

Natural breathing, abdominal breathing, rib-swing breathing, back breathing, the debate has gone on for centuries. Although we have made many advances in voice science, there is still a lack of agreement among voice teachers regarding the subject of breathing. A historical look at the evolution of breath management techniques and the ideas espoused on the subject may give the voice specialist an understanding of the reasons for the continuing debate.

Professional singing is known to have existed all the way back to the days of ancient Greece. The very first schools of singing in Italy were created to prepare choirs to sing the liturgical chants of the Roman Catholic Church. The earliest known school of singing for chant was founded in the fourth century by Pope Sylvester (314-336 AD). The employment of trained singers in the service of the church in its earliest centuries led to the institution, in 590 AD, of the famous *Schola Cantorum* of Pope Gregory (540-604 AD). As early as 535 AD, there is evidence of manuals of instruction used by teachers of chant. It is likely that the choristers had to develop breath control and unity of resonance in order to perform the chants in perfect unison. By the thirteenth, fourteenth, fifteenth and sixteenth centuries, the leading musicians were not only composers of vocal music, but also singers, revealing that singing had evolved into a high art. There is a direct lineage of the art of vocal pedagogy descending from the schools of chant immediately preceding the birth of modern Italian opera. Many of the chants used in the liturgies of the Catholic Church have survived, but little is known of the vocal instruction, as most of it was passed down orally from master to singer. Nevertheless, it is evident that the techniques of the Italian choristers were incorporated in the advent of Italian opera. These were the techniques that most strongly influenced international singing pedagogy.

During the sixteenth century, the first major treatises appeared on singing and the first glimpse into vocal training by the Italian masters was revealed. Names of the “old masters” such as Porpora, Pacchiarotti, Crescentini, Veluti, and Rubini are sprinkled throughout these works. This was the beginning of the attempt by voice teachers to write down some of the techniques known as the Italian Method of singing. Each teacher in subsequent centuries attempted to shed light on what the teachings were but, in actuality, many of the techniques of the “old Italian method” are still a mystery as most were never entirely written down and have been subjected to both alteration and interpretation.

Most voice teachers believe that the study of breathing is paramount to good singing, but most of the references to breathing in the early singing manuals focused on when to take a breath, how to navigate musical passages and how not to interrupt a musical line. There was little mention of how specifically to use the body for breathing or breath control until the late sixteenth and early seventeenth centuries, when treatises on singing by Giovanni Battista Bovicelli and Guilio Caccini appeared.

Giovanni Battista Bovicelli (1550-1597), *Regole de Musica* (1594), was one of the first voice teachers to advocate silent breathing and to advise against forcing the breath. He wrote that the singer should always think about the breath and complained of singers who took breaths every few notes. He objected to the use of a half breath and remarked that singers whose inhalations are louder than their voices are very distasteful (Stark, 2003, 94).

Guilio Caccini (1551-1618), in his treatise *Nuove Musiche* (1602), was one of the first teachers to write down a breathing exercise thought to have originated in the *Schola Cantorum*. This exercise advocated practicing singing from a soft tone to a loud tone (*crescendo*) and from a loud tone to a soft tone (*diminuendo*) in order to control the breath. Caccini called this technique *crescere e scemare la voce* (to grow and diminish the voice). It became one of the main exercises for breathing and its use continued into the twentieth century. It was eventually called the *messa di voce* and required the singer to have impeccable command of the breath and the voice.

During the eighteenth century, the important treatises on the voice were written by well-known castrato singers. The first was by the castrato soprano Pier Francesco Tosi (1647-1732). *Osservazioni Sopra il Canto Figurato* was released in 1723. Tosi also advocated (like Caccini) the *crescere e scemare la voce*, which he renamed the *messa di voce*. Mastery of the breath was important to Tosi. He wrote that the master must train the scholar to “...manage his Respiration that he may always be provided with more Breath than is needful; and may avoid

undertaking what, for want of it, he can not go through with” (1723, 16).

