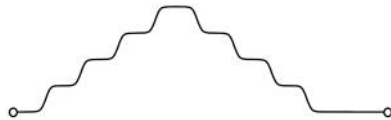
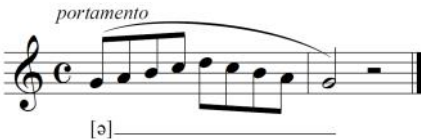
- i. **Sostenuto** (sustaining the tone): Phonation at the same pitch monotonously. Sound quality should be controlled carefully, pitch glides or breaks are prevented; especially at the end of that phonatory task, patients tend to elevate the pitch. Vertical laryngeal position is also monitored by the clinician. The sostenuto exercises may be done in different pitches alternatively.



ii. **Glissando** (gliding between two pitches): Glissando exercise is especially important for pitch control. Starting from a medium-low pitch comfortably, the patient continuously raises (or lowers) the pitch without changing the voice quality. Occasionally, patients may fail in phonating a comfortable high pitch. Then falsetto register may be used to find a comfortable way of phonating high pitches and then starting from falsetto, gliding to lower pitches in chest register may even relax the mid-low tones in tessitura.



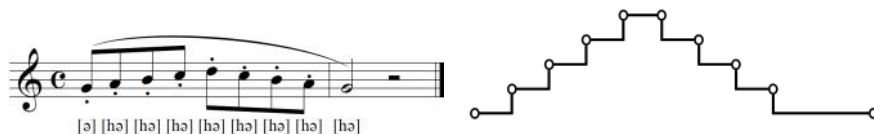
iii. **Portamento:** Two or more sostenutos are connected by a short glissando at the same breath.



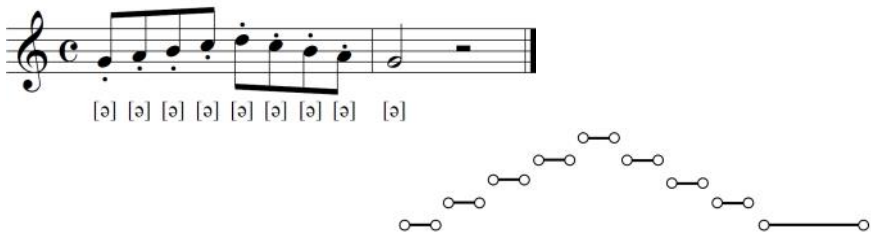
iv. **Legato:** Connecting tones without glide. One of the most difficult vocal tasks which needs time to be acquired. Acoustic instruments are not capable of this kind of connection between two tones. Legato needs a high precision in source-filter balance and breath management.



v. **Portato:** Changing the tone with a continuing breath. Each tone has a glottal attack and the breath connects the adjacent tones (which has an accent feeling inbetween). The vocal task is performed at a single breath. Each tone must have a stable timbre and loudness; this is harder to execute compared to glissando and portamento especially in the high pitches.



vi. **Staccato:** Short and intermittent tones are executed with a single breath or with slopes. Tricky point is to balance glottal attack and glottal damping at each staccato phonation. Bubbling must cease at the pauses (breath held inbetween not by glottal closure) and each tone must be treated individually. The tones must have a similar timbre if the pitch raised or lowered.



Loudness based DVT exercises

i. **Stable loudness:** This exercise aims to balance the force-resistance interaction between the glottic closure pattern and the breath support. It can be applied in various loudness (pianissimo-piano-mezzoforte-orte-fortissimo) levels but the focus must be on a constant loudness level. Pitch changes may happen, in order not to cause a confusion, clinician may ignore pitch changes in the beginning.

ii. **Variable loudness:** Again, without focusing on the pitch, the patient tries to change the loudness level with similar bubbling rate while increasing (crescendo) or decreasing (decrescendo) the loudness level. This will provide a better force-resistance adjustment.

iii. **Messa di Voce:** It is a combined exercise based on loudness control. Changing the loudness without changing pitch and timbre. During crescendo (increasing the loudness) the pitch tends to raise, also a higher vertical laryngeal position is generally observed in uneducated subjects (the opposite also applies). Messa di Voce helps to manipulate and develop the accurate physical balance between force (breath support) and resistance (glottal closure). The exercise may be applied in various forms:

Messa di Voce (crescendo or decrescendo), Esclamazio viva (decrecendo-crescendo) or Esclamazio languida (crescendo-decrecendo-crescendo).



