Perspectives on straight-tone singing in Western Classical music

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A minor dissertation submitted in partial fulfillment of the requirements for the award of the degree of Master of Music

Faculty of the Humanities

University of Cape Town

September 2013

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Declaration

This work has not been previously submitted in whole, or in part, for the award of any degree. It is my own work. Each significant contribution to, and quotation in, this dissertation from the work, or works of other people has been attributed, and have been cited and referenced.

Signature: _____ Date: _____

Acknowledgements

I would like to thank the contributors to this study, my interviewees, who so generously gave of their time and knowledge.

I am deeply grateful for the support of my supervisor, Associate Professor Anri Herbst, who encouraged, nudged and advised me during this study. Her academic experience and wisdom were invaluable to my growth and to this study.

My parents, my family near and far and many good friends who have given words of encouragement and shown interest in my writing, are all very dear to me, especially my husband, James Blyth. Thank you one and all.

Thank you to the librarians, Shaheema Luckan, Dave Kruger, Brandon Adams and Julie Strauss for being available to help with numerous interlibrary loans, new book orders and other administrative tasks as well as for your kind words of encouragement.

To Shirley Churms who so generously gave of her time to edit my work, thank you for sharing your talent in English and for your interest in my studies. To Dr. Rory Attwood (ENT) for his advice on my physiology chapter.

Finally, my grateful thanks to the University of Cape Town for awarding me the South African College of Music post-graduate scholarship for two years of my study.

Abstract

Straight-tone singing in Western Classical music is a highly controversial subject. The primary objective of this study was to determine whether singing with a straight-tone was considered healthy or not and whether it is encouraged or recommended in performances today for aesthetic reasons. A secondary objective was to determine how a straight-tone could be produced healthily, if at all. Select opinions of three professional teachers and three international performers about straight-tone singing were solicited. Qualitative interviews were used and their findings compared to those in literature. To put straight-tone singing into a context of vocal health, the vocal physiology and acoustics of a normal functioning voice are discussed. Since a straight-tone is referred to as a vocal fault, vocal health issues are also examined. The question of aesthetics includes reference to straight-tone singing in ensembles or choirs and Early Music and opinions of its use in these contexts is discussed. The nature of the study was qualitative because of the subjective opinions at the centre of the research.

The findings of this study are inconclusive as to whether straight-tone singing should be employed or not. However, key findings in this study were that some sources are in favour of straight-tone usage for reasons of taste and some are strongly against it, mostly for reasons of health but also sometimes for aesthetic reasons. Those sources that advocate straight-tone usage also advise against its prolonged use because of vocal health concerns. This study is relevant for all singers, choral directors, teachers of singing and all professionals involved with voice usage, for whom it is essential to have clear definitions of the concepts of straight-tone singing and vibrato and their possible effects on the voice, before they advocate or reject either. It is recommended that further investigation be done into straight-tone singing with a broader sample group of interviewees including professional ensemble singers and voice science specialists.

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Chapter One

Introduction, rationale and methodology

1.1 Rationale

This study arises from the need and desire to be versatile as a singer from style, aesthetic and economic perspectives. Versatility is the ability to sing appropriately in several different styles. As a soloist this means, for example, an understanding of the performance practices of the early Baroque style as well as the late Romantic. As an ensemble or choral singer, versatility is about adapting to different styles and also being able to blend with other singers. For solo and ensemble singers alike, versatility across different styles necessitates adapting the production of the tone to a lesser or greater degree. One such way of adapting the tone is the control of a singer's vibrato.

Vibrato has many different definitions and it has been a controversial term amongst Early Music scholars as well as choral specialists. The term "vibrato" in an early example, from the *Grove Dictionary* of 1889, equates to the modern understanding of a tremolo where the same pitch is repeated many times. The mechanism of vocal vibrato was defined as "an alternate partial extinction and reinforcement of a note, producing almost its apparent re-iteration" (Deacon 1898:260). The more current definition of vibrato is outlined in Sadie's *The New Grove Dictionary of Opera:* vibrato is "A regular fluctuation of pitch and/or intensity, either more or less pronounced and either more or less rapid" (Sadie 1992:982). These two descriptions differ essentially as the earlier definition does not mention a fluctuation in pitch present in vibrato.[1]

Vibrato, as it is called today, used to be called "tremolo" or "shake" and various other names.

