

2017-05-01

Rehabilitation Strategies for Brass Musicians with Focal Task-Specific Embouchure Dystonia

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UNIVERSITY OF MIAMI

REHABILITATION STRATEGIES FOR BRASS MUSICIANS WITH
FOCAL TASK-SPECIFIC EMBOUCHURE DYSTONIA

By

Eric J. Bowman

A DOCTORAL ESSAY

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Doctor of Musical Arts

Coral Gables, Florida

May 2017

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FOCAL TASK-SPECIFIC EMBOUCHURE DYSTONIA

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Rehabilitation Strategies for Brass Musicians
with Focal Task-Specific Embouchure Dystonia

(May 2017)

Abstract of a doctoral essay at the University of Miami.

Doctoral essay supervised by Dr. John Daversa.

No. of pages in text. (58)

The purpose of this essay is to provide rehabilitation strategies for brass musicians with focal task-specific embouchure dystonia. These strategies are based on common techniques used by those who have experienced success retraining their embouchure. There will also be a discussion of pertinent scientific research regarding the focus of attention during the learning process. The goal of rehabilitation is to provide a means of reducing unnecessary tension, restore a healthy airstream, and allow unconscious movements in the embouchure to accommodate the airstream. This will allow brass musicians to focus on sound rather than body mechanics. This essay was inspired by my own struggle with focal task-specific embouchure dystonia.

Acknowledgements

I would like to thank Professor Dante Luciani and Dr. John Daversa for their guidance and patience throughout my recovery process from focal dystonia. The detailed insight and advice provided by Professor Tim Conner and Professor Donald Coffman was greatly appreciated. My utmost gratitude is due to Devin Bennett for guiding me through the rehabilitation process.

A very special thanks goes out to my family for supporting my interests and enduring my long practice hours. I wish to express deep gratitude to my parents for supporting my passions every step of the way.

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CHAPTER 1

INTRODUCTION

Playing a brass instrument requires a unique coordination of movements not typically used in everyday life. Therefore, it will require some time dedicated to developing effective and efficient technique to produce an intended sound. Many of these movements are made unconsciously, similar to the movements made when creating the intended sound when speaking. This leads to speculation as to the teaching of how a brass instrument is ideally played. Dennis Wick, trombonist and brass pedagogue, describes the speculative process of teaching and learning a brass instrument.

“The players/teachers do what they do. They tell the students what they think they do. The students then try to do what they think the teachers (think they) said about what they think they do.”¹

When the unconscious movements (made by expecting a sound) conflict with conscious movements (made by focusing inwardly), a movement disorder can develop, called focal task-specific dystonia.² The word dystonia is derived from the Greek word “dys”, meaning abnormal, and “tonos”, meaning tension. Hermann Oppenheim first introduced the term in 1911, defining it as “a state in which muscle tone is hypertonic at one occasion and in tonic muscle spasm in another, usually but not exclusively elicited upon volitional movements.” In 1984, the Dystonia Medical Research Foundation defined dystonia as “a neurologically-based syndrome of sustained contractions, frequently causing twisting and repetitive movements, or abnormal postures.”³ Focal dystonia only afflicts a specific group of muscles or area of the body. Task-specific focal

¹ Seth D. Flether, “The Effect of Focal Task-Specific Embouchure Dystonia Upon Brass Musicians: A Literature Review and Case Study” (D.M.A. diss., University of North Carolina, 2008), 30.

² Flether, “The Effect of Focal Task-Specific Embouchure Dystonia Upon Brass Musicians,” 17.

³ Ibid.

dystonia only causes spasms or abnormal postures when performing a specific task, such as playing a brass instrument. Focal task-specific embouchure dystonia (FTSED) afflicts the muscles used to form a brass embouchure during the act of playing a brass instrument.

Each part of the human body corresponds to a specific region of the brain (or “brain map”) used to sense and move that body part. If a person habitually uses two nearby muscles simultaneously in a rigid, stressful, or unnatural way, the brain maps for those two muscles can fuse, preventing the musician from moving the two muscles independently of one another. The more the person tries to move one muscle independently of the other, the more reinforced that fused brain map becomes. In a brass musician, this can cause tremors or uncontrollable tension in the embouchure or any other muscles used to play the instrument.⁴ For example, a musician with focal task-specific hand dystonia may not be able to move fingers independently of one another.

Symptoms of embouchure dystonia include air leaking out of the corners of the mouth, involuntary puckering, excessive elevation of the corners of the mouth, and involuntary closing of the mouth. Some brass musicians have difficulties sustaining notes in specific registers without tremors. Dystonia is typically painless but can be the cause of intense psychological stress.⁵

Those afflicted with focal dystonia can recover their ability to play free of tremors and unnecessary tension because of neuroplasticity. Neuroscientists such as Edward

⁴ Norman Doidge. *The Brain That Changes Itself* (New York: Penguin, 2007), 123.

⁵ “Focal Dystonia” Focal Dystonia: A Musician’s Resource, accessed November 14, 2016, <http://www.focaldystonia.co.uk/#/brass/4563030932>.

Taub, Phd, made discoveries demonstrating that our brain maps are not fixed for life.⁶ Certain parts of the brain can change function to compensate for change in the body. For example, amputees given a prosthesis can restore neural connections originally governing the lost limb, and apply them to be used for the prosthesis.⁷ Discoveries in neuroplasticity led to innovative ways of treating brain problems, previously thought to be untreatable, such as focal dystonia.⁸

FTSED is a learned movement disorder. Therefore, brass musicians afflicted with focal dystonia must unlearn much of what they have learned. By redirecting the focus of attention, there are musicians who have been able to rewire their brain, eliminating the conflicting neuromuscular signals. Examples are included in subsequent chapters.

Purpose and Need for Study

Current estimates suggest that roughly 1% of professional musicians are diagnosed with focal dystonia⁹. After being diagnosed, many musicians are told that they will never be able to regain their ability to play the same way. While this is true for many musicians, there are several others who not only regain their ability to play, but learn to play more musically and more efficiently than before the onset of dystonia.

As dystonia is a rare condition, there is little literature concerning treatment for afflicted musicians. There is even less literature concerning treatment of afflicted brass musicians. For this reason, a methodology for recovery from dystonia needs to be

⁶ Doidge, *The Brain That Changes Itself*, 134.

⁷ Giovanni Di Pino, "Neuroplasticity in Amputees: Main Implications on Bidirectional interfacing of cybernetic hand prostheses," *Progress in Neurobiology* 88, no. 2 (June 2009): 114.

⁸ Doidge, *The Brain That Changes Itself*, xvii.

⁹ Harnum, John, "Physics of Trumpet Playing," *Essential Trumpet Lessons*, March 13, 2016, accessed February 18, 2017, <https://talkingtrumpet.wordpress.com/2016/03/13/the-simple-physics-of-trumpet-playing-with-fire/>.

expanded. Several musicians who recovered from dystonia attribute their recovery to similar exercises and concepts. This essay examines these exercises and concepts, along with scientific research to provide rehabilitation strategies for brass musicians afflicted with task-specific focal dystonia or dystonic symptoms.

Research Goals

Jon Gorrie, a professional trumpet player who claims to have made a full recovery from FTSED, states that recovery requires change in three areas: body mechanics, mental direction, and emotions. Through focusing on body mechanics, musicians can learn to use their body more efficiently, healthily, and free of unnecessary tension.¹⁰

Knowing where to focus attention can be helpful during the rehabilitation process. Many musicians report that focusing on the symptoms of their dystonia only made the symptoms more severe or problematic.¹¹ According to Gabriele Wulf, Professor of Kinesiology at University of Nevada, Las Vegas, “Depending on the extent to which movements in a novel skill resemble those commonly practiced in every day motor behavior, focusing attention on movement goals may be more advantageous than focusing on the movements themselves.” However, Wulf also states, “Learners who are first introduced to novel skills of moderate to high complexity produce more consistent and accurate performances when initial instructions focus attention on body movements.”¹² Brass musicians would benefit from knowing when to shift their focus internally to their movements or externally to their sound. This research will attempt to

¹⁰ “Jon Gorrie-Focal Dystonia Story,” Musicians Focal Dystonia, accessed November 16, 2016, <http://musicians-focal-dystonia.com/my-story>.

¹¹ “How to Resolve Focal Dystonia.” The Poised Guitarist, Last modified July 2002. Accessed December 2, 2016. <https://thepoisedguitarist.com/articles/focal-dystonia/>.

¹² Gabriele Wulf, “The Learning Advantages of an External Focus of Attention in Golf” *Research Quarterly for Exercise and Sport*, no. 70 (1999): 121

determine how an ideal balance between internal and external focus can be used to create healthy habits when playing a brass instrument.

Some musicians who rehabilitated from FTSED, such as Jon Gorrie and Joaquin Fabra, speculate that their onset of focal dystonia was largely due to emotional reasons. If musicians associate playing their instrument with more pain than pleasure, the body might start to shut down physical processes. This can happen if playing a musical instrument is causing too much psychological stress to perform. In this theory, the brain then sends conflicting signals to muscles used to play in order to avoid the pain associated with playing that instrument. The pain that the body is subconsciously trying to avoid can also be the result of chronic tension from inefficient technique.¹³

The purpose of this research is to provide methods for rehabilitation from FTSED and a means of learning effective and efficient technique. The following questions will be addressed.

1. What is healthy playing technique and how can it be achieved with minimal effort?
2. Where should the focus of attention be when rehabilitating from FTSED?
3. What exercises can be used to rehabilitate an embouchure with FTSED?

¹³ Musician's Focal Dystonia, "Jon Gorrie-Focal Dystonia Story."

CHAPTER 2

LITERATURE REVIEW

Tai chi and qigong

Many instances of unhealthy brass technique are the result of unnecessary body tension. There are many methods of relieving chronic physical and psychological tension such as tai chi and qigong. Both practices foster internal focus on the body and an awareness of the flow of energy within it.