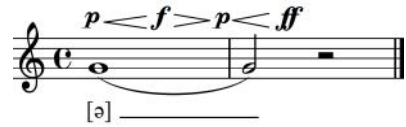
(a)



(b)



(a)



(b)

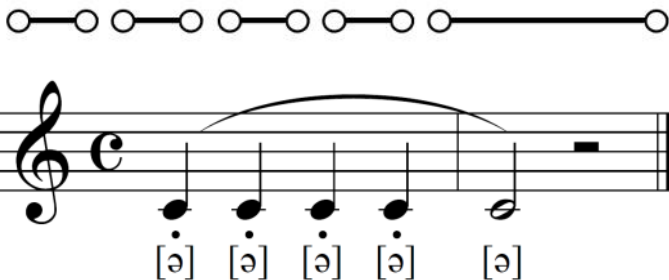
(a, b) Messa di voce, (c) Esclamazio viva, (d) Esclamazio languida.

c. Combined DVT exercises:

Various combinations are possible depending on patient's needs (which muscles are supposed to be developed) and capabilities; also the clinician's creativity. Pitch, loudness and vowel alterations may be applied.

Here are some combination patterns commonly used by the author:

i. Staccato-sostenuto monotone exercise



ii. Staccato-glissando variable pitch exercise

The exercise is presented in two parts. The upper part is a pitch contour diagram consisting of five pairs of circles connected by horizontal lines, each pair at a lower pitch level than the previous one, followed by a large, smooth, bell-shaped curve that rises and then falls. The lower part is a musical staff in treble clef with a common time signature (C). It contains five eighth notes with stems pointing down, followed by two notes with stems pointing up. The first two of these final notes are marked with the word "gliss.". Below the staff, the phonetic transcription [ə] [ə] [ə] [ə] [ə] is aligned with the first five notes, followed by a horizontal line.

iii. Glissando-sostenuto register change exercise

The exercise is presented in two parts. The upper part is a musical staff in treble clef with a common time signature (C). It contains a half note, followed by a note marked "falsetto" with a slur over it, then a note marked "gliss." with a slur over it, and finally a quarter note. Below the staff, the phonetic transcription [u] is aligned with the first note, followed by a horizontal line. The lower part is a pitch contour diagram showing a high starting point, a horizontal line, a sharp downward curve, and then a horizontal line at a lower level.

Practical instructions

Explanations and instructions are critical to make the patient understand; this is mandatory not only for correct exercise but also for therapy adherence. Below, *samples* of verbal instructions (in italics) during a therapy process can be found:

1. Preset:

- a. Counseling: let the patient see his/her vocal folds in action by stroboscopic recordings. You can use slides, graphics, or you may draw by yourself.
- b. Relaxation: It does not define a slouched posture; it is ***fit but not fixed***. *Take your cheeks in your palms and slightly wipe your face and jaw down. Unload your shoulders and let them hang down.* Face, neck, upper back and upper chest muscles are relaxed and do not interfere with laryngeal posture especially during breathing.
- c. Posture: *Take a balanced posture; stand (or sit) high, like a king or queen. Do not make it stiff like a soldier; while keeping your sternum high, relax your shoulders. Try to imagine a 'tail up' position, this provides a dynamic spine to you. This is called the noble posture, use this term as a motto when you think how you are supposed to manage your posture.*
- d. Breathing and appoggio: *Breathe in as if you have lungs under (!) your belly button. Try to feel that the direction of the breath is downwards and sideways. Use the same direction when you breathe out but do not try to squeeze your upper chest and shoulders. Imagine that you are blowing a candle but keeping it on fire. Try to keep your sternum on place, don't let it to go down or sink in your chest. Do not close the airflow from your throat, let it stay open all the time during breathing.*

2. Bubbling without phonation: Bubbling rate is a good indicator of transglottic airflow. The patient can use it as a feedback tool and control the glottic resistance more easily.

- a. *Hold the bottle/device close to your rib cage.*
- b. *Dip the tube into water (1 to 2 cm deep at the beginning).*
- c. *Place the tube into your mouth between the incisor teeth and 1cm of it above the tongue.*
- d. *Enclose the tube with the lips (Elongate your lips like phonating [u] to prevent air leak).*
- e. *Breathe in from your nose like in yawning or sniffing slightly.*
- f. *Breathe out as you did at the previous session (keep the noble posture and do not squeeze the upper chest) into the water and try to monitor bubbling without phonation. Focus on your larynx and do not close your vocal folds before you breath out, do not hold your breath by closing your vocal folds as well.*
- g. *First you can bubble in a constant rate, then change the bubbling rate on will. By this way you can see, hear and monitor your breathing during consciously.*

