

There can be no doubt that a classical voice requires a supporting breath to allow for vocal power and freedom. In this case, it is the muscles of the abdomen that are utilized to provide the singer with a strong and consistent airflow. The muscles the singer uses are the internal and external intercostal muscles (used in expanding and contracting the rib cage), the internal and external obliques, the transverse abdominus and the rectus abdominus. As noted when discussing the role of the tongue, pharynx and oral cavity, coordination of the abdominal muscles for singing is a sophisticated process that requires clear description on the part of the teacher and clarity of practice from the student. It is not only the coordination of the muscles of expiration that need attention; it is also both the manner in which the student manages the breath as it enters the body and the manner in which the sound is generated at the larynx.

Many writers on singing technique have spoken of the need for a simultaneous onset: the free flow of voice and breath that occurs in a simultaneous manner. Simultaneous onset is also the usual form of onset in speech. While it is important for a student to understand the physiological nature of what is happening when phonating, it is equally - and perhaps much more - important for them to be able to recognise the physical action and feeling that occurs when different forms of phonation are taking place.

It is useful, therefore, for the student to realize that there are three types of vocal onset: aspirant (breathy), simultaneous and glottal. Chapman describes the three varying types as follows:

‘If the airflow occurs before the glottis is closed, a breathy onset (sounding like an /h/) will occur. If the closure is complete before the airflow commences, a glottal attack (sounding like a small click) will result as the air forces the vocal folds apart.

Coordinated action of muscle and breath leads to a simultaneous onset which is efficient and usually the most appropriate for classical singing.’ (Chapman, 2006, 60)

The ‘efficiency’ that Chapman advocates is similarly explained by Sundberg as ‘flow phonation’ when he refers to the state of the vocal folds as they react to an optimal level of sub-glottic pressure. Too much pressure and too high adductive force at the larynx and pressed phonation occurs, too little and the folds fail to adduct properly resulting in breathy phonation (Sundberg, 1987, 80).

The coordination required for classical singing is not only to maintain a simultaneous onset (also sometimes known as a balanced onset) with good closure (adduction) of the vocal folds but also to increase the level of breath support and provide a subsequent increase in the compressed character of the breath. Another way to express this is to say that the sub-glottic pressure (i.e. the pressure from the lungs) is increased for singing. Singing uses a more concentrated form of breath; in essence the air is ‘compressed’ by the action of the belly wall (abdominal muscles) providing a more concentrated and faster airflow than in speech. This technique can be activated in a number of ways, with projected speech being one. By encouraging the student to speak well, with full tone and projection, the teacher can encourage a simultaneous onset. By using speech, which, in the majority of cases, presents with a simultaneous onset, it can act as an initiator of the full closure of the vocal folds to allow for a simultaneous onset in the singing voice.

In tidal breathing (the type of breathing we experience when ‘at rest’) the ‘quantity of air contained in the lungs is determined by the lung volume. In this case, the air pressure in the lungs is almost the same as in the air outside’ (Sundberg, 1987, 26). Singing, however, requires a change in the sub-glottic pressure that is occasioned by a contraction of the abdominal muscles and the diaphragm. The diaphragm flattens from its relaxed shape (similar to an upside-down bowl) to decrease the sub-glottic pressure and allow air into the lungs. In order to restore the diaphragm to the previous relaxed shape and expel the air, the muscles of the abdominal wall are activated, increasing the sub-glottic pressure and releasing air from the lungs (Sundberg, 1987, 31).

With respect to air pressure changes and breathing, the downward contraction of the diaphragm and the subsequent stretching of the tissue of the lungs creates an imbalance of air pressure – the pressure inside the lungs is less than the outside atmospheric pressure causing air to flow into the lungs to even up the pressure. The pressure inside the lungs then builds to a point where it is greater than that of the outside pressure causing the opposite to happen; breath flows out. Singers require a stronger breath flow than that found in tidal breathing. They need to strongly activate the muscles of expiration thereby compressing the air in the lungs, producing a stronger sub-glottic pressure, to create an air pressure greater than that outside the lungs causing the air to flow out in a vibrant and steady stream. (Sundberg, 1987) This is the desired type of airflow in classical singing: a strong and consistent stream. Students must learn to control that stream by learning to control the muscles of expiration. Sundberg has this to say about lung volume and air use, illustrating that singers will use the lungs to the best advantage and to promote breath flow:

‘The lungs contain a certain amount of air when they have been maximally filled; this amount of air is called the *total lung volume*. In an adult man it amounts to something in the neighbourhood of 7 litres. After a maximum exhalation, a small amount of air will always remain, this is called the *residual volume*. In an adult male this volume is about 2 litres. The difference between the total lung volume and the residual volume corresponds to the amount of air we can use for breathing and phonation. It is called the *vital capacity*, approximately 5 litres in an adult male.’ (Sundberg, 1987, 32)

And further:

‘Gould (1977) has shown that singers possess a vital capacity about 20% greater than the average for non-singers. This expansion does not take place by an increase of the total lung volume, but rather by a reduction of residual volume. Thus, voice training seems to have the effect, among others, of teaching one to take advantage of a greater portion of one’s total lung volume. It seems that one simply learns how to squeeze one’s

lungs more efficiently.’ (Sundberg, 1987, 35)

In projected speech (i.e. speaking to be heard over a distance or noise interference) or singing, the abdominal muscles – together with the intercostal muscles which control the movements of the ribs – are engaged more strongly, further raising the sub-glottic pressure. There is often some confusion in developing singers about the role of the diaphragm and many are sure that they need to sing ‘from the diaphragm’. It is indeed the diaphragm that contracts to allow air to enter the lungs, but it is the muscles of expiration (abdominal, intercostal etc) that the singer uses to provide the necessary sub- glottic pressure. As such the abdominal muscles are situated below the diaphragm and separate from it. Karen Sell is quick to mention: “Phonation, for singing, at least, is **expiratory**, and the diaphragm is an **inspiratory** muscle.’ (Vennard cited in Sell, 2005, 113) (Letters in bold are the author’s).

In classical vocal production it is the higher sub-glottic pressure that facilitates the generation of the classical sound. It assists with the tonal quality of the voice and, of course, the carrying power.

The other major factor in achieving an effective breath management method is to ensure that the in-coming breath also has a place in the student’s understanding and thinking. Allied to the concept of opening the throat, the in-breath must neither instigate tension in the throat nor must it engender tension in the abdomen to allow for a rapid expansion of the rib cage and descent of the diaphragm in order for breath to flow into the lungs as efficiently as possible. There are many different forms of breath management (as outlined by Miller in his 1997 book *National Schools of Singing: English, French, German and Italian Techniques of Singing Revisited*), however all systems advocate that the in-breath be ‘relaxing’ and as free of tension as possible. Indeed, as muscles are only able to relax or contract, and if the muscles of the abdomen are to be engaged (contracted) for the supportive expiration cycle of the breath, then it is necessary to have a degree of relaxation on the inspiratory phase of the breath to allow for the contraction of the muscles that will follow.

There are a number of techniques available to the teacher to assist the student to physically feel the difference between a tension-inducing breath and one that allows for muscle relaxation. Methods such as the *Accent Method* (as outlined in Chapman, 2006) may be utilized to assist in educating the student and increasing their awareness of the effort that is involved in the expiration cycle and the lack of effort necessary to achieve a relaxing inspiration.