“Originally developed for self-defense, tai chi has evolved into a graceful form of exercise that’s used for stress reduction and a variety of other health conditions. Often described as meditation in motion, tai chi promotes serenity through gentle flowing movements.”¹⁴

The Harvard Medical School Guide to Tai chi by Peter Wayne scientifically demonstrates how regular practice of tai chi leads to more vigor, flexibility, balance, mobility, and sense of well-being. This book also includes a basic tai chi program with photographs and practical tips for integrating tai chi into everyday activities.¹⁵

Qigong is the combination of two Chinese words, “qi” and “gong”. “Qi” refers to life force or vital energy. “Gong” means skill or accomplishment. “Qigong is an integration of physical postures, breathing techniques and focused intentions.”¹⁶ An article from *Journal of Bodywork and Movement Therapies* titled *Qigong’s Relationship to Educational Kinesiology: A Qualitative Approach* outlines many of the health benefits of qigong practice, including reduction of psychosomatic tensions.¹⁷

¹⁴ “Tai Chi: A Gentle Way to Fight Stress,” Mayo Clinic, last modified June 25, 2015, accessed April 8, 2017, <http://www.mayoclinic.org/healthy-lifestyle/stress-management/in-depth/tai-chi/art-20045184>.

¹⁵ Peter Wayne. *The Harvard Medical School Guide to Tai chi*. (Cambridge, MA: Shambhala, 2013)

¹⁶ “What is Qigong,” National Qigong Association, accessed April 8, 2017, <http://nqa.org/about-nqa/what-is-qigong/>.

¹⁷ Paul Posadzki. Qigong’s Relationship to Educational Kinesiology: A Qualitative Approach. *Journal of Bodywork and Movement Therapies* 14. No. 1 (January 2010): 73-79.

Feldenkrais

Another approach to movement-based therapy was developed by Israeli physicist, Moshe Feldenkrais from the 1950's until his death in 1984. Inspired by martial arts techniques such as Jujitsu and Judo, Feldenkrais sought to improve human functioning by increasing self-awareness. Feldenkrais wrote *Awareness Through Movement*, which includes twelve lessons, consisting of simple and slow movements to reduce force and increase sensitivity. In this book, Feldenkrais also writes about the psychology of changing one's behavior. Feldenkrais argues, "systematic correction of the image is more useful than correction of single actions."¹⁸ According to Feldenkrais, the way we hold and use our body is derived from our self-image. This image often reflects how we wish to be perceived by others, regardless of whether that image accurately reflects our inner state of being. Like tuning an instrument, Feldenkrais suggests tuning our body. Then it becomes easier to use the body like an instrument in a harmonious way. "Improvement in action and movement will appear only after a prior change in the brain and the nervous system has occurred."¹⁹

Awareness Through Movement also includes information about breathing and posture. According to Feldenkrais, improved organization of the skeletal structure in relation to gravity will result in improved breathing. Feldenkrais describes how the entire body functions as an integrated unit where sensing, feeling, and thought cannot be separated out into various parts.²⁰

¹⁸ Feldenkrais, *Awareness Through Movement*, 32.

¹⁹ Feldenkrais, *Awareness Through Movement*, 36.

²⁰ Feldenkrais, *Awareness Through Movement*, 38.

His subsequent book, *The Potent Self: A Guide to Spontaneity*, focuses on the underlying emotional mechanisms that lead to compulsive and dependent physical behavior that inhibits people from reaching their full potential.²¹ In another book by Feldenkrais, *Body Awareness as Healing Therapy: The Case of Nora*, he uses the example of a patient whom Feldenkrais helped recover from a severe stroke.²² This book demonstrates the healing potential of the Feldenkrais Method.

Body-mapping

William Conable, a cellist, began developing the body-mapping concept during the 1970's. He found that many of his students moved according to their idea of how their bodies function. Sometimes this idea was not congruent with how their bodies actually function. Conable often noticed unnecessary tension or difficulty of movement in these students. He also found that correcting the students' faulty body images often resulted in healthier and easier movement.²³ In Barbara Conable's, *What Every Musician Needs to Know about the Body*, she illustrates the human anatomy from head to toe, commenting on common body-mapping misconceptions. "Body mapping is a somatic discipline based on the scientific fact that the brain contains neural maps of the bodily functions and structures that govern our body usage."²⁴ Conable suggests that knowing where our joints are, how they move, and when we use them will assist with healthy movement.

²¹ Moshe Feldenkrais. *The Potent Self: A guide to Spontaneity* (Berkeley, CA: Frog Books, 2002), 1.

²² Moshe Feldenkrais. *Body Awareness as Healing Therapy: The Case of Nora* (Berkeley, CA: Frog Books, 1993), 1.

²³ Barbara Conable. *What Every Musician Needs to Know About the Body*. (Portland, OR: Andover Press, 2000), 1.

²⁴ Ibid.

Another book by Barbara Conable, *The Structures and Movement of Breathing*, is a guide to healthy breathing for vocalists. According to Conable, “excellent singers’ breathing depends on three conditions: freedom from tension throughout the body, a lively, on-going awareness, and an accurate body map.”²⁵ According to Conable, breathing becomes free and efficient as soon as an accurate body-map is ascertained.²⁶ Though this book is written for vocalists, its information can be applied to breathing for brass instrumentalists. William and Barbara Conable both studied Alexander Technique, which formed the basis for the body-mapping concept.

Alexander Technique

During the 1890’s, Frederick Alexander developed a method of balancing the body to avoid unnecessary chronic muscular tension. A Shakespearean orator at the time, Alexander was inspired to develop the method when he would lose his voice during his performances. Alexander developed a technique of re-arranging the working of a person’s entire supportive musculature as it functions in relation to gravity from moment to moment. *Alexander Technique; Original Writings of F. M. Alexander* offers the most insight into Alexander’s teachings.²⁷ Barbara and William Conable also wrote *How to Learn the Alexander Technique*, a very insightful guide to getting started learning Alexander Technique. *The Body Moveable* by David Gorman is another insightful resource for learning about the body. Gorman provides clear images and descriptions that are helpful for refining movement.²⁸

²⁵ Conable, Barbara. *The Structure and Movement of Breathing* (Chicago: GIA Publications, 2000), 13

²⁶ Conable, *The Structures and Movement of Breathing*, 19.

²⁷ Alexander, F.M. *Alexander Technique; Original Writings of F. M. Alexander*. (Burdett, NY: Larson Publications, 1997), 1.

²⁸ David Gorman, *The Body Moveable* (Etobicoke, ON: Learning Methods Publications, 2002).

Brass Technique

Little literature has been published about brass embouchure deficiencies or injuries. However, Lucinda Lewis wrote *Broken Embouchures*, which contains a summary of common problems and injuries that occur in brass embouchures.²⁹ She also outlines a few non-surgical treatment options and methods for diagnosing an embouchure deficiency. Another book by Lewis, *Embouchure Rehabilitation*, provides in-depth strategies for recovering from injuries resulting from overuse. Lewis encourages mindful practice techniques aiming to replace unhealthy playing habits.³⁰

Many renowned brass pedagogy experts regard healthy breathing as one of the most important aspects of playing a brass instrument. *Arnold Jacobs: Song and Wind* is a synopsis of Arnold Jacob's teachings, written by Brian Frederikson, Jacob's assistant.³¹ Former tubist with the Chicago Symphony Orchestra, Arnold Jacobs emphasized the importance of healthy breathing practices to foster control of the sound produced by a brass instrument. Jacobs emphasized hearing the desired sound and metaphorically "singing" through the instrument. According to Jacobs, when a brass musician focuses on the desired sound rather than the method, the brain acts as a sophisticated "bio-computer", teaching the body to respond in an efficient way.³²

With regards to breathing, Jacobs taught that the diaphragm should relax during exhalation. The Valsalva maneuver (forceful exhalation) results in using too much air pressure to play a brass instrument effectively. In response to excess air, the throat

²⁹ Lucinda Lewis. *Broken Embouchures* (New York, NY: Lipson, 2002), 1.

³⁰ Lucinda Lewis. *Embouchure Rehabilitation* (New York, NY: Lipson, 1998), 1.

³¹ Brian Frederikson, "Arnold Jacobs: Song and Wind" (Gurney, IL: Windsong Press, 1996), 8.

³² Lewis Loubriel, "Arnold Jacobs: His Global Influence" (paper presented at the Midwest Clinic, December 17, 2015).

constricts, preventing healthy airflow, resulting in a constricted tone quality. Jacobs advocated breathing rather than blowing.

Physicist Arthur H. Benade, PhD, wrote an article dispelling myths about how sound is made on a brass instrument. Many brass players teach that the sound is produced by buzzing lips while the instrument acts as an amplifier. However, Benade concluded that “a trumpet produces musical tones when the vibrations of the player’s lips interact with the standing waves in the instrument. These waves are generated when acoustic energy is sent back by the instrument’s bell.” The lips vibrate sympathetically to the standing wave in the instrument.³³

John Harbaugh, Professor of Trumpet at the University of Central Washington, demonstrated Benade’s conclusion by lighting a torch underneath a glass tube. The tube resonated, creating a sound, then caused the flame to flicker. Harbaugh advocates applying this concept by blowing air through the mouthpiece, while sliding it into the shank of the trumpet to feel how resonance is created. He argues that this way of playing is more efficient, as it is congruent with the way the instrument naturally resonates.³⁴

Dr. Karen Lynn Marsten published her dissertation titled, *Finding the Balance: Jan Kagarice, A Case Study of a Master Trombone Teacher*. This dissertation provides insight into the pedagogy of trombonist Jan Kagarice, who has facilitated in the rehabilitation of over one hundred players diagnosed with FTSED.³⁵ Marsten reveals Kagarice’s preference for a conceptual approach to teaching brass rather than a

³³ Arthur Benade, “The Physics of Brasses,” *Scientific American* 229, no.1 (July 1973): 28, accessed February 18, 2017, <https://www.scientificamerican.com/article/the-physics-of-brasses/>.

³⁴ Essential Trumpet Lessons. “Physics of Trumpet Playing.”

³⁵ Karen L. Marsten, “Finding the Balance: Jan Kagarice, A Case Study of a Master Trombone Teacher” (Phd diss., Columbia University, 2011), 266.

behaviorist approach. Kagarice teaches that the behaviorist approach of replicating the symptoms of effective brass playing can lead to the development of FTSED.³⁶ This is because misplaced sensory information entering the brain disrupts the motor signals that should be flowing out of the brain.