3. Bubbling with phonation (primal sound):

- a. *Try to make a primal sound (by various vegetative phonation maneuvers such as yawning, sighing, humming, coughing, laughing, crying, grunting, sobbing, moaning, and trilling) before phonating into tube. This sound is supposed to be meaningless, raw, reflexive, natural...*
- b. *Phonate into the tube by this sound at the same pitch; do not change anything in your throat and keep your posture stable, blow as you did before. Just try to make the primal sound in the tube shortly.*
- c. *Phonate out with the primal sound and then into the tube alternatively: see whether you change anything.*

4. Bubbling with phonation (skill acquisition):

- a. *Do not squeeze your larynx before you start phonation; you don't need to do it. First, try to make a short bubbling then phonate. Next, phonate at the same time with bubbling starts; not after bubbling. Stop before you feel that you are getting out of breath.*
- b. *Sustain this sound (sostenuto) at the same breath; try not to change your phonatory setup at the end of the breath: stop before you feel breathless. You can control bubbling rate by watching the water in motion.*
- c. *Do the same with a higher loudness level.*
- d. *Now, start from a louder tone to a lower one (decrescendo). Try to keep the same preset, do not change your throat position.*
- e. *Try to carry the sound to a comfortable high pitch (glissando) and then to a low tone by gliding it softly. Do not change the loudness (not aloud in high pitches and the not the opposite in low pitches)*
- f. *If the patient fails to phonate a high pitch comfortably, falsetto register may be a better choice to start: Try to phonate a falsetto sound (out of tube) and do the same by laxvoxing. Now, try glide down to lower pitches from the falsetto.*
- g. *Sustain a comfortable tone shortly, and pass to another tone at the same breath. Connect two tones with a short glide (portamento).*
- h. *Now do the same thing connecting the separate tones by a short [h] at the same breath (portato).*
- i. *Phonate the same tone intermittently by breath pauses (staccato). Concentrate on how you cease your voice: do not close your vocal folds to stop, just use your breath to stop phonation. Try to feel your vocal folds*

5. Bubbling with phonation in complex tasks (skill retention):

- a. *Sustain a comfortable pitch, then glide it to the highest pitch that you can phonate and stay at that pitch for a while with-*

- b. *Start from a comfortable pitch, then raise it step by step at the same breath then go back to the same pitch by gliding (portamento-glissando).*
- c. *Start from a comfortable pitch, raise it step by step and do not glide inbetween, you can put an [h] to continue with the next pitch ([huuhuuuu]) portato*
- d. *Same exercise by dividing each pitch with a breath pause (staccato)*
- e. *Try to keep a certain tone starting from low loudness and make it louder; do not change the pitch (Messa di Voce).*
- f. *Now try to phonate at the comfortable pitch adding some linguistic meaning (a meaningful syllable) using the mask and sustain it monotonously: Say [huuu] or [hooo].*

6. Behavioral transfer:

- a. *Use the same vocal pattern and say [huuooaaa]-one-two-three...*
- b. *Read the text in the mask (or tube) and control bubbling continuously. Take the mask/tube out and speak with the same pattern as if you do it with the device.*
- c. *Read aloud the text; if you cannot execute your new sound in a certain word or phrase, stop and repeat it focusing on the timbre and sensations of the new vocal pattern.*
- d. *Speak with your new voice at home*
- e. *Speak with your new voice on the phone...*

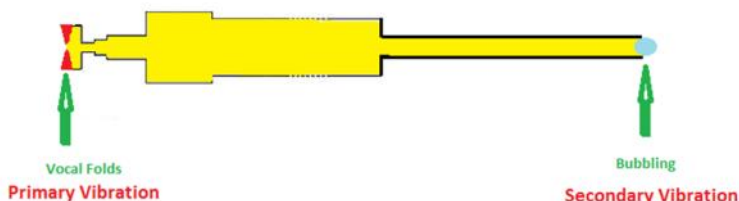
MECHANISMS OF THE DVT

Mechanisms of DVT can be treated in two perspectives: physically and physiologically. Physical effects are about Acoustic, Aerodynamic, and Biomechanical changes. Physiologic effects are about subsystems of voice production (breathing phonation and resonance) and Neuropsychological factors about behavioral treatment and motor learning principles.

1. Physical effects
 - a. Acoustic
 - b. Aerodynamic
 - c. Biomechanical

2. Physiological effects
 - a. Subsystems of voice production (breathing phonation and resonance)
 - b. Neuropsychological factors

The physical effects depends on three main mechanisms: Artificial elongation of vocal tract, backpressure and effect of a secondary vibration source.