The *mesa di voce* started as an exercise for the castrato singer and was then adapted for the un-castrated male and female singer. Tosi suggested to the teacher the method of attaining the *mesa di voce*:

In the same Lessons, let him teach the Art to put forth the Voice, which consists in letting it swell by Degrees from the softest *Piano* to the loudest *Forte*, and from thence with the same Art return from the *Forte* to the *Piano*. A beautiful *Messa di Voce*, from a Singer that uses it sparingly, and only on the open Vowels, can never fail of having an exquisite Effect (1723, 10).

The voice in *mesa di voce* needed to remain constant and full in both *piano* and *forte*, as well as during *crescendo* and *decrescendo*. The vibrato rate, intonation and resonance also had to remain as close to constant as possible. The *mesa di voce* trained the singer to adjust breath support to the changes in volume and intensity. This exercise remains an important part of voice training today.

The main method of breath management during the eighteenth century was to fill the lungs with as much air as possible and keep the chest fully inflated to hold back or dam, as it was called, the breath so that the singer could control the expiration of the breath stream. The majority of pedagogues during this century believed that chest position would ensure good breathing.

The castrato soprano Giambattista Mancini (1714 -1800) was thought to be the chief authority of singing in the eighteenth century. Mancini published *Practical Reflections on Figured Singing* in 1774. Mancini recommended that the singer use an “elevated robust chest assisted by the graduation of breath” (1774, 154). Mancini was one of the first teachers to give specific exercises to achieve breath control. He recommended that the singer practice long, sustained notes (on a single pitch), or an extended row of notes that are gradually increased in length.

Mancini devoted a full chapter to the *mesa di voce* and warned against its use before the student was ready. “The student should not presume to be able to execute the *mesa di voce* before he has acquired the art to hold, reinforce, and take the breath back” (1774, 131).

Carlo Broschi, called Farinelli (1705-1782), was one of the last great castrati. He was famous for his amazing breath control. To increase breath control, he recommended that the singer “sip the breath slowly and steadily through the smallest possible opening of the lips; hold it a few counts, then exhale very slowly and steadily through the smallest possible opening of the lips” (Fillebrown, 2009, 54). This exercise became known as the Farinelli exercise and had been passed down orally to Farinelli by the great voice teacher, Nicola Antonio Porpora (1686-1768).

Ingo Titze, Executive Director of the National Center for Voice and Speech, advocates similar exercises (2010) using phonation into a straw or other “semi-occlusion at the mouth” to train “vocal fold adduction, registration and epilarynx tube narrowing for the best acoustic power transfer from the glottis to the lips.” Titze is quick to point out that this kind of exercise has a long tradition in vocal pedagogy.

The first attempt to study the voice scientifically was by a well-known French anatomist, Antoine Ferrein (1693-1769), who published a work on the vocal organs in 1741, titled *De la Formation de la Voix de l'Homme*. He coined the term *vocal cords*. This was the first scientific treatise to influence voice teachers of the era. Even so, there was little use of scientific knowledge in voice pedagogy until the middle of the nineteenth century.

By the nineteenth century, voice teachers had begun to create relationships with medical doctors resulting in the emergence of voice techniques based on the anatomy and physiology of the body. Voice teachers became very specific with regard to how they required students to use the body for singing. Teachers began to adopt the new scientific ideas, some in hopes of clarifying and strengthening the historic Italian Method, some as a new pedagogy.

Two clear schools of thought regarding breath control emerged in the nineteenth century, pioneered by two great educators of singing and their treatises, Manuel Garcia II and Francesco Lamperti. At this time, breathing

methods were divided into three categories: clavicular, diaphragmatic and thoracic. The first category, clavicular breathing, was quickly ruled out for sound production. Scientists had studied the act of respiration for sound production and clavicular breathing was deemed ruinous to the voice and never to be practiced. Dr. Gordon Holmes in his book, *A Treatise on Vocal Physiology and Hygiene* (1879), stated that error and injury could be caused by the use of clavicular breathing. He wrote, "...no speaker or singer can practice it to any extent without showing a marked deficiency of his endurance if called on to use his voice for a lengthened period" (1879, 165). Devices were sometimes used to discourage clavicular breathing. Dr. Holmes recommended that the singer, while singing, stand with his back to the wall with two "projecting ledges" on top of the shoulders, to inhibit their rise on inhalation (1879, 165).