Marsten's dissertation includes interviews with Jan Kagarice and her students, revealing insight into her teaching philosophy. One student describes the effects of an external focus on air. "There's a point where you can feel the resonance with the air, and that feel of balance, that's the goal, that's the end result. You actually have to experience it."³⁷

Marsten states that no known medical intervention can reverse the effects of FTSED. The only known way of rehabilitation is through a complete retraining of the mental, emotional, and physical skills used in playing the instrument.³⁸

Kagarice describes sensory training as a four-step process: "Guiding the body into a state of release, brining the focus of attention to the outward flow of air, directing the air into the instrument, and finding balance/resonance."³⁹ With regards to the embouchure, a state of release means that the lips are relaxed and ready to respond to air flow. With regards to exhalation, air is released rather than forced, as previously suggested by Arnold Jacobs.

Through a focus on the outward flow of air, tremors, twitching, and abnormal postures of the embouchure will gradually reduce. These symptoms are not reduced by

³⁶ Marsten, "Finding the Balance," 63.

³⁷ Marsten, "Finding the Balance," 131.

³⁸ Marsten, "Finding the Balance," 65.

³⁹ Marsten, "Finding the Balance," 127.

focusing on the physical movements of the embouchure. Once air is being released in a natural and healthy way, it is free to resonate.

“Specifically, Kagarice explains the ideal tone production system in terms of finding the *balance point*-the point within the instrument where the moving air supplied by the player bumps into the still air in the instrument and creates a change in air pressure that initiates a vibration in the embouchure.”⁴⁰

Bioenergetics

Bioenergetics is a form of therapy based on the relationship between the body and mind, rooted in the work of Dr. Wilhelm Reich, and founded by Dr. Alexander Lowen. According to Lowen, tension in the mind will manifest as tension in the body. Emotional trauma is stored in various parts of the body as chronic muscular tension. This can limit the breath, motility, and orgasmic potential of a person. Lowen also wrote about stretches and exercises that can relieve some of this chronic tension from the body. According to Lowen, when chronic tension is released from the body, suppressed emotions are sometimes also released. This allows deeper breathing, increased motility, relaxation, and more capacity to feel emotions. Lowen wrote several books on this topic including *Bioenergetics and Language of the Body* and *The Way to Vibrant Health*.

In bioenergetics therapy, the goal is to free psychological and physical defenses. According to Lowen, the outermost layer of heart-armoring is the ego layer. Underneath this armoring is muscular defenses and below that, emotional defenses. The heart is at the core of all these defenses. Once the patient lets go of fear, they are able to express emotions more fully. This is important for brass musicians to be able to feel and express the emotions elicited by music. A greater sense of motility will give musicians a sense of

⁴⁰ Marsten, “Finding the Balance,” 132.

natural movement and expression through their music.⁴¹ “Some musicians recover ease and freedom of movement, and, with it, their primary control, by allowing the music they are playing to affect them. They consciously build a feedback loop with the music in which they are changed by the music as they make it. Music deeply nourishes us and deeply frees us, when we are open to it. Music itself is an agent of liberation.”⁴²

Neuroplasticity

Neuroplasticity refers to the brain's ability to rewire neural pathways based on new experiences.⁴³ *The Brain That Changes Itself*, by Dr. Norman Doidge, demonstrates the possibilities of neuroplasticity. Doidge includes several accounts of patients with brain trauma, learning disabilities, and emotional disorders who recovered lost ability or compensate for inabilities through brain plasticity. Doidge also includes the history of discoveries in neuroplasticity by scientists such as Edward Taub, PhD, Michael Merzenich, PhD, and Nancy Byl, PhD. These scientists made discoveries that demonstrated the capabilities of the brain to physically change, previously thought impossible.

A part of Doidge's book explains focal dystonia and how Nancy Byl treated afflicted guitar players. First, she instructed the guitar players to stop playing guitar for a while.

“Then the guitarists held an unstrung guitar for a few days. Then a single string with a different feel from a normal guitar string is put on the guitar, and they feel it carefully, but with only one finger. Finally, they use a second finger, on a separate string. Eventually the fused brain maps for their fingers separate into two distinct maps, and they can play again.”⁴⁴

⁴¹ Alexander Lowen. *Bioenergetics and Language of the Body* (New York, NY: Coward, Mc Cann & Geoghegan 1975), 119.

⁴² Conable, *What Every Musician Needs to Know about the Body*, 98.

⁴³ Doidge, *The Brain That Changes Itself*, xix.

⁴⁴ Doidge, *The Brain That Changes Itself*, 124.

This is a form of constraint-induced therapy which Edward Taub used at great length to change brain maps of his patients.

Focal Dystonia

In addition to writing about body-mapping, Barbara Conable wrote about resolving focal dystonia on the website for Andover Educators, a group that teaches the art of movement through music.⁴⁵ She argues that resolving dystonia requires a full-body awareness with no concentration on any one part of the body. Unlike Joaquin Fabra, she argues that dystonia is only a sensory-motor disorder, not a psychological condition. Conable mostly gives advice for those afflicted with focal hand dystonia, as that is more common than embouchure dystonia.

The goal of Conable's advice is to restore the somatosensory representation of the hand and normal fine motor control. She recommends "identifying everything about the surface of the instrument, eyes closed (strings, fret, white keys, black keys)". Conable also advocates using mental imagery to remind the player of how it felt to play before dystonia.

Conable mostly blames unhealthy technique for the development of dystonia. Continuous stressful, tense, repetitive movements eventually exceed the capacity of the nervous system to integrate such movements. As a result, the motor outputs become disorganized as well. Treatment of focal hand dystonia involves "decreasing stress, stopping the abnormal movements, learning stress free hand techniques, and restoring the normal sensory representation of the hand."⁴⁶

⁴⁵ "How to Resolve Dystonias," Andover Educators, accessed November 6, 2016, <http://bodymap.org/main/?p=226>.

⁴⁶ Andover's Educators, "How to Resolve Dystonias."

The sensory neural pathway is responsible for sending the tactile sensations involved with playing an instrument to the brain while the motor neural pathway is responsible for sending movement instructions to muscles. Neuroscientists at the American Academy of Neurology published an article about sensorimotor reorganization in focal hand dystonia and writer's cramp. They found that long-term motor training (such as that of professional musicians) results in structural and functional changes in the sensorimotor cortex. In musicians tested, the sensorimotor output lay midway between that in healthy non-musician subjects and those with musician's dystonia. The authors hypothesize that the change in the sensorimotor cortex of healthy musicians is beneficial for fine motor control, but when this change goes too far (as is the case with dystonia), it interferes with movement. The sensorimotor output of musicians with dystonia lacked the usual differential organization seen in healthy non-musicians.⁴⁷

One experiment by Rosenkraz involved stimulating specific muscles of the hands of healthy musicians and musicians with focal hand dystonia. When specific muscles of the dystonia-affected hands were stimulated, excitability increased in all muscles of the hand rather than simply being focused on the stimulated muscle. The scientists involved concluded that there is an excess sensory coupling to motor output in the brains of musicians with focal dystonia. However, this was not the case with patients with writer's cramp (sometimes referred to as a form of dystonia).⁴⁸

⁴⁷ Karen Rosenkraz, "Sensorimotor reorganization by proprioceptive training in musician's dystonia and writer's cramp" *Neurology* 70, (February 2008): 304, accessed November 9, 2016, <http://www.londonhandtherapy.co.uk/wp-content/uploads/2010/04/Sensorimotor-reorganisation-by-proprioeptive-training-in-musician%C3%94%C3%87%C3%96s-dystonia-and-writer%C3%94%C3%87%C3%96s-cramp-.pdf>

⁴⁸ Rosenkraz, "Sensorimotor reorganization by proprioceptive training in musician's dystonia and writer's cramp", 312.

David Vining, a trombonist who claims to have made a full recovery from focal dystonia, provides rehabilitation strategies for focal embouchure dystonia on his website. His advice includes generic principals such as “do not try to play in public when you retrain” and “keep a journal”. Vining advocates being healthy physically and mentally by doing yoga, Alexander Technique lessons, Feldenkrais lessons, and seeking psychiatric help if depressed. Unlike Conable, Vining advocates giving up on recapturing the old way of playing prior to the onset of dystonia. Vining recommends redefining the embouchure and finding a healthier and less athletic way of playing.⁴⁹

Joaquin Fabra, another trombonist to recover from embouchure dystonia, claims that focal dystonia is an emotional condition. Fabra claims that fear of failure will result in tension in the body, which inhibits the natural airflow. When a musician tries to control tension, more tension is added, exacerbating the problem. His solution involves accepting failure to stop restraining movement. “If you accept failure, failure is not failure anymore. Failure is just a concept but it is also a feeling.”⁵⁰ Fabra argues that attempting to control tension is an attempt to change a consequence of something that has already happened. He likens this to somebody throwing a stone at a target, and then trying to change the trajectory of the stone after it has been thrown. The only change that the stone-thrower can make is in the aim of the next throw. However, if the stone-thrower is too preoccupied by the failure of not hitting a target, the proper aim cannot be found.⁵¹

⁴⁹ “Retraining Strategies”. Embouchure Help, accessed November 14, 2016, <https://davidvining.com/embouchure-help-2/retraining-strategies/>.

⁵⁰ “Joaquin Fabra,” Focal Dystonia: A Musician’s Resource, accessed November 15, 2016, <http://www.focaldystonia.co.uk/joaquin-fabra/4562942930>.

⁵¹ Ibid.

Dr. Steven J. Frucht conducted a study of brass musicians with embouchure dystonia that revealed trends of the disorder. Of the 26 patients studied (25 of whom were professional musicians), symptoms of dystonia appeared an average of 25.6 years after learning to play. Within the year preceding the onset of dystonia symptoms, only 12% altered their embouchure and 8% altered their instrument. Only one of seven patients experienced benefits from botulinum toxin injections, a medical treatment commonly used to diminish dystonic symptoms. “Patients found that the most effective treatment was to attempt to compensate for dystonia by retraining their embouchure.”⁵²

Another study by Frucht reveals trends in the prevalence of different types of abnormal movements among different types of brass instrumentalists. For example, Frucht found that task-specific embouchure tremor and lip-pulling embouchure dystonia phenotypes were common among high-register brass players such as trumpet and French horn players. Lip-locking (inability to move the lips to accommodate airflow) was only found in low-register brass players such as trombonists and tuba players. Frucht also found that six percent of brass musicians with embouchure dystonia subsequently developed writer’s cramp, another form of dystonia. According to Frucht, this suggests a genetic predisposition to develop dystonia.⁵³

Dr. Seth David Fletcher wrote a dissertation titled, *The Effect of Focal Task-Specific Embouchure Dystonia upon Brass Musicians: A Literature Review and Case Study*. Fletcher provides detailed descriptions of the symptoms, possible causes, and treatments of FTSED. Studies of both brass musicians and other musicians with focal

⁵² Steven J. Frucht, “The Natural History of Embouchure Dystonia,” *Movement Disorders* 16, no. 5, (2001): 899.

