

## Part I

# Fundamental Vocal Principles: Anatomy, Physiology, and Vocal Techniques

The voice is an amazing instrument. Without valves or keys we can make innumerable sounds over a wide range of pitch and loudness. We can sing in different styles and change the brilliance of our tone almost instantaneously. This flexibility is wonderful but can also be a source of frustration when we sing without understanding our instrument.

Understanding how our voices work is essential to diagnosing problems and improving our singing abilities. However, too much detailed information can confuse us and make us feel helpless. This section will introduce you to each step in the process of singing and provide exercises for focused study and integration of skills.

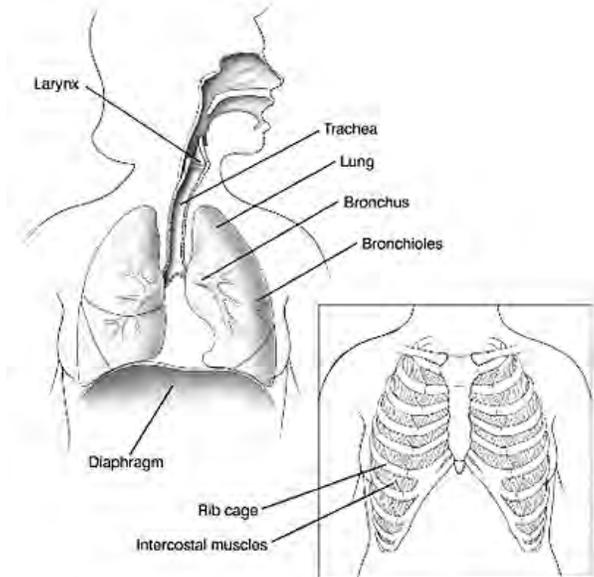
The initial impetus for singing begins in our brain. Once we decide that we're going to sing, it sends messages to the rest of the body to initiate respiration (breathing), phonation (making sound), resonance (amplifying sound), and articulation (shaping sounds into words).

## Respiration

The primary structures of the respiratory system involved in singing are the larynx, trachea, bronchioles, bronchi, lungs and diaphragm. Musculoskeletal structures are also involved in breathing, such as the internal and external intercostal muscles that lift and lower the ribcage for inhalation and exhalation (see Figure 1). As part of the respiratory system, the larynx functions as the entrance and exit of the airway. The **trachea** is responsible for directing air to and from the **bronchi** and **bronchioles** where blood gases are exchanged.

The **lungs**, of course, are the organs that make the exchange of air possible, and the **diaphragm**, a large dome-shaped muscle that separates our thoracic and abdominal cavities, is responsible for balancing air pressures within the chest. It descends on inhalation and ascends on exhalation. In singing, our goal is to maintain balanced tension between the muscles of the abdomen and ribcage so that we can sing effortlessly. If we are too stiff

and straight we can create tension; but if we hunch over, no room is provided for expansion of the ribcage or belly.



**Figure 1: Respiratory System**

Posture and muscle interactions have the most impact on this balance. In this way we maximize the use of air we have inhaled and have the potential to sing longer phrases.

The thing to remember is that we must release all muscle tension in the lower abdominal muscles to allow the diaphragm to drop and draw air into the lungs. We also must expand our ribcages to allow for the best breath energy, but this can't be done with a stiff posture. Therefore, a free and flexible body allows for the optimal energized release of air for phonation.

## **Age-related Changes**

In an aging respiratory system there can be malfunctions in any of these component parts (muscles, skeletal framework, air exchange). Generally, diaphragm strength is reduced, meaning that it must work harder to remain in a descended position or, because of an increase in respiratory rate, it is working harder during each cycle of breathing. This elevation in respiratory work can lead to increased overall fatigue, which can translate to sub-par vocal tone, phrasing, and tuning.