[1] Carl Seashore defines a good vibrato as "a pulsation of pitch, usually accompanied with synchronous pulsations of loudness and timbre, of such extent and rate as to give a pleasing flexibility, tenderness, and richness to the tone" (Seashore 1967:33). Both Seashore and *The New Grove Dictionary of Opera*'s definitions mention a fluctuating pitch and intensity or loudness, extent (more or less pronounced) and rate (more or less rapid). Seashore's description adds to this as he ends with a subjective comment on aesthetics. A more scientific description of vibrato is as a "periodic fluctuation, which includes variations of frequency amplitude (Hz), rhythm (vibrations per second), intensity (dB), timbre (formants), and/or the relationship between sound and breath" (Isherwood 2009:271). Vibrato is perceived as one pitch, in comparison to a trill, which is heard as a fluctuation between two pitches. Vibrato rate for musical instruments, depending on the instrument, typically ranges from 1 to 7 Hz. Vibrato depth ranges from approximately one tenth of a semitone (100 cents) to a maximum of a minor third (Loy 2007, Vol. II:369.)

In 1921 Thomas Edison studied the "tremolo" of about 3800 accepted singers, from the standpoint that tremolo was a defect. Only 22 of the voices recorded in his study were able to produce a tone without tremolo (a pure sound without extraneous sounds) and he concluded that tremolo was a universal trait of accepted artists of all nationalities (Westerman 1938:48).

Is it a challenge to make a living as a singer in South Africa by focusing on only one style of singing. It is helpful to be able to sing solo repertoire as well as adapt to singing ensemble or choral repertoire as a further option for employment. When moving from one type of singing to another (for example, from solo to ensemble), the subject of vibrato becomes relevant. In ensemble singing it often becomes necessary for singers to be able to control their vibrato production in order to blend with other voices, causing a singer to alter their vibrato characteristics, either in rate (how fast) (Hawkins 1988:669) or in extent (how wide or large) (Hawkins 1988:282). Contemporary Classical compositions often demand that a singer is able to sing with very precise intonation: for example, when microtones (tones where the interval is smaller than a semitone) are required (Sublett 2009:540). Since vibrato is a variation in pitch, it seems obvious that this fluctuation of pitch and hence, vibrato, would need to be limited or eliminated so that the actual pitch is clearly discernible in microtonal singing. The *bel canto* style of singing is regarded to be the benchmark for singers specialising in Western art music. A *bel canto* vibrato ranges from a quarter tone to a semi-tone in pitch (Isherwood 2009:273).

Singing "without vibrato" is essentially singing with a straight tone. The concept of straight-tone singing is controversial since it involves human perception and taste. Many musicians and academics prefer to rename it as "simple tone", "early tone", "young sound" or "antique style" for their own purposes (Sherburn-Bly 2007:61). For the purposes of this study I will use the term "straight-tone" as defined by that which is *perceived* as having no vibrato. The notion of perception is important as vibration is inherent to producing vocal sound. Skelton believes that healthy vocal production that is perceived as straight-tone is still, to some extent, a vibrating tone (Skelton 2004:51). This opinion is in agreement with Walker's assertion that there is no such thing as a completely straight tone (Walker 2006:42). Even when straight-tone or minimal vibrato is employed, Skelton believes that the carrying power or ring of the voice associated with the singer's formant can still be present (Skelton 2004:51).[2]

[2] A further discussion on straight-tone and vibrato singing in choirs and ensembles can be found in Chapter Five.

1.2 Questions and objectives

Straight-tone singing has sparked much debate, as seen in this study with regard to vocal health and aesthetic considerations. This study focuses on some of the opinions about this debate. The reasons given in literature for using straight-tone singing are concerned with aesthetics, in other words, the type of singing or sound required for a particular style, for clarity of pitch or intonation and also for blending with other singers. Against this background, this study aims to answer the following research questions:

- What are the opinions of select performers and teachers of Western Classical singing on straight-tone singing?
- How do concerns of vocal health and stylistic aesthetics contribute to the opinions on straight-tone singing?

1.3 Historical background

The debate around vibrato and straight-tone usage has been found in orchestral music as well as vocal. It is useful to discuss orchestral vibrato to put vocal vibrato or straight-tone singing within a broader musical context. No doubt one had an effect on the other. Tastes and uses of vibrato in orchestras have changed over the centuries. Historical facts about an aesthetic such as sound quality are hardly ever incontrovertible. Research into the sound of orchestras has been a topic of debate even when recordings are available.