In the nineteenth century, most of the teachers of singing were in agreement that clavicular breathing was not adequate for singing; thus, breathing for singing became divided into two categories: thoracic (also called ribcage or lateral breathing) and diaphragmatic (also called abdominal breathing), propelled by their enthusiastic advocates, Manuel Garcia II and Francesco Lamperti, respectively.

Manuel Garcia II (1805-1906) is regarded as the founder of voice science and is considered one of the greatest voice teachers of all time. Garcia inherited the historic Italian Method from his father, Manuel Garcia I.

Manuel Garcia I (1775-1832) was a celebrated tenor and voice teacher who wrote two treatises rooted in the Italian Method, *Exercises pour la Voix* (1820) and *Exercises and Method for Singing* (1824). Garcia I's teachings can be traced back to the teachings of the Italian master, Nicola Antonio Porpora. The role of Count Almaviva in Rossini's *Il Barbiere di Siviglia* (1816) was written specifically for Garcia I.

Garcia I advocated an erect standing posture for singing with the shoulders back and the hands crossed behind the lower back, with the palms facing outward. His son carried on the use of this posture. Garcia I claimed it would "open the chest and bring out the voice" (Coffin, 1989, 16). This posture became known as the Garcia posture and is still used today by some singers. Garcia I also recommended that the singer "always take the breath slowly and without noise and The Throat, Teeth and Lips, must be sufficiently open so that the voice may meet with no impediment" (Coffin, 1989, 16). Garcia I continued the tradition of using the *messa di voce* for breath management.

Manuel Garcia II began his vocal education in the Italian Method, but he also desired to have scientific knowledge of the voice. He created the first vocal pedagogy based on the physiological functions of the voice combined with the historic Italian Method. Garcia II worked in administration in French military hospitals where he studied the physiological aspects of the voice and later wrote three treatises: *Traité Complet de l'Art du Chant I and II* (1841, rev. ed. 1847), *Mémoire sur la Voix Humaine* (1841) and *Hints on Singing* (1894).

Mémoire sur la Voix Humaine was presented to the French Institute in 1840 and is considered to be the foundation of all subsequent investigations into the voice. In 1855, Garcia II invented the laryngoscope, an instrument that would revolutionize voice science. The laryngoscope is a small mirror with a long metal handle that can be inserted into the mouth for observation of the vocal cords. This instrument is still widely used today. The invention of the laryngoscope allowed the vocal cords to be observed in real time in a living subject. He published the results of his investigations in a paper that he presented to the Royal Society of London in 1855 and included the laryngoscope in his last book, *Hints on Singing*. Garcia II's books were some of the first to include anatomy illustrations and to rely on science as a basis for teaching voice.

In Garcia II's first book, he advocated the noble posture and the *messa di voce* of the Italian Method for breath management. In *Hints on Singing* (second edition) he added exercises specifically for breath control, recommending Dr. Roth's Chinese breathing exercises for "strengthening the chest and regulating its movement" (1982 p 4).

Dr. Roth was a Hungarian who settled in London in 1848 after studying Chinese in Paris. He was an advocate and practitioner of Chinese Kung-fu and pioneered its health benefits in Great Britain. He believed in the use of Kung-fu breathing exercises to cure illness and alleviate pain. Dr. Roth published numerous works on the subject: *The Cure of Chronic Diseases by Movements*, *Handbook of the Movement Cure*, and others. His work was popular in the nineteenth century among scientists and health enthusiasts.

Garcia II also created his own breathing exercises to strengthen the lungs for singing. He said that since the lungs were independent of the vocal organs, breathing exercises would not create voice fatigue. In *Hints on Singing* (1982, 5), he suggested the following:

1. Draw a breath slowly through a very minute opening of the lips; then exhale freely.
2. Breathe freely and exhale slowly through the same small opening.
3. Breathe freely and retain the breath during ten seconds or more.