Changes in the lungs also lead to a similar increase in demand on the respiratory system. Lung tissue loses elasticity, making it more difficult for the lungs to fill and empty (Berk 569). Added to this are changes in lung volumes, which play a role in both musical phrasing and breath support. Residual volume or the air left over after expiration increases and “undermines primary respiratory improvements learned in earlier voice training. This can lead to hyperventilation” (Sataloff, Spiegel & Rosen 129). Vital capacity, the amount of air we can take into the lungs, decreases as well, and we find it harder to manage our breathing. In addition, the cartilages that aid in the

process of lifting and lowering the ribs during inhalation and exhalation start to stiffen, decreasing the range of motion of the ribs and making it more difficult to inhale (Digiovanna 84). A barrel chest also may form, meaning that the chest becomes “deeper front to back” and makes “deep inspiration” difficult (Digiovanna 85). The efficiency of inhalation, air exchange, and exhalation are all affected by changes in the component parts of the respiratory

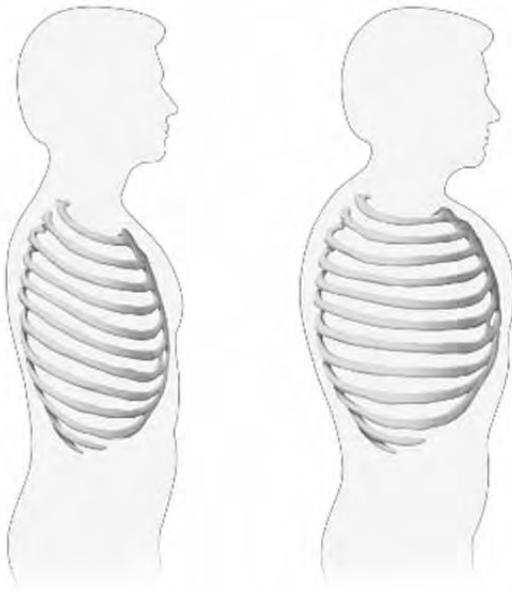


Figure 2: Barrel Chest

system. Most of these changes lead to difficulty with breathing and therefore with phrasing and vocal tone quality.

Another factor affecting breath support and tone quality is fat deposits. These deposits increase as we age

(in the lower torso for women and upper torso for men), causing the body to work harder to move this larger body mass during inhalation (Berk 502). The generalized atrophy of fast-twitch muscle fibers in the body can lead to a loss of speed and strength, which in turn leads to breathing issues and compensation with excess neck and tongue tension (Berk 571; Sataloff, Spiegel and Rosen 129).

### Exercises for Improving Respiration

The following exercises focus on developing coordination of the muscles used for breathing. Understanding the difference between energizing your air outwardly as described in many of these exercises is different from what actually happens while you sing. The reason we exaggerate in such a manner is to help you become comfortable with your body outside of the songs you sing, isolating the components of the singing process before integrating them into a balanced whole.

**1. Muscular Awareness.** There are several ways to become oriented to these low muscles in your torso, both in your front and your back. One way is to stand and find the fleshy area between your lowest rib and your hips. Place your hands

there with your thumbs in front and your middle fingers touching in the back. Bend over from your hips, elongating your spine, and take a deep breath in. What happens to your middle fingers? Do they stay together? Pull apart? They should pull apart when you take that deep breath. What happens to your belly? Does it fall toward the floor? It should fall away from you to the floor.

**2. Mirror image.** Imagine that you are looking at your side profile in front of a mirror and trying to flatten out your abdomen. Next, release those muscles you held tight while trying to flatten your abdomen. These are the muscles you will continue to manipulate as you balance respiration with phonation and resonance. Many people call this breath support; I call it the gut tug. This action simply is the force that balances all of the muscular energies that play a part in creating a tension-free, balanced tone. To further explore this power, stand in a leaning-forward position at a 45 or 50 degree angle to the floor. Pull in those same muscles you used above, and then let them drop toward the floor by releasing all tension. Gradually take

yourself to a standing position and see if you have the same control over your abdominal muscles.

- 3. Dog pant.** Stand in a balanced position and let your tongue hang out. Try to imitate a dog panting by quickly pulling in your abdominal muscles and letting them relax outward again with each breath. Notice how your abdominal area moves in and out very quickly. Try slowing down and speeding up your pace, developing control over your abdominal muscles as you go.
- 4. Movement.** Try walking briskly around your practice space or walking up and down several stairs. When you feel slightly out of breath, stop and notice how your abdomen is moving. When you sing your next exercise, use these muscles to help you inhale and exhale.
- 5. Pulsations.** Use your abdomen to pulsate on an [s], [sh] or [f] five times. Deliberately, but gently, pull your abdominal wall inward with each consonant sound. As you become better coordinated, increase your speed or number of pulsations from five to seven or nine before taking a breath again. This is not the motion you will maintain during singing, but an exercises to contin-

ue to orient you to abdominal muscles.