⁵³ Steven J. Frucht, “Embouchure Dystonia: Portrait of a Task-Specific Cranial Dystonia,” *Movement Disorders* 24, no. 12, (September 2009): 1752-1762.

dystonia are also included. Fletcher gives a description of his rehabilitation from FTSED through the guidance of trombonist and retraining specialist, Jan Kagarice. According to Fletcher,

“Although this intensive period of re-training did not result in a spontaneous remission of symptoms, it did provide some immediate benefits, specifically in improved tone quality, enhanced ease of production in less-affected ranges, reduction in severity of involuntary facial spasms, and increased endurance.”⁵⁴

Fletcher provides a thorough review of scientific literature concerning task-specific focal dystonia. He concludes, “no proven or typical medical plan of treatment for FTSED exists and the only treatment shown to be effective is a retraining of the embouchure, although little documentation exists to substantiate this assertion.”⁵⁵

French horn player, Katie Berglof, wrote a blog about her recovery process from focal dystonia. This blog includes many tips and tricks that may reduce symptoms of FTSED by changing the sensory stimulation of playing. For example, changing equipment, position of the instrument, or how the instrument is held, may trick the brain into thinking the task is new, and allow the musician to approach playing in a more functional way. This blog also reveals the emotional struggle of coping with FTSED.⁵⁶

Focus of Attention

Gabriele Wulf, Phd, Professor of Kinesiology at University of Nevada, Las Vegas, published a study investigating what type of focus is ideal when learning a novel skill such as golf. A group of eleven novice golfers were asked to focus internally on the movement of their arms, while another group of eleven novice golfers were asked to

⁵⁴ Fletcher, “The Effect of Task-Specific Focal Embouchure Dystonia on Brass Musicians”, 160.

⁵⁵ Fletcher, “The Effect of Task-Specific Focal Embouchure Dystonia on Brass Musicians”, 38.

⁵⁶ Katie Berglof, *Living with Embouchure Dystonia*, April 3, 2017, accessed April 11, 2017, <http://embouchuredystonia.blogspot.com/>.

focus externally on the movement of the club. Wulf discovered that the group focusing externally on the movement of the club scored considerably and consistently higher than the group focusing internally on the movement of their arms. Also, when tested again a day later, the group focusing externally retained their ability to score higher than the internally focusing group. Wulf found that instructions were most helpful when they directed the students' attention externally to the effect of their movements on their environment. From the results of Wulf's study, she concludes that "actions should be more effective if they are planned in terms of the anticipated outcome, rather than in terms of the specific movement patterns."⁵⁷

Another article written by Gabriele Wulf reveals similar findings concerning the focus of attention during a tennis swing.⁵⁸ Players who were instructed to focus on the trajectory of the ball performed better than players who focused on the ball-racket contact point. Though movements of both groups were similar, focusing on movement goals allowed for more accuracy and retention. In Wulf's article, she also includes a list of studies demonstrating the effectiveness of an external focus vs. an internal focus with regards to many other sports.⁵⁹ In more than fifty scientific studies, an external focus of attention yielded more accurate results than an internal focus of attention.

Robert. A Duke, Phd, Professor of Music and Human Learning at University of Texas, Austin, published a similar study examining the effects of different types of focus on keyboard performance. Sixteen music-majors performed a brief keyboard passage

⁵⁷ Wulf, "The Learning Advantages of an External Focus of Attention in Golf", 121.

⁵⁸ Gabriele Wulf, "Attentional Focus and Motor Learning: A Review of 15 Years", *International Review of Sport and Exercise Psychology* 6, no. 1 (September 1012): 81, accessed April 11, 2017, https://faculty.unlv.edu/wpmu/gwulf/files/2014/07/Wulf_AF_review_IRSEP_2013.pdf.

⁵⁹ Ibid.

after being asked to direct their focus to either their fingers, piano keys, piano hammers, or to the sound they produced. The results revealed that focusing on the effects of movements resulted in more accurate performance than focusing on the movements themselves. Duke concluded that the more distal the focus of attention, the more accurate the performance was. Focusing on the sound produced the most accurate performances while focusing on movements of the fingers produced the least accurate performances.⁶⁰

⁶⁰ Robert Duke, "Focus of Attention Affects Performance of Motor Skills in Music" *Journal of Research in Music Education* 20, no. 10 (2011): 8.

CHAPTER 3

METHOD

Through this research, potential strategies for recovering from FTSED will be provided. Most musicians who develop FTSED struggle with perfectionism, need for control, and anxiety.⁶¹ Therefore, addressing these issues will be an integral part of the rehabilitation process. Learning to let go of control and observing the effects of our actions objectively is not easily taught. However, gaining an understanding of how this can assist the retraining process may be a helpful first step.

Through bioenergetics exercises provided by Dr. Alexander Lowen, musicians can learn to become more grounded and identified with the lower half of their body (rather than being stuck “in the head”). In Japanese, the word, *Hara* refers to the belly and describes a person who is centered in this region. According to Dr. Lowen, somebody who has Hara is balanced both psychologically and physically.

“When a man possesses fully developed Hara he has the strength and precision to perform actions which otherwise he could never achieve even with the most perfect technique, the closest attention or the strongest will-power. Only what is done with Hara succeeds completely.”⁶²

Dr. Lowen describes Hara as the center for the unconscious or instinctive life. When training or retraining the embouchure, most healthy movements and postures are made unconsciously in response to the intended sound. Dr. Lowen also states that loss of contact with our vital center (Hara) imbalances a person, leading to anxiety. Therefore, becoming more grounded and feeling the vital center may provide a basis for successful rehabilitation.

⁶¹ Marsten, “Finding the Balance”, 329.

⁶² Alexander Lowen, *The Way to Vibrant Health*, (Alachua: Alachua, Harper, 1977), 15.

Occasionally, the automatic processes of the body are dysfunctional or inefficient due to a misunderstanding of how the body naturally functions. To remedy this, potential causes for the misuse of muscles will be presented through body-mapping, along with descriptions of how these muscles function efficiently. Having an accurate body-map and understanding how our anatomy functions may allow effective and efficient unconscious movements during an external focus.

Gabriele Wulf and Robert Duke's studies on the focus of attention will play an essential role in the retraining process. Retraining strategies will attempt to realign musicians' focus of attention with the way a brass instrument naturally resonates. Allowing the musician's airstream to create resonance will direct the musician's attention away from the dysfunctional mechanics of the embouchure, allowing the lips to vibrate sympathetically to the standing wave in the instrument. Moving attention to the sound via the airstream will allow the embouchure to make the automatic adjustments necessary for the intended sound.

Healthy Breathing

“Our breathing reflects every emotional or physical effort and every disturbance”⁶³. Restricted breathing is an indication that there is tension in the body. This study will investigate how to avoid restricted breathing or tension resulting from inhaling inappropriately for a phrase.

Hyperventilation can trigger neuromuscular disorder. Through a poor understanding of how the instrument resonates and a poor understanding of how we breath, many brass musicians are not allowing breath to turn into sound. A means of

⁶³ Feldenkrais, *Awareness Through Movement*, 37.

allowing musicians to inhale appropriately for the intended sound, and allowing the exhale to resonate the instrument may minimize symptoms of FTSED. Also, acquiring an understanding of the movements involved in breathing will provide guidance.

Body-mapping

According to cellist William Conable, his students moved according to how they thought their body functions, even when that was at odds with the reality of how their body functions. An inadequate understanding of joints can result in laborious movement. Also, lacking understanding of where joints are and how they move can cause difficulties or pain. Conable also noticed that his students' movements became more fluid and graceful once they ascertained a more accurate understanding of their body and how it functions.⁶⁴ This study will incorporate anatomical descriptions of muscular and skeletal structures necessary for brass playing. Common detrimental misconceptions about the body will also be incorporated from body-mapping literature. This section will primarily explain the causes of inefficient technique among brass musicians.

Healthy Brass-Playing

Arnold Jacobs, renowned brass pedagogue and former Chicago Symphony Orchestra tubist, taught a natural way of playing using air to create song.

“In the human body, the simple controls are in our brains so we can be free to cope with life outside ourselves. To deal with life inside ourselves, we can study Yoga so we can influence our internal body by using mental concentration and emotions.”⁶⁵

⁶⁴ Conable, *What Every Musician Needs to Know about the Body*, 5.

⁶⁵ Loubriel, “Arnold Jacobs: His Global Influence.”

Jacobs suggests that an external focus on exhalation and sound is ideal when playing. However, focusing inwardly to observe healthy and efficient movement may have benefits when not playing the instrument.

An understanding of how the body and mind is used in healthy brass playing will be made clear. Many unhealthy habits can be overcome through understanding how a brass instrument naturally resonates and directing the focus of attention when playing a brass instrument. Methods for learning healthy brass playing taught by Arnold Jacobs, Jan Kagarice, and John Harbaugh will provide multiple perspectives on the mechanics of producing a healthy and resonant sound.

Focus of Attention

As Feldenkrais and Conable suggest, we move according to our self-image, even when that image is incorrect. Therefore, accruing a more accurate understanding of the human anatomy and how it functions during healthy brass playing may be beneficial. Developing this understanding before retraining may be ideal so that an external focus of attention can be used during the retraining process. Developing an understanding of how the body functions healthily and efficiently can allow a musician to trust unconscious movement to be productive.

As demonstrated by Gabriele Wulf and Robert Duke, a more distal focus on the effect of movements is ideal when learning a novel skill. A dystonic musician is accustomed to focusing internally on the symptoms of the dystonia, as it is difficult not to be perturbed by spasms and abnormal postures. Incrementally moving the dystonic musician's focus more distally may be an effective way of retraining. As David Vining suggests, the embouchure accommodates the airstream. Restoring healthy airflow and

focusing on how the airstream resonates the instrument may allow the natural learning process to occur in the embouchure, replacing abhorrent movement with productive movement. Ideally, a musician can hear the desired sound in the brain, and trust the automatic processes of the body to produce that sound.