Garcia II's method of inspiration was one of both diaphragmatic lowering and ribcage expansion. He wrote of the act of respiration as being a two-part process, beginning with the diaphragm lowering and the stomach slightly protruding. He called this abdominal breathing and stated that this is only a partial breath.

During this partial inspiration...the ribs do not move, nor are they filled to their full capacity, to obtain which the *diaphragm must and does contract completely*. Then and only then are the ribs raised, while the stomach is drawn in (1982, 4).

Garcia stated that a complete breath is not achieved until the ribs freely expand 360 degrees. "This inspiration is complete and is called thoracic or intercostal" (1982, 4). When asked to choose between diaphragmatic or thoracic breathing, Garcia II's preference was for the latter:

This double procedure, on which I insist, enlarges the lungs, first at the base, then by the circumference, and allows the lungs to complete all their expansion and to receive all the air which they can contain. To advise abdominal breathing exclusively would be to voluntarily reduce by one half the element of strength most indispensable to the singer, the breath (1847, 184).

In 1876, a famous physiologist in Paris, Dr. Louis Mandl (1812 - 1881), wrote a treatise on the voice, *Hygiène de la Voix* that revolutionized the world of singing. Dr. Mandl advocated abdominal (diaphragmatic) breathing instead of chest breathing. *Hygiène de la Voix* contained the first definite statement of the opposed-muscular-action theory of breath control that Mandl called *lutte vocale*. Mandl stated that the "lutte vocale is primarily the struggle between the abdominal muscles and the diaphragm, and that this struggle is reflected in the contractions of the larynx as well" (Stark, 2003, 100).

Francesco Lamperti (1813-92), a celebrated teacher of the Italian Method, became an advocate of the studies of Dr. Mandl. He and his son Giovanni Battista Lamperti (1839-1910) were instrumental in spreading Mandl's theories to the world. Lamperti began his book, *A Treatise on the Art of Singing*, lamenting the decline of good singing brought on by the new style of opera emerging in the nineteenth century. He chose to "avert the ruin of voices" by imparting some "practical and fundamental rules" of singing (1890, 4). In a section of the book, called "Note," he stated that he was in complete agreement with Dr. Mandl's theories on respiration and inserted a page and a half of passages from Mandl's book. Most notable is the description of the *lutte vocale*, which is still widely used by singing teachers today:

To sustain a given note the air should be expelled slowly; to attain this end, the respiratory muscles, by continuing their action, strive to retain the air in the lungs, and oppose their action to that of the expiratory muscles, which, at the same time, drive it out for the production of the note. There is thus established a balance of power between these two agents, which is called the *lutte vocale*, or vocal struggle. On the retention of this equilibrium depends the just emission of the voice, and by means of it alone can true expression be given to the sound produced (1890, 21).

Lamperti believed that the best way to achieve breath control was through the use of *appoggio*. He is considered the first to introduce the concept of *appoggio* in pedagogical literature. "By singing *appoggiata* is meant that all notes, from the highest to the lowest, are produced over a column of air by which the singer has perfect command, by holding back the breath" (1890, 18). Like Mandl, Francesco Lamperti was an advocate of abdominal breathing. "Any effort about the chest-ribs in breathing must be absolutely and entirely avoided. It is here that the evil lies" (Stark 2003, 100).

To experience an abdominal breath, Lamperti instructed the singer to sit in a chair and cross the arms behind the back as high up as possible and then to take a breath. He believed that in this position, the shoulders and chest would be immovable, therefore the inspiration would be purely abdominal (1890, 20).

Giovanni Battista Lamperti (1839-1910), the son of Francesco, was a well-known teacher in his own right. In his treatise, *The Techniques of Bel Canto* (1905), he expanded his father's theories on *appoggio*, and advocated a more scientific, systematic method of vocal technique. G. B. Lamperti also believed that the sole method of inhalation to be used was abdominal: "It cannot be too strongly emphasized, that the diaphragm is the principal and essential breathing-muscle (if it should be crippled, breathing would cease and death ensue), and that Expiration is effected chiefly by the abdominal muscles" (1905, 7).