Conductors such as Roger Norrington asked modern orchestras to play Romantic compositions without vibrato (Kleinerman 2004:48), as he claimed to have heard in Bruno Walter's recording of Mahler's 9th Symphony in 1938 a sound devoid of vibrato. However, Walter was interviewed in 1960 and recalled the “Vienna Philharmonic's special string vibrato in 1897” and insisted that the sound of the orchestra in 1960 was the same. This evidence contradicts Norrington's assumption (Hurwitz 2012:72).

Hurwitz explains how sources about orchestral vibrato in the Classical and Romantic periods mention the ‘abuse’ of continuous vibrato (Hurwitz 2012:72), concluding that orchestras in these periods tended to avoid vibrato altogether. However, Hurwitz maintains that eliminating vibrato in "historical" performances today is not a viable solution. If early sources complain

about the abuse of continuous vibrato, he concludes that there must have been a great deal of vibrato being used. He continues to say that the remedy for using too much vibrato is not to avoid it altogether, but to learn how to employ it correctly. Hurwitz provides several examples of vibrato notation in orchestral scores from composers in the 18th and 19th centuries as evidence that vibrato was present both as an integral part of the orchestral sound and as a means of emotive emphasis (Hurwitz 2012:72). It would appear as if the sounds ideals of historically informed orchestral performances were transferred to those of vocal performances.

Specifically in the Baroque period vocal and instrumental vibrato was considered to be an ornament sometimes asked for by symbol, but most often added at the performer's discretion (Neumann 1978:511; Sadie 1992:982). An in-depth examination of vocal treatises of the time, such as Tosi's "Observations on the Florid Song,"[3] shows that the terminology used to describe vocal vibrato, in treatises such as this one, is often ambiguous and has been misunderstood with controversial conclusions drawn from them. It is important to remember that the human voice, unlike other man-made instruments, has not changed over the centuries, only its context has.

Many Baroque or Classical kinds of vibrato are believed to be only distantly related to the present concept of vibrato (Sadie 1992:982). It is possible that the Baroque singing tone would have had a narrower vibrato than the 21st century average vibrato and as a result would sound "straighter" in comparison (Gable 1992:101). Also, it is suggested that a particular type of vibrato should be used occasionally in Baroque music, which is different to the vibrato currently used today, but that this use should be conscious and not indiscriminate (Alessandrini 1999:635). A clear difference between normal tone, ornamental vibrato and trills or other ornaments is necessary in the Baroque singer's lexicon for expressive purposes (Gable 1992:94).

In the late nineteenth century singers were expected to convey heightened drama and this, together with the striving to be heard over larger, louder orchestras in bigger venues,

[3] Tosi, P. F (1723) *Opinioni de' cantori antichi, e moderni o sieno osservazioni sopra il canto figurato* Bologna; Caccini, G (1602) *Le Nuove musiche* Florence

increased the need to produce more vibrato more often (Strempel 2006:409; Isherwood 2009:281). A vibrant sound, or a sound with vibrato, is perceived as louder than a straight-tone (Isherwood 2009:281). Therefore, as more projection and drama in singing became a requirement of taste, Western Classical audiences began to prefer the *bel canto* vibrato (Isherwood 2009:282).

Tastes in vocal production and as a result, in vocal vibrato, have changed over the centuries. Ferrante's survey on the change in vibrato over one century of recordings shows how in one century the rate and extent of vibrato can change for the exact same piece of music. He found a trend towards a wider vibrato at a slower rate in the more recent recordings of the same musical works. Ferrante compared this trend of a widening and slower vibrato over the years to the effects of aging on a voice and finds a positive correlation: in other words, older voices often had wider, slower vibratos than younger voices. He suggests that singers from his survey could have tried to imitate their older teachers; also that the more narrow vibrato singers could sound old-fashioned to students who possibly desire to cultivate a more "modern sound" of a wider, more generous vibrato (Ferrante 2011:1687).

As mentioned above, the human voice has not evolved in five hundred years, but the understanding of it has and thus the teaching methods of singing has evolved. This is the context in which vibrato and its use also developed.

Ludovico Zacconi (1555–1627) and Gioseffo Zarlino (1517–1590), both Renaissance music theorists, clearly described two distinctly different styles of singing in their day, namely *cappella* singing and *camera* singing. The former is a louder type of singing intended for the church while the latter was quieter, closer to speech and intended for private audiences (Uberti & Lindley 1981:492). In terms of physiology and the intended quality of sound, the techniques described in Renaissance *camera* singing differ greatly from the Romantic technique described by Manuel Patricio Rodríguez Garcia (1805–1906) (Uberti & Lindley 1981:486, 489).