CHAPTER 4

REHABILITATION

It should be noted that there is currently no universally accepted rehabilitation method for FTSED. Each case of FTSED is different and may have a slightly different solution. However, there are many similarities in successful approaches to rehabilitation. David Vining described his personal experience combining teachings and methods from several sources to rehabilitate.

“It was as though I had many pieces of a puzzle in front of me and I knew they would come together and coalesce in some way, but I did not know how. Ultimately, the missing link was how I fused all the therapies and information I had received into an amalgam of my own devising. I had assembled all the ingredients of the cocktail-now it was up to me to stir until blended.”⁶⁶

It should also be noted that the blend of methods presented in this chapter was inspired by my own development of FTSED. A more detailed description of my experience rehabilitating is provided in chapter five.

Mind/Body

Joaquin Fabra, Jon Gorrie, and Dr. Joaquin Farias suggest a significant influence of emotions on focal dystonia.

“Focal dystonia is thought to be due to a functional anomaly of the basal ganglia in the brain. Presently, the role that the basal ganglia play in its connections to the limbic system and prefrontal cortex is being studied in its relationship to pathophysiologic processes involved in disorders such as anxiety, depression, and obsessive compulsive disorder. The basal ganglia are better known for their role in the planning and execution of movements, but they are also related to other processes such as emotional behavior and cognitive functions for instance, making decisions, monitoring, and inhibitory control. Therefore, a functional anomaly of the basal ganglia could affect the generation, maintenance, and change of emotions, thoughts, and movements. In this way, the borders between that which is emotional, mental, and motion blur, making it imperative to consider these three elements as one. In essence, the experience of not being able to stop

⁶⁶ “My Dystonia Narrative,” David Vining, accessed April 11, 2017, <https://davidvining.com/embouchure-help-2/embouchure-help/>.

thinking, feeling, or moving is due to these same processes. We need to explore the interrelationships among emotion, thought, and movement during rehabilitation in order for it to be effective.”⁶⁷

If a musician experiences difficulty performing, psychological tension will manifest as physical tension, exacerbating the dystonia. For this reason, David Vining recommends avoiding performing during the recovery process. Dystonic musicians must learn not to fear failure or let failure affect their emotions. A musician who is worried about failing will try to control tension, which only adds to the unnecessary tension. Archery master, Kenzo Awa in *Zen and the Art of Archery* put it eloquently. “The right shot at the right moment does not come because you do not let go of yourself. You do not wait for fulfillment, but brace yourself for failure.”⁶⁸

Ernestine Whitman, former flutist with the Atlanta Symphony Orchestra, wrote about the emotional process of recovering from focal task-specific hand dystonia.

“While my case may be extreme, I do think all of us too readily allow our sense of dignity and self-worth to be dependent upon our success as musicians...I hope that I carry with me this newfound conviction that one’s value as a person exists apart from one’s ability as a performer.”⁶⁹

Whitman returned to a performing career six years after developing hand dystonia. David Vining includes a similar testimony on his website.

“I have experienced countless benefits from retraining. The most stunning to me has been a recalibration of my sense of self-worth. No longer do I depend upon trombone playing to define who I am. It’s certainly important, but it’s no longer the obsession it was prior to the dystonia.”⁷⁰

⁶⁷ Joaquin Farias, *Intertwined: How to induce Neuroplasticity, A New Approach to Rehabilitating Dystonias* (Galene Editions: 2012) 1129, Kindle.

⁶⁸ Herrigel, *Zen in the Art of Archery*, 30.

⁶⁹ Fletcher, “The Effect of Focal Task-Specific Embouchure Dystonia Upon Brass Musicians,” 98.

⁷⁰ “My Dystonia Narrative,” David Vining, accessed April 11, 2017, <https://davidvining.com/embouchure-help-2/embouchure-help/>.

The human body reacts to psychological threats and physical threats similarly. If humans perceive a physical threat, they instinctively contract specific muscles. The psychological threat of failing to meet expectations can feel the same way⁷¹. There are stretches that can help alleviate this physical tension. However, the best way to remove this tension is by removing its cause (the fear of failure), as suggested by Joaquin Fabra⁷².

This is a bioenergetics exercise taught by Elliot Hulse, a personal trainer, to orient the body for primal movement and balance. A common place to experience unnecessary muscle tension after perceiving a threat is the pelvic floor and anus. To relax these muscles, squat all the way down as if you were going to defecate, while reaching your arms forward for balance. Reaching your arms forward will also stretch out your shoulders, another common place to experience unnecessary tension. Holding this position, while breathing deeply will help relax many muscles that are tensed as the result of psychological tension.⁷³

Other common places to experience unproductive muscular tension is the abdomen. When a dog feels safe, it will often expose its abdomen and let you pet it. When people feel threatened, they will often cross their arms, unconsciously covering their vulnerable abdomen. A stretch commonly used in tai chi called the “taoist arch” can help relieve this tension, allowing freer flow of air and expression (figure 2).

The “taoist arch” is used in tai chi and in bioenergetics, a form of therapy that links physical pain, muscle tension, and postural disorders with state of mind. Alexander

⁷¹ Lowen, *Bioenergetics*, 54.

⁷² Focal Dystonia: A Musician’s Resource. “Joaquin Fabra.”

⁷³ Elliot Hulse, “Daily Bio-energizer Warm up,” *Elliot Hulse Blog*, May 19, 2012, accessed February 18, 2017, <http://elliottthulse.com/daily-bioenergizer-warm/>.

Lowen, author of *Bioenergetics*, describes the stretch as a means of becoming more grounded.

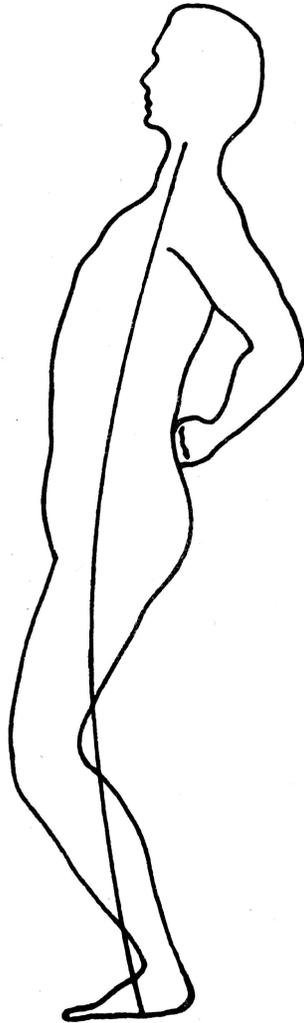
“The center point of the shoulders is directly above the center point of the feet, and the line joining these points is almost a perfect arch passing through the central point of the hip joint. We use this position to give the person a sense of being connected or integrated, of being firmly planted in his feet and holding his head up. But we also use the position diagnostically for it immediately reveals a lack of integration in the body, and it pinpoints the nature and location of the main muscular tensions.”⁷⁴

If the arch cannot be done properly because of body tensions, harmony will not be restored by doing this stretch. However, it will help such people to get in touch with their body and feel the tensions in their bodies that prevent proper execution of the arch and the accompanying feeling of harmony (see figure 4.1).

If a brass musician consistently plays with focal embouchure dystonia, facial muscles can become very tense due to the spasms and abnormal postures associated with the disease. Afflicted players can do some stretches to relieve some of this tension.

Dr. Simon McGrail, ear, nose, and throat surgeon, developed a set of exercises for strengthening damaged or weakened lip muscles. Trumpet player Jonathan Vieker used these stretches to successfully rehabilitate from a torn orbicularis oris (lip muscle). These stretches may not be necessary for everyone suffering from focal dystonia. However, if a brass musician has been playing regularly with focal dystonia, muscles may be weakened or tense. In that case, these stretches may be beneficial.

⁷⁴ Lowen, *Bioenergetics*, 69.

FIGURE 4.1. TAOIST ARCH⁷⁵

“Stand with feet about 18” apart, toes slightly turned inward. Now place both fists with the knuckles facing upward into the small of your back. Bend both knees as much as you can without lifting the heels off the floor. Arch backward over your fists, but make sure that your weight remains forward on the balls of your feet. Breathe deeply into your belly.”⁷⁶

⁷⁵ Lowen, *Bioenergetics*, 73.

⁷⁶ Lowen, *The Way to Vibrant Health*, 20.

McGrail describes 4 stretches to be repeated five times twice a day.

“Loosen the lips by rolling air around the mouth for a minute or so. Form an embouchure, and direct all the muscles toward the center of the aperture. Hold for five seconds, and repeat three times. With the teeth slightly apart, as is usually the case naturally, do an extended smile, stretching both corners of the mouth sideways. Hold for five seconds, and repeat three times. With a small rolled up gauze, or plegette, such as dentists use, place this between the upper lip and upper gum. Try to push the gauze through the gum by pressing the lip backward. Hold for five seconds, and repeat three times.”⁷⁷

These exercises can be beneficial for relieving facial tension caused by playing inefficiently. However, they are not necessary for learning a more efficient way of playing. To rehabilitate, dystonic musicians generally learn a new way of playing that requires less effort. When a brass musician is using air to resonate the instrument naturally, the muscles of the embouchure do not need to work as hard, ideally eliminating the need for lip stretches or isometric exercises.

Qigong and Breathing

Some musicians may find it difficult not to stop the air between inhaling and exhaling. Qigong breathing exercises may be helpful for such a musician. The goal of qigong breathing is circulating chi throughout the body. Qigong breathing is supposed to be natural and smooth like a water wheel pumping energy throughout the body. This type of breathing is also healthy for brass playing.

One simple qigong exercise can help teach this healthy style of breathing and help a musician to relax. Start by standing with your arms at your side and your feet shoulder-width apart. While inhaling, move your hands up towards your head, while bending your knees slightly. While exhaling, move your hands out and downward towards your pelvis

⁷⁷ “Dr. McGrail’s Lip Exercises,” A Trumpet Player’s Blog about Overcoming Lip Injuries, last modified September 14, 2014, accessed March 12, 2016, <http://lipriplues.com/dr-mcgrails-lip-exercises/>.

and straighten your knees without locking them. Repeat this circular motion with your hands, resembling a water wheel.⁷⁸

Qigong breathing is used to help promote relaxation, awareness, and focus. These traits may be beneficial for the rehabilitation process. As some have suggested a significant impact of emotions on dystonia, calming the mind and body with qigong may help dystonic musicians mentally. Concert pianist Michael Houston credits qigong as being helpful in his rehabilitation from focal dystonia.