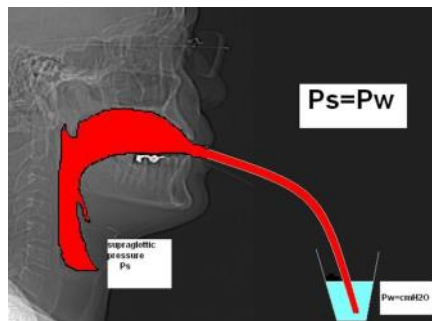
In DVT exercise, there are two systems which work simultaneously: one is the vocal folds (primary vibration source) and the vocal tract (primary tube). These two systems affect each other simultaneously. This interaction changes the vocal mechanism via possible pathways as follows:

1. Efficient and balanced vibratory movements of vocal folds (Increasing vocal tract inertance)

Positive supraglottal pressure in front of the voice source provides an inertive vocal tract. This triggers a number of acoustic-aerodynamic-biomechanic interactions as seen in semi-occluded vocal tract exercises (lip trills, tongue trills, humming):

- i. Phonation threshold pressure decreases by “squaring up” the vocal folds
- ii. Fast-easy opening and closure of the vocal folds
- iii. Maximum flow declination rate (MFDR) increases
- iv. Vocal intensity can be raised to high levels without excessive vocal fold collision increases (Without muscle forces!)
- v. Closed phase of vibration lengthened
- vi. Forward positioning of voice (high frequency harmonics are loaded with more energy)
- vii. Vibration efficiency increases

As a result, it is possible to phonate (sing) loudly without forcing vocal folds, feeling ease in high pitches, preventing vocal fatigue.



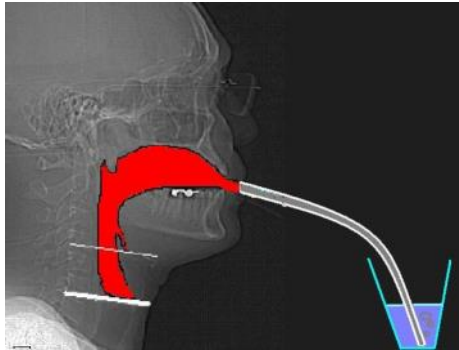
2. Enhanced formant- harmonic interactions (Elongating length of the vocal tract)

Acoustic results:

- i. Lowered F1
- ii. Lowered phonation threshold pressure
- iii. Lowered airflow
- iv. Low-effort voice production
- v. Resonance tubes-voice interaction levels

Interaction levels of artificial elongation of the vocal tract

1. Acoustic-aerodynamic interaction
(acoustic pressures → glottal flow pulse)
2. Mechano-acoustic interaction (*phonation threshold pressure*)
(vocal tract pressures → vibrational characteristics)
3. Neuro- mechanic interaction
(Non-laryngeal articulatory movements → laryngeal setting)



3. Easy control and reduced hyperfunction (Lowering larynx)

Effects:

- i. Vocal folds are likely to be thicker;

F₀ decreases

- ii. Loosens the vocal fold ‘cover’

Efficient closing phase

Vocal intensity increases

Flow phonation

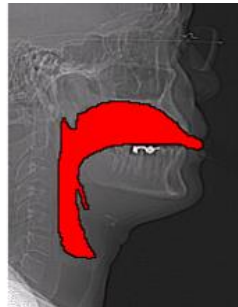
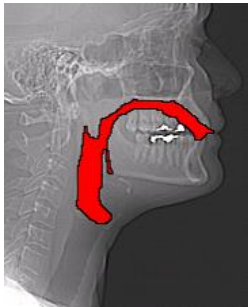
- iii. Loosens the thyroarytenoid muscle

The control capacity of thyroarytenoid (TA) muscle increases due to reduction of muscle tension.

Better opportunity to get the TA muscle actively involved in vibration.



- iv. Resonating volume increases by:
 - The vocal tract elongation
 - Hypopharyngeal enlargement
 - Vertically stretched and flattened ventricular folds
 - Inverted megaphone shape
 - Anteriorly placed tongue
 - Palatal rise (Pre-yawn position)
- v. Larynx-hyoid bone-tongue relation (*The Bermuda Triangle*) loosens, the tongue moves forward, relaxed
- vi. Extraneous tension in the neck and shoulders are tend to be decreased
- vii. Abdominodiaphragmatic respiration becomes a natural result



4. Preventing secondary breathing muscles from overworking and facilitating abdominodiaphragmatic respiration

Doctor Vox facilitates abdomino-diaphragmatic respiration by:

- Relaxation of secondary breathing muscles
- Reduces extraneous tension in the neck and shoulders
- Dissolves the compact arrangement of the larynx, hyoid bone and tongue
- The correct breathing type comes without ‘thinking’

It may not be necessary for all of the patients to work on abdomino-diaphragmatic respiration technique. Vocal demands will help to decide. But not to concern about more than one mechanism at the same time will make the things easier.