A *bel canto* vibrato was mentioned earlier in this chapter and this term warrants a brief explanation. *Bel canto* is commonly understood to be a desired method of beautiful singing. The era of *bel canto* in the eighteenth century in Italy was known for its particular vocal

lyricism (Duey 1951:v). The two most important principles of *bel canto* are virtuosity and beauty of tone, which are still principles of primary importance in singing today (Duey 1951:vi). The term *bel canto* only found its way into dictionaries in the 20th century and it is often used to discern between the earlier Italian style and the later, 19th century Romantic German operatic style, which focused more on dramatic, declamatory expression or Romantic emotion (Duey 1951:3, 4). Many regard the style of teaching in *bel canto* to have been lost during the nineteenth century. However, many teachers today still claim to use the method of *bel canto*. Teachers of both Romantic German schools and early Italian *bel canto* strove towards beauty of tone and virtuosity (Duey 1951:4). Vibrato in *bel canto* singing seemed to be reserved only for heightening the expression of particular words and for giving grace to longer notes (Toft 2013:4).

In the early school of *bel canto* the singing technique was based on the sensations of the singers. They were able to teach breathing well as it is something that can be consciously controlled (Vennard 1967:16). Giulio Caccini[4] (1551–1618), Giambattista Mancini[5] (1716–1800) and Pier Francesco Tosi[6] (1647–1732), who were advocates of the *bel canto* singing style, wrote about notions of "singing on the breath", "supporting the tone" and "let the tone float on the breath." It was furthermore important to focus on legato, producing sounds "like pearls on a string". These early pedagogues also wrote about the resonators when referring to "opening the throat", "loosening the neck" and "singing forward on the lips" (Vennard 1967:17). Caccini, Tosi and Garcia linked certain vocal techniques to the musical styles of the day. Their treatises advised on vocal and musical matters as these were considered inseparable from each other (Stark 1995:70).

Tosi and Mancini, two very influential teachers, were both castrati. The castrato voice had a great influence on the *bel canto* style because of its specific abilities, such as great sustaining of long phrases because of castrati's increased lung capacity, increased clarity of phonation and enhanced resonance due to the larger proportions of the vocal tract and larynx. The castrato was particularly good at flexibility and agility and often had a very large vocal range (Kennedy-Dygas 2000:28, 29). Modern voice scientists agree that the elements of *bel canto,*

4 Caccini was known for his *Le Nuove Musiche* of 1602 in which he developed new styles of ornamentation.
5 Mancini's *Pensieri, e riflessioni pratiche sopra il canto figurato* of 1774 was mostly devoted to practical reflections on vocal ornamentation (Miller 2006:205).
6 Tosi's *Observations on the Florid Song* was first published in 1723 when Tosi was more than 70 years old (Miller 2006:205).

such as vocal efficiency and control, should be the norm against which all other singing methods should be be measured (Stark 1995:72).

In the late 19th century, with the help of Hermann Ludwig Ferdinand von Helmholtz (1821–1894) and his knowledge of acoustics, the speculative approach to teaching singing became more scientific. Manuel Garcia, who is credited with the invention of the laryngoscope, was the first great scientific voice teacher. The late nineteenth and early twentieth century teachers were preoccupied with resonance. They counted all the sinuses and believed that they were all important resonators. As a result of this view of different cavities as resonators, the theory of voice registers developed, calling them "head", "chest" and "palatal register". Vennard states that these resonating chambers do not determine the basic quality of the voice (Vennard 1967:17). However, according to Kiegsen (2006:419), the vocal tract resonator plays an essential role in creating individual sonority and volume. The resulting vocal resonance is due to the filtering of harmonics of the voice in the vocal tract and their selective amplification. Singing instruction, with the help of scientific measurement and observation, started to evolve into a scientific as well as artistic education.

Another area of singing where straight-tone singing is often employed is in choral music. There is much debate on the use of straight-tone singing in choirs and a selection of these opinions are discussed in this study. Reasons for limiting or eliminating vibrato in choirs are blend, intonation, articulation and style. The main reasons given for not using straight-tone are strain on the vocal mechanism, lack of vibrancy in tone, not enough breath flow or support and intonation (Olson 2008:563). The use of straight-tone singing in choirs is a very contentious issue and worth exploring if singers (including solo singers in ensembles) or conductors desire an informed approach to their career.