“I began to seriously practice qigong (A treatment by a Chinese qigong master in Sydney was a revelation). Eventually I/we settled on the idea that the involuntary movements could be countered through relaxation and that this was primarily a mental matter.”⁷⁹

Breathing should be a natural automatic process that does not require teaching.

However, some rigidities in the body can prevent natural and spontaneous breath from happening. Dr. Alexander Lowen describes respiratory movements as waves.

“The inspiratory wave starts deep in the pelvis and flows upward to the mouth. As it passes upward, the large cavities of the body expand to suck in the air. These cavities include the abdomen, the thorax, the throat, and the mouth...The expiratory wave starts at the mouth and flows downward. When it reaches the pelvis, that structure moves slightly forward...Expiration induces a relaxation of the whole body. You let go of the air in your lungs, and in the process you let go of any holding. People who are afraid to let go have difficulty in breathing out fully. Even after a forced expiration their chests remain somewhat inflated.”

As Jan Kagarice discovered, musicians with FTSED generally are perfectionists who feel a need for control. It is likely that such musicians attempt to control their sound by unnecessarily tensing muscles and trying to force air through a tense embouchure. Therefore, learning to fully expire and allow the instinctive inhalation reaction to occur may be beneficial for the rehabilitation process. When playing a brass instrument,

⁷⁸ *Tai chi: The 24 Forms*, Sydney Australia: Paul Lam, 2009, DVD.

⁷⁹ “Focal Dystonia-My History,” Music and Health, last modified November 20, 2005, accessed April 12, 2017, <http://www.musicandhealth.co.uk/articles/Houstoun.html>.

inhalation should be an unconscious reaction to the expectation of a desired sound.

Learning how much air to inhale for the desired sound depends on a brass musician's ability to feel the resistance of the instrument with the air column.⁸⁰

Body-mapping

The effectiveness and efficiency of musicians' unconscious movements may depend on the accuracy of their body map. Since playing a brass instrument involves fine motor movements that don't resemble everyday motor behavior, some inefficient or abnormal habits can be inadvertently learned through a distal focus. In her study on different types of focus, Gabriele Wulf states, "Learners who are first introduced to novel skills of moderate to high complexity produce more consistent and accurate performances when initial instructions focus attention on body movements."⁸¹ For example, instructing a novice brass musician to keep the corners of the embouchure firm and not to puff the cheeks out may help the musician to find effective and efficient technique faster. However, these movements (or lack of movement) are most effectively made when they are a reaction to the expectation of a specific sound. Trombonist David Vining credits knowledge of healthy brass-playing anatomy as being influential in his recovery from FTSED.⁸²

An incorrect understanding of human anatomy may result in inefficient or ineffective use of that anatomy. For example, poor understanding of how the jaw works, and where the temporomandibular joints are, may cause problems playing a brass instrument. "The role of the jaw within the embouchure team (body parts used to form

⁸⁰ Marsten, "Finding the Balance," 131.

⁸¹ Wulf, "The Learning Advantages of an External Focus of Attention in Golf," 121.

⁸² David Vining, *What Every Trombonist Needs to Know About the Body* (Flagstaff: Mountain Peak Music, 2010), xi.

sound on a brass instrument) is to provide stability for the surrounding soft tissue and to move along with the changing shape of the lips and facial muscles.”⁸³ The TMJ’s are located in front of the earholes on either side of the skull. Humans have only one jaw which is attached to our skull by two TMJ’s. Belief in two jaws may inspire brass musicians to tilt their head backward when dropping their jaw, causing tension in their neck. As we only have one jaw, dropping the jaw involves simply surrendering the jaw to gravity. Having a sufficiently mobile jaw allows a brass musician greater control over tone quality, especially in the low register.

Another common anatomical misunderstanding is that the tongue is one muscle. Belief that the tongue is one muscle will result in sluggish articulation as the musician is moving more of the tongue than necessary. It is possible to move the tip of the tongue without involvement from the back of the tongue. The back third of the tongue is vertical, and part of the pharyngeal space, which should remain open during healthy brass playing. Inefficient articulation can close off this space, resulting in a constricted air stream, and subsequently, a less resonant sound.⁸⁴

Healthy articulation is accomplished exclusively with the tongue. Brass musicians who do not understand this may move the jaw up and down or close off the lips with each articulation. Others may attempt to puff air or close the glottis and make a grunting noise, in an attempt to assist the tongue. The tongue does not need assistance from any other part of the embouchure to articulate. Proper articulation happens when the tongue touches the roof of the mouth, bounces off the air stream and is propelled back down and out of the way of the air flow.

⁸³ David Vining, *What Every Trombonist Needs to Know About the Body*, 64.

⁸⁴ Vining, *What Every Trombonist Needs to Know About the Body*, 69.

"When air is moving sufficiently, the tongue acts like a speed boat moving fast across the water. The speed boat bounces off the water because of its momentum and the tongue bounces off the roof of the mouth because of the of momentum of the air flow."⁸⁵

According to Zen teacher, Kenzo Awa, unnecessary tension isn't inhibited by actively focusing on the tension. In *Zen and the Art of Archery*, author Eugen Herrigal describes a conversation with Awa. "I once remarked that I was conscientiously making an effort to keep relaxed. He replied: 'That's just the trouble, you make an effort to think about it. Concentrate entirely on your breathing, as if you had nothing else to do!'"⁸⁶

A method called "constructive rest" used in Alexander Technique may help dystonic musicians and healthy musicians to relax tension and observe healthy breathing. To rest constructively, lie down on the floor with your legs bent so that your feet are flat on the floor and your knees are above your hips. Place some books or another firm surface under your head for support so that your head isn't tilted too far forward or backwards. Your neck should not come in contact with the support. Your feet should be as close to your pelvis as comfortable and your knees should be hip-width apart (see figure 4.2).

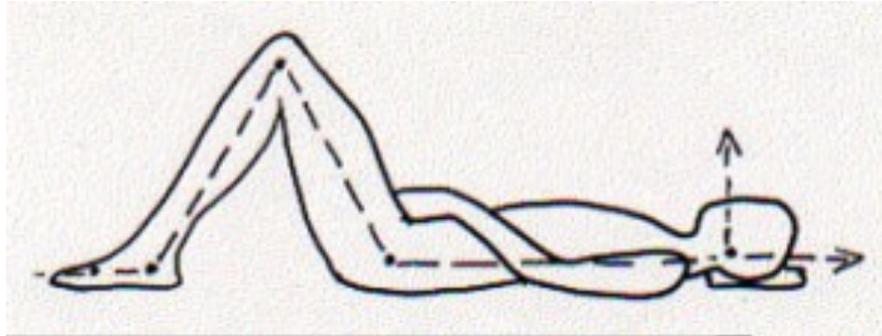
"Raising the head on books encourages a very slight lengthening of the neck. Having knees up flattens out the curve in the lower back. Placing hands softly on your tummy allows the shoulders to open. In this position, the deep postural muscles of the back can resume their proper supporting role; the large superficial back muscles can let go."⁸⁷

⁸⁵ Vining, *What Every Trombonist Needs to Know About the Body*, 72.

⁸⁶ Herrigal, *Zen in the Art of Archery*, 25.

⁸⁷ Jim Crosthwaite, "Resting the Back is Great for Desk-bound People," *Alexander Works*, December 7, 2011, accessed February 19, 2017, <http://jimcrosthwaite.blogspot.com/2011/12/resting-back-is-great-for-desk-bound.html>

FIGURE 4.2. CONSTRUCTIVE REST POSITION⁸⁸



Doing constructive rest may help with muscle tension or strain, stress and anxiety, decreasing pain or discomfort, breathing coordination, level of energy, and sensory awareness.⁸⁹ This position can help remind dystonic musicians what healthy and relaxed breathing feels like. Connecting this type of breathing to playing a brass instrument may alleviate many of the tremors and unnecessary tensions of a dystonic embouchure.⁹⁰

Focus of Attention

One might assume that embouchure rehabilitation would involve lengthy descriptions of a healthy embouchure with instructions on how to achieve this embouchure. However, this mentality assumes that a focus on emulating the characteristics of a successful performance is the ideal way to replicate that success. Oftentimes, the observable physical actions of playing a brass instrument are only a small

⁸⁸ Ibid.

⁸⁹ Expanding Self. "Constructive Rest." Laurel Podulke-Smith and the Alexander Technique of Rochester, MN. Last modified March 2011. Accessed February 19, 2017. http://www.expandingself.com/constructive_rest.

⁹⁰ "Constructive Rest," Laurel Podulke-Smith and the Alexander Technique of Rochester, MN, last modified March 2011, accessed February 19, 2017, http://www.expandingself.com/constructive_rest

part of the physical process being employed. Therefore, recreating the observable symptoms of healthy brass playing may not yield the same results.⁹¹

When focusing on how to form an embouchure, a description of the symptoms of effective playing is being used as a prescription for effective playing. However, as Gabriele Wolf discovered with golfers, this type of internal focus is not ideal.⁹²

Wulf's theory coincides with German scientist Wolfgang Prinz's "common coding theory". This theory states that actions are coded in terms of the perceivable effects they are intended to cause. If action and perception attempt to access shared representations simultaneously, the action can become disrupted.⁹³ This may explain what is happening in the brain of those suffering from focal dystonia.

Evidence suggests that excess internal focus on the physical sensations of playing a brass instrument may contribute to the development of FTSED. Neuroscientists from the American Academy of Neurology concluded from their study of hand dystonia that there is an excess sensory coupling to motor output in the brains of musicians with focal dystonia.⁹⁴

Similar results were found in a study published in *Neuroreport* of former brass musicians with FTSED. The brass musicians with FTSED were discovered to have decreased sensitivity in their upper lips as compared to a control group of non-

⁹¹ Marsten, "Finding the Balance", 56.

⁹² Wulf, "The Learning Advantages of an External Focus of Attention in Golf", 121.

⁹³ Wolfgang Prinz, "Perception and Action Planning", *European Journal of Cognitive Psychology* 9, no. 2 (1997): 129.