5. Increasing resonance of voice by staying away from tension of vocal tract and elongation of vocal tract via relaxation

‘KEY’ for good voice

Meditation, hypnosis, postural alignment, etc may be used.

‘The device’ takes the attention from daily life

Relaxation is the first step and ‘sine qua non’

Begin with forehead and then eyelids, cheeks, tongue and jaw in order

‘feel your head, neck and shoulders over clouds’

‘think and remember how you feel in relaxed position’

Keeping the relaxed position stable -floating head, silly face start bubbling with voice. Your cheeks must be relaxed and let them tremble with bubbling. Then extend the trembling into your throat. Play with focus, you will find the best place!

Do not even move your suprahyoid region. First you may try bubbling without voicing to feel and understand that it is possible to phonate with relaxed suprahyoid muscles.

6. Increasing kinesthetic sensitivity

Changing habits by proprioceptive biofeedback

-Eases to feel and to manage the subglottal pressure and resonance spaces

-Helps tactile biofeedback for symmetrical adduction and relaxation

-Sensation of efficiency in converting aerodynamic energy to acoustic energy

7. Neuropsychological effects (enhanced motor learning by multilevel biofeedback and using a device)

The objective outcomes and the nature of the method enhances the therapeutic compliance.

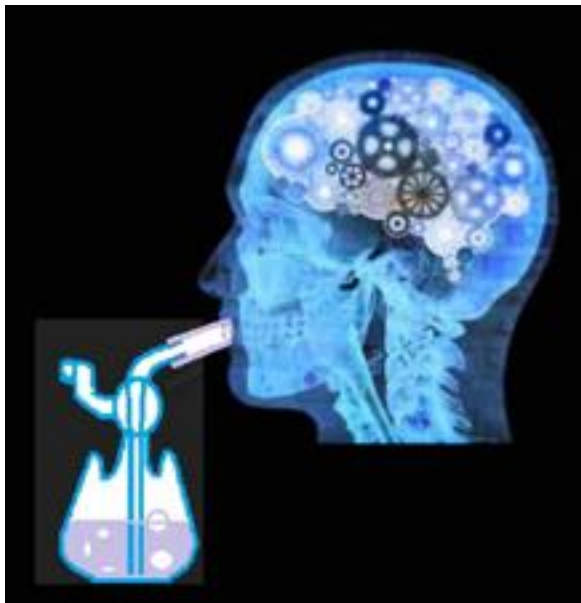
-Effective exercise instruction

Effective exercise instruction includes some consideration for encouraging compliance or adherence to the exercise program. There are many challenges to a patient who has to undergo an extended rehabilitation through the behaviour change. A positive outcome from treatment are contingent not from designing the optimal exercise program but rather from designing a program that patient will follow.

-Trust in the method: The patient uses a device. It helps people to follow the instructions and exercise at home.

-Easy to use: The physical effects due to elongation of vocal tract and backpressure help.

-Strong feedback detection: visual (bubbling pattern), auditory and kinesthetic feedback



GOAL(S)

In fact, there's only one goal: reaching and using the target voice. You can call it in different words: 'Maximum vocal economy', 'Maximum output-cost ratio', 'Vocal efficiency', 'Resonant voice', 'Flow phonation'...

The main issue is simply the glottal efficiency. In other words, output-cost ratio (which is calculated by dividing radiated oral acoustic power to aerodynamic input power) is the formula of vocal trade-off. Resultant voice projects well, easy to produce, involves a sensation of vibration in the imaginal mask on the face and characterized by ample harmonic content.

CONCLUSION

Treatment success for voice disorders depends on many factors: the disorder being treated, the clinicians treating it and 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.

In the voice clinic, DVT is a holistic therapy for various functional and organic voice disorders (muscle tension dysphonias, vocal fold nodules and polyps, habitual and psychogenic dysphonias-aphonias, vocal fold paralysis, presbiphonias, pre and postoperative phonosurgery ...)

Doctor Vox is also a useful approach for pedagogical vocology. Singers can use it to warm-up and cool-down and to find the 'position' of singing voice. It is a way for vocal fitness; developing and blending the registers and relaxing the unnecessary muscle groups. DVT increases the consciousness about the vocal mechanism. It can be used for various professional vocal exercises.



Doctor Vox is easy to follow, easy to teach, easy to learn and easy to perform at home. There are not so many things to remember and do at the same time. Patient uses a 'device' (!). A perfect and trained ear is not so much required for Doctor Vox. It can be performed not only by voice therapists but also by laryngologists. The patients accept and use the technique easily and may daily train by themselves.