A marked difference between G. B. and his father was the mention of additional muscles in the body that may activate during sustained singing. "There are also so-called auxiliary breathing-muscles, those of the neck, back, and thorax, which may aid in sustaining an impaired breathing, but can never replace the regular function of the diaphragm" (1905, 7).

During the late nineteenth century, teachers of singing became divided into supporters of either the Garcia School (thoracic breathing) or the Lamperti/Mandl School (abdominal breathing). Both sides felt that theirs was the only true method for correct breathing. G.B. Lamperti addressed the ongoing debate and suggested that there was actually no need for argument. Since other muscles activated during exhalation, he believed that both ways of breathing were viable and actually interdependent: "This shows that a sharp distinction between chest and abdominal breathing, such as was formally generally accepted, cannot be maintained" (1905, 7).

Although G.B. Lamperti seemed to convince voice teachers that there was no need for debate between diaphragmatic and ribcage breathing, it is commonly thought that there was an actual rivalry between the Lamperti School and the Garcia School. G.B. Lamperti was quoted as professing his "dislike for voice doctors" who taught tricks, instead of sound vocal pedagogy (Brown, 1957, 21).

Another important teacher of the nineteenth century was Giovanni Sbriglia (1832-1916). He was a celebrated Neopolitan opera singer and teacher who is sometimes credited with the founding of the Paris School of singing. Sbriglia was the teacher of the famous and flamboyant opera singer Jean de Reszke.

It is thought that Sbriglia created his own technique, as he was not a student of Garcia or Lamperti. Sbriglia did not write a book on singing because he believed that "voices vary like faces and the treatments that might be useful for one voice will not be suitable for another" (1905, 1). Sbriglia stated that he taught the way the old Italian teachers did: "The foundation of my teaching is perfect breath control without tension . . . high chest held high without tension by developed abdominal and lower back muscles and a straight spine" (1905, 1).

Sbriglia was the inventor of the abdominal belt for singing. He had belts made that he would tie around the upper abdomens of his students after they took a breath. While singing, their upper abdomen, waist and base of ribcage would need to stay expanded to hold the belt in place, or the belt would fall down.

Sbriglia's method of breath control was to focus the breath, during exhalation, against what he called the *point d'appui*. The *point d'appui* was a focal point in the chest that, he said, was the major place of support:

[As you sing] the air is slowly pushed out of the body through the small bronchial tubes, which merge into the big bronchial tube at the focal point in the chest . . . the *point d'appui* - the place of support, the place where everything rests . . . (Coffin, 1989, 99).

This method became very popular, and many opera singers sang with their hands clasped in front of their chest at the place of *point d'appui*. The famous opera singer Luisa Tetrazzini (1871-1940) liked to press her chest against her clasped hands, which she said increased the activity of support of the chest and ribcage.

During the middle of the nineteenth century, the florid, flexible vocal style of the Italian operas of the seventeenth and eighteenth centuries fell out of fashion and new types of singing emerged in several different

geographical regions of Europe, leading to new national schools of singing.

In Germany, the composer Wilhelm Richard Wagner (1813 – 1883) designed and constructed the famous Bayreuth Festspielhaus for his music dramas and changed the configuration of the stage, orchestra and seating. Wagner wrote for the largest orchestra ever used in opera and invented the orchestra pit, as he felt the orchestra detracted from the drama onstage. Greater demands were also made on the singers. Wagner disliked the Italian style that had dominated opera up until the middle of the nineteenth century and deemed it inadequate for his works. He called for a German Method of singing and a more speech-like production of sound called *sprechgesang*. In response, Friedrich Schmidt published *Grosse Gesangsschule für Deutschland* in 1854, and in 1884-86, Schmidt's protégé Julius Hay wrote *Deutsche Gesangs-Unterricht*. Hay was also hired to help train singers under Wagner's watchful eye (Frisch, 2005, 53). Müller-Brunow and Lauritz Christian Törsleff continued to write on the German Method in the 1890s (Stark, 2003, 106).