1.4 Research design

The methodological paradigm is of qualitative nature. This study consists of short pre-survey questionnaires as well as in-depth interviews to ascertain professional opinions about Western Classical usage of straight-tone singing (see Addendum C). A pre-survey serves to introduce the respondents to the topic of the study and also assist the interview process by defining some opinions before more in-depth questions are asked. This pre-survey consists of closed-ended questions with possibilities of "yes", "no" and "debatable" as answers. Specific

international performers from three different continents who are known for their interpretation of Early Music are questioned about their experiences with straight-tone singing. Teachers of singing, also from three different continents, are also interviewed on their views of healthy production of straight-tone singing if they indeed condone the use at all.

This study focuses on the opinions of the interviewees, it is therefore important that open-ended questions are used to complement the closed-ended ones. Qualitative research is defined by Babbie and Mouton as “the insider perspective on social action” (Babbie 2001:270). Qualitative research's main concern is acquiring an individual's knowledge of a topic and determining their perception of actions and events. The qualitative researcher is seen as the principal tool in the research process (Babbie 2001:270). The purpose of an interview is to glean information from someone, based on a prearranged set of questions in the manner of a structured conversation (Babbie 2001:249). One-on-one interviewing has several advantages over questionnaires where the participants answer the questions on their own. An interviewer can probe for answers and clarify questions not immediately understood, thereby giving a more comprehensive record of information (Babbie 2001:250). Having a difference between the interviewer and respondent can be useful to facilitate data collection (Babbie 2001:252). If the two people are on the same intellectual level, for example, the respondent may not feel the need to explain their answers in a comprehensive way. In this study, the interviewer is a student and the respondents are all experienced teachers and performers who would feel comfortable imparting knowledge to one who respects their achievements and wants to learn.

Each interview is conducted either in person or over Skype. The sound from the interview is recorded on a Roland R-09HR wave/MP3 recorder and transcribed. Obtaining a verbatim record of the interview is ideal if the analysis afterwards is to be valid and meaningful (Johnson & Rowlands 2012:106). The completed study will be made available to the participants in PDF format.

The nature of the interviews in this study can be described as semi-standardised. Here, the interviewer asks particular major questions in the same manner in each interview, but is free to change the order of the questions and to probe for further information. This model allows the interviewer to adapt the interview to the level of understanding of the participant as well as their level of articulation. It also allows for the fact that participants tend to give answers to

questions intended to be asked later (Gilbert 1993:136).

In-depth interviews are often relatively long in duration. As in this study, they usually involve face-to-face, one-on-one interaction between an interviewer and an informant. A kind of intimacy needs to be built that facilitates mutual self-disclosure and they will involve more of an expression of the interviewer's self than other types of interviews (Johnson & Rowlands 2012:99). In-depth interviews are similar to friendship because of the intimacy that is needed, but they are also quite different to friendship as the information the interviewer is seeking is needed for another purpose. In-depth interviews usually seek deeper information and knowledge than surveys, informal interviews or focus groups (Johnson & Rowlands 2012:100). In-depth interviews are focused on how individuals make their experiences meaningful and they typically lack quantification during analysis; therefore, they are not suited to generalisable results. However, they are most useful for describing the context and mechanism of cause and effect explanations in a way that surveys, experiments and direct observations cannot (Johnson & Rowlands 2012:101).

In-depth studies look for “deep” information or knowledge and this depth can have several meanings or implications. Firstly, the interviewer seeks to obtain the same deep level of knowledge and understanding as the participants. Depending on the amount of knowledge the interviewer begins with, the outcome of the interview could be that of basic learning or that of much greater and in-depth understanding. Secondly, in-depth interviews begin with common-sense perceptions but aim to explore the contextual boundaries of those perceptions or to uncover what is usually hidden from view. Thirdly, the deeper the interviewer goes into understanding of a context, the more it can be revealed how their own experience colours their understanding and interest. Fourthly, in-depth interviews allow the researcher to understand and articulate several opinions and perspectives on or meanings of a particular context (Johnson & Rowlands 2012:102).

It is useful for a researcher to have experience in their field of exploration before starting in-depth interviews. My experience as a choral director, solo and ensemble singer as well as one interested and involved in the performance of Early Music is a helpful foundation for this study. Some years ago, the ideal of professionally conducting interviews was that of detachment and pure objectivity. But today, many researchers use their studies and interviews to further explore phenomena about which they have prior or current knowledge (Johnson &

Rowlands 2012:103). Participants in this study were carefully chosen for their ability to answer specific questions of substantial or theoretical importance to this study (Johnson & Rowlands 2012:105).