⁹⁴ Rosenkraz, "Sensorimotor reorganization by proprioceptive training in musician's dystonia and writer's cramp," 304.

musicians.⁹⁵ This study, along with the study of hand dystonia led to the conclusion that abnormal somatosensory organization may contribute to the disorder.

Dr. Roger Martin, Professor of Flute at Tennessee Technological University, describes his focus of attention prior to the development of Focal Task-Specific Hand Dystonia as being split evenly between the sound and the physical sensation of playing. As his FTSHD became more severe, his focus drastically shifted to the physical sensation of playing. Martin credits his ability to rehabilitate to shifting his focus externally. “When I ignored my hands and put all my attention on hearing the motion of pitches, there was improvement.”⁹⁶

Trombonist David Vining defines the embouchure as “A three-dimensional entity in motion which is produced when air moves past lips.” Vining suggests that there is no perfect embouchure for every note and every face. It is always changing to accommodate the air flow required to produce the desired sound.⁹⁷ One useful analogy for the embouchure compares it to the sail of a sailboat. If a sail were quivering on a boat, the logical solution would be aligning the sail to the wind rather than changing the sail. Similarly, the solution to a twitching or abnormal embouchure is frequently found by focusing on allowing a healthy airstream to flow through the embouchure and instrument.

One might assume that the solution to unhealthy airflow is to focus on breathing. However, internally focusing on inhalation may prevent a brass musician from using the appropriate amount of air to make the desired sound. Appropriate inhalation is a reaction

⁹⁵ Yoshihiro Hirata, “Sensory Mapping of Lip Representation in Brass Musicians with Embouchure Dystonia,” *Neuroreport* 15 (January 2004): 815.

⁹⁶ Fletcher, “The Effect of Focal Task-Specific Embouchure Dystonia Upon Brass Musicians,” 99.

⁹⁷ David Vining, *What Every Trombonist Needs to Know About the Body* (Flagstaff: Mountain Peak Music, 2010), 59.

to the expectation of the desired sound. Focusing on inhalation changes it from a reaction into an action. If a brass musician is inhaling more than is needed for the phrase, tension can occur in the intercostal muscles, glottis, and tongue in an unconscious effort to hold air back. This tension restricts the air column resulting in constricted tone and sometimes hesitation at the beginning of notes. If brass musicians habitually take in too much air, hyperventilation can occur. Hyperventilation can cause stress, twitching in the hands and face, dry mouth, and neuromuscular problems.⁹⁸

External Focus

Task-Specific Focal Embouchure Dystonia only causes dysfunction during movements associated with playing an instrument. However, this can vary from case to case. For example, one person may become dysfunctional only when blowing through a brass instrument while another person is dysfunctional even when blowing through a mouthpiece. The stimulus of the mouthpiece may feel the same as playing, and therefore triggers the dystonia.

Once a dystonic musician ascertains an accurate body map by focusing internally, unconscious movements made when focusing externally will be effective and efficient. Once healthy breathing is observed, musicians with FTSED can shift their focus to connecting outward flow of air to the sound it produces on a brass instrument. To apply the relaxed breath from “constructive rest” to playing a brass instrument, a straw can be used. A straw may help ease the transition from relaxed breathing in the “constructive rest” position to breathing through a mouthpiece. Former Principal Trumpet of the New

⁹⁸ “Hyperventilation Syndrome Clinical Presentation,” *Drugs and Diseases*, last modified November 28, 2016, accessed January 20, 2017, <http://emedicine.medscape.com/article/807277-clinical>

York Philharmonic, Phil Smith, credits using a straw to retrain airflow as being an effective tool in his rehabilitation from FTSED.⁹⁹

The following exercise is inspired by the teachings of trombonist and FTSED expert, Jan Kagarice. While in the constructive rest position, observe your breath. Allow natural breathing to happen rather than forcing inhalation and exhalation. Observe how this natural type of breathing feels. Take a straw and exhale this way through the straw (next to the lips, not touching the lips) to start connecting relaxed exhalation to exhalation through an apparatus (such as a brass instrument). Continue this natural and relaxed way of breathing through the straw while sitting and standing. The focus of attention should be on the outward flow of air.

Use the healthy airflow from constructive rest while blowing through a mouthpiece. Blowing through the mouthpiece should feel the same as blowing through the straw in the constructive rest position. Air is released through the mouthpiece rather than forced through. Treat the mouthpiece as if it were part of your body so that air is flowing out of the shank unencumbered. Then while exhaling out of the mouthpiece, slide the mouthpiece into the horn until the air column creates resonance. Observing the air creating resonance is like observing a pencil drop to the ground. Gravity does not need assistance moving the pencil to the ground any more than the air needs your assistance creating resonance. Once resonance is found, feel the resonance of the instrument with your air column as if you were a blind man feeling your way around with a cane. This will retrain the brain to know what kind of air to use to create the desired sound. Focus on

⁹⁹ Ryan, King, "Healthy Tone Production" *Ryan King Trumpet*, June 18, 2016, accessed February 22, 2017, <https://ryankingtrumpet.wordpress.com/2016/06/18/first-blog-post/>.

feeling the resonance with the air column. Remember where the air finds resonance and the speed of the air column.

An exercise recommended by David Vining for learning healthy air flow may help remedy a dysfunctional embouchure. In one of Vining's videos, he instructs students to blow air through their instrument without allowing the lips to vibrate. This results in a "whooshing" sound as air moves through the bell. In this exercise, the musician blows air through the instrument twice. Then on the third blow, the musician expects the desired sound to come out of the bell. By focusing on the air moving out of the bell and expecting the air sound to turn into the desired tone, the adjustments necessary for that transition to occur will happen unconsciously. This may be difficult for dystonic players to believe as they are used to attempting to control the sound by focusing internally on their embouchure. However, it is essential to keep the focus externally on the sound coming out of the bell.

Blowing air through the horn without vibrating the instrument is retraining the body to use unencumbered air. The goal is to use this same type of airflow while vibrating the instrument. It is important to remember how the instrument naturally resonates. The lips vibrate sympathetically to the resonance of the instrument and are not creating sound. Therefore, lips require no special attention when playing a brass instrument in the most resonant way.

The next part of Vining's exercise is to add the tongue. For the sake of this exercise, Vining recommends using a "dah" syllable instead of a "tah" syllable. The goal is to allow the tongue to "dent" the air rather than disrupting the air. Dysfunctional brass

players sometimes rely on the tongue to hold back the air and release it to attack a note. This results in an encumbered air flow and can cause hesitation.¹⁰⁰

Once a brass player can execute Vining's first exercise with a healthy sound, the exercise can be repeated adding the tongue. First the musician blows air through the horn without using the tongue. Then the musician adds a "dah" syllable to the beginning of the exhale through the instrument.¹⁰¹ It is important that there is no hesitation between inhale and exhale. Just as when we speak, the tongue does not interrupt the seamless transition from inhale to exhale.

On the third exhale, the musician allows the instrument to resonate using the same breath as before, denting the air with a flick of the tongue, giving an articulation to the beginning of the note. The goal of this exercise is to use the same type of breathing regardless of whether the lips are buzzing or whether the tongue is articulating. Ultimately, the correct articulation is a reaction to the expectation of sound just as when we speak.

Focusing on using the airstream to resonate the trombone can improve resonance and efficiency in non-dystonic musicians as well. One trombonist reported his experience on an online blog.

"I tried gently placing the horn on my lips while doing the blow through the aperture thing. The instant the mouthpiece touched my lips, with virtually no pressure, the lips started vibrating and I produced a warm centered tone with no effort. This was the complete antithesis of having to have a buzz in place and happening in order to produce a sound. This seems to indicate to me that the sound production process is part of a system that includes the horn, the mouthpiece and the chops together rather than the instrument being a simple amplifier of the noise that the chops produce."¹⁰²

¹⁰⁰ David Vining, *What Every Trombonist Needs to Know About the Body*, 118.

¹⁰¹ Ibid.

¹⁰² Dan Walker, "Buzzing: Same Pitch as that Played on the Horn?" *Trombone Forum*, accessed February 22, 2017, <http://tromboneforum.org/index.php?topic=15124.30;imode>.

On another blog, a trumpet player recommends similar practices to another trumpet player struggling with dystonic symptoms.

“A similar method is first taking out the mouthpiece and moving air through (without making a sound) and then placing the mouthpiece inside the leadpipe. From air alone, and no buzz, we can hear a sound form inside the leadpipe (or trumpet). This demonstration is often to show the player doesn’t need to vibrate or buzz the lips on their own, the standing wave aids in this process. The buzz will fix itself the more you do this. After a few weeks you’ll notice that your embouchure will start to favor a certain angle and placement that more quickly resonates the instrument. That’s how you organically change your embouchure. It should be a reactive process, not an active one and it should be based on the sound you’re getting when you resonate the horn.”¹⁰³

¹⁰³ “ScreamerA440”, “Playing with Air vs. Playing with Vibration” *Reddit*, accessed February 22, 2017, https://www.reddit.com/r/trumpet/comments/2pview5/playing_with_air_vs_playing_with_vibration/?st=j0kb30gd&sh=11cab259

CHAPTER 5

PERSONAL EXPERIENCE

In the interest of providing more anecdotal evidence regarding experience with rehabilitation from FTSED, I will discuss details of my own development of the movement disorder and subsequent retraining. This may benefit further research into effective rehabilitation strategies for FTSED and other forms of movement disorders.

I started experiencing dystonic symptoms when playing trombone about four years prior to writing this essay. My first symptoms involved hesitation of exhalation, especially when starting a phrase in the low register when no tempo had been established. I would inhale and feel like my tongue was preventing the exhale, as if the tongue was responsible for releasing the air like a valve. The problem expanded to the middle register but was still limited to situations in which I was starting a phrase with no established tempo (such as playing a tuning Bb).

Two years later, I was preparing for a classical solo competition, and noticed that regardless of how much I practiced, I felt like my progress in general was limited. The feeling of naturally and comfortably being able to play the instrument that I used to get from regular practice was gone. I believe that nerves exacerbated symptoms as I was preparing for the audition.

Symptoms were still not severe at this point. However, two months later, I took two weeks off from playing trombone before starting a job playing on a cruise ship every day. When I returned to playing on the cruise ship, my lip muscles felt weak. I was unable to take a break and let my lips recover so I played through the discomfort every day for two months. My playing became drastically more dysfunctional with an

embouchure tremor and a habit of pulling one corner of my mouth upward with each articulation. This resulted in an unpredictable air leak out of the corners of my embouchure. My body had become habituated to holding back air and restricting the amount of air that I was blowing through the trombone, resulting in a constricted tone.