With the new need for declamatory, sustained tones, singing became more athletic and required a more robust vocal production. The German teachers instructed their singers to take in a very large amount of breath and hold it back by a method of *appoggio* they called *Stauprinzip* (damming principle). *Stauprinzip* required a more muscular production than the Italian approach and often resulted in higher sub glottal pressures that produced a laryngeal sound similar to a primitive grunt called a *Stöhnlaut*.

One faction of the German School favored low abdominal breathing and another favored breathing in the lower back at the level of the lowest ribs. Breath support, known as *atemstütze*, was achieved by retarding the movement of the diaphragm upward and the movement of the abdominal wall inward by muscularly pushing out on the belly. This technique was called *bauchausenstütze*, which means distended belly support (Miller, 2002, 21). The pushing out on the lower abdominal wall made it difficult for German singers to maintain an elevated chest, resulting in a relatively low chest posture. The German School also required the singer to firm the pelvis, squeeze the buttocks, and squeeze the anal sphincter to help engage the lower back muscles for additional breath support. The teachers of the Italian Method were appalled by these new techniques that were gaining popularity in Europe. Giovanni Sbriglia did not like what he called “the new pushing method of singing with the back of your neck, sunk in chest and muscularly pushed out diaphragm.” He felt that it would rapidly ruin a voice (Coffin, 1989, 98).

In England, there was also a new school of singing emerging. William Shakespeare (not the playwright, 1841 – 1931) was a student of Francesco Lamperti and wrote two treatises, *The Art of Singing*, (1910) and *Plain Words on Singing* (1924). Shakespeare felt that natural breathing was not adequate for singing. He believed that singing required “a considerable amplification of the ordinary breath-taking” (1910, 9). Shakespeare had an interesting view on breathing that became specific to the English School. He felt that breathing should be diaphragmatic, causing considerable abdominal expansion to be felt by the singer, but “for singing purposes diaphragmatic breathing must be combined with rib breathing” (1910, 13). “The singer must have recourse to the additional aid of yet another type of respiration” which he called rib spreading (1910, 11). He stated that the group of muscles “which join the ribs to the backbone and the shoulder blades is that on which the singer must chiefly rely in order to raise the ribs during inspiration” (1910, 12). This resulted in expansion of the back, little chest expansion and the abdomen to bulge up in the epigastric region. “Considerable pressure and expansion should be felt at the soft place under the breastbone, below this we should be slightly drawn in” (1901, 16).

Shakespeare advocated a special posture for singing to facilitate his breathing method:

Balance the body on one foot and touch the ground behind with the other . . . Now extend both arms forward and outwards, keeping the elbows in, the palm of the hands upwards, as though in the act of imploring. This position slightly twists the muscles under the shoulder-blades, and shows us, while drawing in the breath, whether we are using the important back rib-raising muscles. We now raise the chest but very slightly, and the points of the shoulders not at all; nor can we breathe too deeply, for we have already raised the ribs with the back muscles and contracted the diaphragm (1910, 16).

Shakespeare also advocated the use of a special exercise to master his method of inspiration:

Half fill the lungs through the mouth and then breathe in and out small amounts of air quickly and noiselessly until you feel yourself panting, yet doing nothing with the chest and without filling the lungs. Now extend this quick, noiseless panting or quivering until it is felt not only at the soft place but at the sides and near the shoulder-blades (1910, 16).

Shakespeare's posture and shoulder blade breathing method led to the back spreading techniques of the English choirs. The English choirs are famous for singing with their books held in front of them as they spread their backs, on inhalation.

Another and different technique specific to the English School was a method aimed at stabilizing the diaphragm called "fixed diaphragm breathing." Fixed diaphragm breathing is a technique in which the singer thinks of inhaling into the epigastric region of the abdomen and then pulls the abdomen in quickly. At the same time as the inward pull of the abdomen, the singer raises the ribs upward and laterally. The Royal College of Music and Royal Academy of Music have within their teaching manuals the specific directions for taking a fixed diaphragmatic breath that they call "Correct Breathing."