- 6. Staccato.** This exercise requires your abdominal muscles to pulsate, much like they did in exercise number five but in a less exaggerated fashion. On a syllable such as [ha], sing a vocal warm-up (vocalise) in a staccato or separated style. It could be the outline of a chord (arpeggio), the first five notes of a scale, or anything you make up on your own. Make sure your abdomen pulses IN on the syllable and releases OUT on the rest between.
- 7. Brrr/Sniff.** Practice buzzing your lips. If you have trouble, place your index fingers on the sides of your

lips lightly and blow, pretending you're saying, "brrr, it's cold outside." Sing the following pattern, inhaling and releasing your abdominal muscles after each group of two pitches and pulling in with them during each group. Again, this exaggerated abdominal motion is about orienting you to your abdominal muscles and should not be used to the same extent while singing. It also is one of the first exercises you might do that requires you to sustain pitch while moving muscles. Sustaining the pitch on a "brrr" is a very relaxing, healthy vocalise.



- 8. "Chicken" walk.** To loosen inhibitions, do something silly; take a try at the chicken walk. Bend at your knees and keep your torso upright. You should feel a moderate amount of tension in your thighs and possibly some in your low abdominal muscles as you work to stay upright. Try to maintain this position

while walking around the room. You might feel silly but your body will be getting used to a lower center of balance, which will help you avoid breathing with tension in your upper body.

### Other ideas

- Use props to help you get a sense of how your air is supposed to move. For example, use a pinwheel and try to make it turn with the energy of your breath. Pretend this is the breath energy used to sing a phrase really loudly (*fortissimo* air).
- You also might imagine yourself blowing out lots of candles on a birthday cake.
- With a partner, lean into each other as you sing a phrase. Use enough breath energy that you won't be pushed over by your partner as she pushes back against you.

### Additional Exercises for Orientation and Connecting to Breath

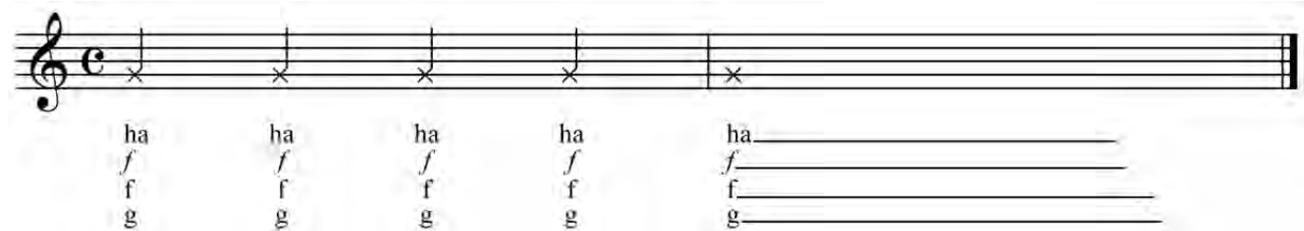
(note: the syllable [ja] used in these vocal exercises is the common phonetic notation for [ya])

1.



Musical notation for exercise 1: A single staff in treble clef with a key signature of one sharp (F#) and a 3/4 time signature. The melody consists of seven quarter notes: G4, A4, B4, C5, B4, A4, G4. Below the staff, the syllables 'ja ha' are written under each note, with a final 'ja ha' followed by a long horizontal line for a sustained note.

2.



Musical notation for exercise 2: A single staff in treble clef with a common time signature (C). The notation shows five 'x' marks on the staff, indicating breath marks. Below the staff, the syllables 'ha' are written under each 'x', with a final 'ha' followed by a long horizontal line. Underneath each 'ha', the letters 'f', 'f', and 'g' are written, likely representing breath or articulation instructions.

3.



Musical notation for exercise 3: A single staff in treble clef with a common time signature (C) and a key signature of one flat (Bb). The melody starts with a quarter note G3, followed by quarter notes A3, B3, and C4. The final note is a half note G3 with a long horizontal line extending to the right, indicating a sustained note.

4.



Musical notation for exercise 4: A single staff in treble clef with a common time signature (C) and a key signature of one flat (Bb). The melody consists of seven quarter notes: G3, A3, B3, C4, B3, A3, G3. Below the staff, the syllables 'ja a a a a a a' are written under each note.