After the two months playing on the cruise ship, I took a break and experienced minor reduction of symptoms. However, I was unable to eliminate the lip-pulling, tremor, air leak, or constricted breathing for the next year. Doing some of Dr. McGrail's stretches helped reduce some chronic muscle tension in my embouchure that had accrued from playing inefficiently on the cruise ship. This helped restore some of my endurance and subtly reduced the tremor and lip-pulling.

Doing some stretches such as the "Taoist arch" helped relieve some tension in my breathing. Sometimes when sustaining the Taoist arch position for a few minutes while breathing deeply, I would experience tension in my neck. Occasionally this became so intense that I started to gag. This felt like a very therapeutic release of chronic tension. I tried playing immediately afterwards and experienced a healthier air flow and resulting tone quality. While this only temporarily alleviated symptoms, it was beneficial to feel and hear the difference that reducing tension in my breathing made.

I found literature regarding embouchure rehabilitation that recommended isometric exercises, particularly those taught by Carmine Caruso. However, I did not encounter anybody that credited such exercises to successful rehabilitation from FTSED. Using the Caruso method caused more inward focus on my embouchure, exacerbating the symptoms of my dystonia, reducing my endurance, and causing my tone to become more constricted.

I visited The Rehabilitation Institute of Chicago to see if I had FTSED. The doctor I saw was not a specialist in the disorder but agreed with my self-diagnosis based on the symptoms. I also took webcam lessons with Jan Kagarice, who thought I developed tongue dystonia, based on my symptoms and listening to me play.

I tried some of the exercises included in chapter 4 involving exhaling through the straw, mouthpiece, and trombone to restore healthy airflow. However, my focus was not in the right place so benefits were initially negligible. I wasn't waiting for fulfillment, but bracing myself for failure.

Almost every personal account I've heard about developing task-specific focal dystonia describes how emotionally taxing the experience is. As this condition usually manifests after several years of playing, most of these musicians were professionals or avid amateurs. Playing music was many of these musicians' primary means of making money, expressing themselves, and relating to other people. Losing that can cause depression and anxiety, making recovery much more difficult.

Part of my recovery process was establishing an identity that was not contingent upon my ability to play trombone. I also learned new ways of expressing myself musically by composing and practicing other instruments. Less emotional dependence on what came out of the bell of my trombone allowed me to relax and allow function to return to my playing.

Bioenergetic exercises, qigong breathing, and tai chi helped me to relax, feel my whole body, and trust my unconscious spontaneous movements. I believe this helped me become more aware of unnecessary tension and put me in a more receptive mindset conducive for the retraining process.

Almost a year after first trying the straw and mouthpiece exercises recommended by Jan Kagarice, I tried again (under the tutelage of her intern, Devin Bennett) with a different focus and less dependence on the outcome. When blowing through the straw in the “constructive rest” position, I focused on what it felt like to allow natural breathing to occur. I noticed my ability to relax and let the air come out without having to force it. I connected that feeling to breathing through the straw. I would sit up or stand, allowing the same relaxed breath in a playing position. Then I would transition that feeling to exhaling through the mouthpiece (not buzzing). I would focus on air flowing through the end of the mouthpiece shank, as if the mouthpiece were a part of my body. I found it helpful to imagine that I was like an elephant and the end of the mouthpiece was the end of my trunk. This was an attempt to incorporate the mouthpiece into my “body map” and draw attention away from my embouchure.

I believe that the physical discomfort I experienced playing on the cruise ship led me to focus inwardly on my embouchure, resulting in the development of focal dystonia. Returning my attention outwardly to my exhalation and tying exhalation to the sound it produced was the most beneficial rehabilitation strategy for me. When I breathed in a relaxed and natural manner through the mouthpiece while sliding the mouthpiece into the shank of my trombone, simply expecting the desired tone, it happened.

Once I let my air flow straight through the trombone, I felt how resonance occurred with my air column in the trombone. Once I stopped blocking the flow of air, I became more efficient with my air, requiring less air to play. This is something that I had to feel for functionality and efficiency to be restored in my playing. As I learn to appropriately breathe for the intended sound, my body no longer needs to hold air back.

As I continue learning to play in a manner congruent with how the trombone naturally resonates, my air flows freely, and my embouchure automatically accommodates the air, free of tremors, lip-pulling or conscious intervention.

BIOGRAPHIES

Conable, Barbara

“During her thirty plus years as an Alexander Technique teacher Barbara Conable helped to save hundreds of musical careers and to enhance hundreds more.”¹⁰⁴ Conable is the author of *How to Learn Alexander Technique: A Manual for Students, What Every Musician Needs to Know about the Body*, and *The Structures and Movement of Breathing*. Conable is also founder of the Andover Educators, a group dedicated to teaching the art of movement in music through body-mapping.

Kagarice, Jan

Jan Kagarice has a master’s degree in trombone performance from University of North Texas, bachelor’s degrees in trombone performance and music education from New England Conservatory and University of New Hampshire, and Montessori Education certification from Southwester Montessori Training Center. Kagarice taught trombone and chamber music as Senior Lecturer at University of North Texas from 2000 until 2015.

“In 2008, the International Trombone Association (ITA) recognized Jan Kagarice with the prestigious Neil Humfeld Award for uniquely effective, innovative, and successful teaching. She was nominated by Dennis Wick, then ITA President and former trombonist with the London Symphony Orchestra, who described Kagarice’s work as ‘groundbreaking,’ and reported that she had facilitated in the rehabilitation of over 100 players diagnosed with FTSED.”¹⁰⁵

Kagarice is the lead consultant at Musician’s Wellness of North America, helping musicians learn healthy playing habits and recover from movement disorders such as dystonia.

¹⁰⁴ “Barbara Conable,” Andover Educators, accessed April 11, 2017, http://bodymap.org/main/?page_id=708.

¹⁰⁵ Marsten, *Finding the Balance*, 17.

Gorrie, Jon

Jon Gorrie has a master's degree in music from Trinity College in London, and a bachelor's degree in music from the Royal Northern College of Music in Manchester. Gorrie was playing trumpet professionally with the Gothenburg Symphony and Gothenburg Opera when he developed FTSED in 2005. In 2010, he began to recover from FTSED, and has since returned to trumpet playing at a professional level.¹⁰⁶ Gorrie is the head of music at the Alesund Cultural School and helps others recover from FTSED.

Fabra, Joaquin

Little information is available regarding trombonist, and euphonium player, Joaquin Fabra. One website describes Fabra's teaching philosophy and history with FTSED.

“Dr. Joaquin Fabra, a musician and teacher based in Madrid, is a leading expert in Embouchure Dystonia. For many years he has successfully treated sufferers by getting them to look at their condition not as musicians but as individuals. His central argument is that brass/wind players are affected as a consequence of a progressive and unnoticed shift of their daily practice, and hence their emotional behavior associated with it. Put simply, the condition is caused by tension arising from negative emotions which are creating the involuntary muscle spasms. These emotions come from trying *not to play the instrument wrong* rather than concentrating on playing the instrument right. He defines emotions as neuro-chemical events that are created by thoughts that we are having at any given moment. Emotions, as the vehicle of thoughts, in turn create a particular physical feeling or sensation. Therefore, negative emotions caused by a specific event or sequence of events lie in wait and trigger the onset of the condition. Dr Fabra cites himself as an example. After years as a successful musician he decided to visit a particular teacher with the view of expanding his technique. The teacher was an absolute disaster, who over a period of less than a week, destroyed Dr Fabra's confidence in his musical ability. This triggered the embouchure dystonia which he then suffered for an extended period of time before he realized that it was actually his emotions that were damaged – *not* his skill as a musician.”¹⁰⁷

¹⁰⁶ “Profile,” Jon Gorrie: Personal Website, accessed April 17, 2017, <http://www.jongorrie.com/>.

¹⁰⁷ “Focal Dystonia,” London Stress Management, accessed April 11, 2017, <https://www.londonstressmanagement.com/musicianspage/musicians.html>.

Farias, Joaquin

Dr. Farias has a doctorate in biomechanics and master's degrees in neuropsychological rehabilitation, psychosociology, and ergonomics. Farias uses his expertise as a musician, martial arts instructor, shiatsu and medical qigong therapist to treat patients with dystonia. "Since 1996 Dr. Farias has helped more than 900 people to have their lives and livelihoods back after being affected by different movement disorders characterized by dystonia, tremors and other problems with coordination."¹⁰⁸

Vining, David

Trombonist David Vining has a master's degree in trombone performance from Bowling Green State University and bachelor's degree in trombone performance from Florida State University. Vining first experienced dystonic symptoms shortly after accepting a trombone teaching position at Cincinnati College-Conservatory of Music in 1999, and was diagnosed with FTSED in 2002. Vining studied Alexander Technique from Barbara Conable and Feldenkrais from Donna Lilley. Vining also studied with Jan Kagarice for five or six hours a day over the course of five days. Vining is the professor of trombone at Northern Arizona University and owner of Mountain Peak Music, a publishing company dedicated to offering innovative teaching methods for musicians. On Vining's website he states, "I am pleased to report that I have resumed a normal performing schedule playing recitals, chamber music, and in orchestras."¹⁰⁹

¹⁰⁸ "Dr. Farias," Farias Technique, accessed April 11, 2017, <http://www.fariastechnique.com/joaquin-farias/>.

¹⁰⁹ "My Dystonia Narrative," David Vining, accessed April 11, 2017, <https://davidvining.com/embouchure-help-2/embouchure-help/>.

Wulf, Gabriele

Dr. Gabriele Wulf has doctoral degrees from German Sport University, Cologne and Ludwig-Maximilians University, Munich. Dr. Wulf served as the founding editor of *Frontiers in Movement Science and Sport Psychology* from 2010 until 2012 and *The Journal of Motor Learning and Development* from 2012 until 2015. Dr. Wulf was also president of the North American Society for the Psychology of Sport and Physical Activity from 2013 until 2016. She is currently professor of Kinesiology at the University of Nevada, Las Vegas.¹¹⁰

¹¹⁰ "Directories," University of Nevada, Las Vegas, accessed April 11, 2017, <https://www.unlv.edu/people/gabriele-wulf>.

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