Take breath down, until there is a slight expansion of the *upper part of the abdomen* (viz., the soft part just below the breastbone), and follow this *immediately* by pulling in the abdomen, and raising and expanding the ribs...By means of this pulling in of the abdomen, the organs contained therein are pressed up into position, thus supporting, or as it is sometimes called, 'fixing' the diaphragm (Miller 2002, 36).

Vennard (1968, 28) states that "at one time it was thought that the action of the diaphragm pulled the ribs up," so that if the singer pulled in the abdomen tightly, holding the abdominal viscera upward, "the central tendon would then become a 'fulcrum' for the lifting of the ribs" (1968, 24).

The final national school of singing emerged in France. Regarding breathing, the French believed that we know how to breathe everyday for life, thus no special method of breathing was required for singing. Pierre Bonnier in his treatise, *La Voix Professionnelle* (1908), stated:

The pupil since birth has breathed to breathe and hasn't managed badly; he learned instinctively to breathe for speaking; it remains up to him to learn *every bit as instinctively* to breathe for singing (Miller, 2002, 40).

The techniques of the Italian, German, French and English Schools of singing are still in use today. Of the four, the Italian School tends to be the most favored, although it is filled with inconsistencies. The treatises of Mancini, the Garcias, Lampertis and others are still available and sold in music stores around the world and many teachers use these books and their vocal exercises as the foundation of their teaching.

Regarding the debate between diaphragmatic and ribcage breathing, voice scientist Willard Zemlin in his book, *Speech and Hearing Science, Anatomy and Physiology* (1998), states that breathing for sound production is both diaphragmatic and intercostal. One does not operate independent of the other, thus both methods have validity. William Vennard in *Singing: the Mechanism and the Technic* (1968), states that the "most efficient breathing for singing" is a combination of rib and diaphragmatic (or abdominal breathing) (1968, 20), although, as a singer, he admits a preference for abdominal breathing: "Probably more breath can be inhaled in this manner than by the sideward expansion of the ribs, though the point is academic since both movements occur at once" (1968, 28).

The breath management system for classical singing most widely in use today is the Italian method of *appoggio*, or some variation thereof. However, singers of contemporary commercial styles (jazz, pop, rock, country, and even musical theatre), may employ a variety of other breathing strategies. To date, very little has been written describing those strategies in any detail.

Ingo Titze, in his book, *Principles of Voice Production* (1994), states that current research reveals that the best method for breath management may be more individualized than previously thought. He says that he withholds judgment regarding the best method for breath support but refers to two prevalent methods: the "up-and-in"

and the “down-and-out method” and states that there is no guarantee that what is thought to happen physiologically actually happens (1994, 76). Body type (endomorph versus ectomorph) may play an important role in what might be the most suitable method for a given individual. When recently asked if his opinion had changed, he responded that it had not, but that the method of breath support may affect the resonance of the vocal tract:

I have not changed my opinion much. The high ribcage breathing (up and in) does two things: 1. Most of the breathing work is done during inhalation (against the recoil force). 2. The overall airway length must become shorter, possibly producing a brighter sound due to higher formants. The lower ribcage position (with a down and out approach) puts more of the breathing work on the exhalation phase and the overall airway length may increase, allowing a darker sound (I. Titze, personal communication, Oct. 28, 2010).

As scientists continue to observe the details of contrasting techniques, a single “best method” may not be forthcoming. Recent studies focusing on muscle activation patterns in the chest and abdominal walls across a range of performance genres (Hodges, Melton 2010) noted considerable individuality and variation even within a single category, e.g., actors, classical singers, jazz singers. In addition, although voice research has tended to focus exclusively on classical singing, that is beginning to change. So the debate regarding breath management is likely to continue; however, by taking a historical look at its roots we may proceed with a broader and clearer view.

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