1.5 Ethics clearance

The UCT Code for research involving human subjects has been read and consulted for this study and ethics clearance was obtained. The individuals interviewed remain anonymous and their names are kept strictly confidential throughout the study. After consultation with the interviewees, most were comfortable with their names being included in the study; however a valid point was raised by one participant. If the performers and/or teachers were named, conclusions drawn from what they say might be coloured by whether people like them as a performer, rather than solely on the arguments. Therefore, anonymity has the advantage of assuring neutrality in the reader.

Each participant was provided with an information sheet detailing the intentions of the study as well as the methodologies of research to be employed (see Addendum A). Their informed consent has been obtained (see Addendum B) and the final research results will be made available to them at their wish. It may be necessary and useful to the study to speak to the participants after the study is completed to ascertain their experience of the research process and their interpretation of the results (Babbie 2001:256).

In-depth interviewing often brings about very personal information about specific individuals. This may include the participant's own feelings as well their perceptions of others. Every effort is made in this study to avoid excessive personal probing and any individual or group of people mentioned by participants will remain strictly anonymous. Participants will be protected from any misuse of their information (Johnson & Rowlands 2012:108–109). Addendum C includes the full interview questions.

1.6 Chapter outline

In order to answer the questions outlined above, an objective overview of healthy voice production is needed. Understanding the physiological and acoustic characteristics of voice production is necessary for singers and singing teachers alike as a foundation on which to build their technique. Chapter Two discusses the anatomy of breathing for singing, the physiological theories of how phonation is achieved and a physiological explanation of vibrato production. Chapter Three contains the understanding of breath and describes theories of respiration and phonation in relation to acoustical concepts of pressure and resonance. The acoustical description of vibrato is an important section of this chapter as it introduces the measuring tool of the spectograph which helps to explain straight-tone singing, ornaments, human pitch perception and the aesthetic of a beautiful voice in terms of scientific measurement.

Discussing fundamental aspects of vocal health is also an essential part of this study and both behavioural and physical causes of vocal problems are addressed in Chapter Four. The misuse and abuse of the voice is presented as well as the hypofunction and hyperfunction of the vocal mechanism. Faults related to vibrato are discussed in detail and remedies to these and other vocal problems are suggested.

Chapter Five includes the findings of the interviews mentioned above. These findings of vocal aesthetic and health, in relation to vibrato and straight-tone singing, are compared to opinions found in literature. Interview questions were themed under sections of aesthetic or style, versatility and blend.

The transcripts of the interviews appear in Addendum D. The conclusions and recommendations of the study are discussed in Chapter Six.

Chapter Two

Physiology of the larynx

2.1 Introduction

Knowledge of the structure of the larynx alone is not sufficient in understanding the entire vocal instrument. Good vocal technique requires coordination of tone, breath and support (Olson 2010:13). Thus, what follows is a brief summary of the mechanisms of the larynx and the greater vocal instrument including the mechanism of respiration, the anatomy of the larynx, the process of phonation and the physiology relating to resonance.

2.2 Anatomy of respiration

The chief muscles of respiration are the intercostal muscles between the ribs, consisting of the internal and external intercostals (see Fig. 2.1 and Fig. 2.2) and the diaphragm (Olson 2010:6). The external intercostal muscles move the rib cage outward and upward allowing for inspiration to take place and this increases the rib cage volume, while the internal intercostal muscles move the rib cage inward and downward and this decreases the rib cage volume during exhalation (Leanderson & Sundberg 1988:2; Olson 2010:6). The diaphragm, a large, dome-shaped muscle at the bottom of the rib cage, flattens out during inhalation and lowers the floor of the rib cage which increases the lung volume and returns to resting position during exhalation. This movement can be achieved because of the diaphragm's attachments to the lower ribs and spine via its vertebral, sternal and costal attachments (see Fig. 2.2). The lowering of the diaphragm compresses the internal organs of the abdomen downward, resulting in the outward expansion of the abdominal regions (Olson 2010:6). During exhalation the intercostal muscles return the rib cage to its original position and the contraction of the abdominal wall muscles slowly restore the diaphragm to its neutral position (Leanderson & Sundberg 1988:3; Olson 2010:7).

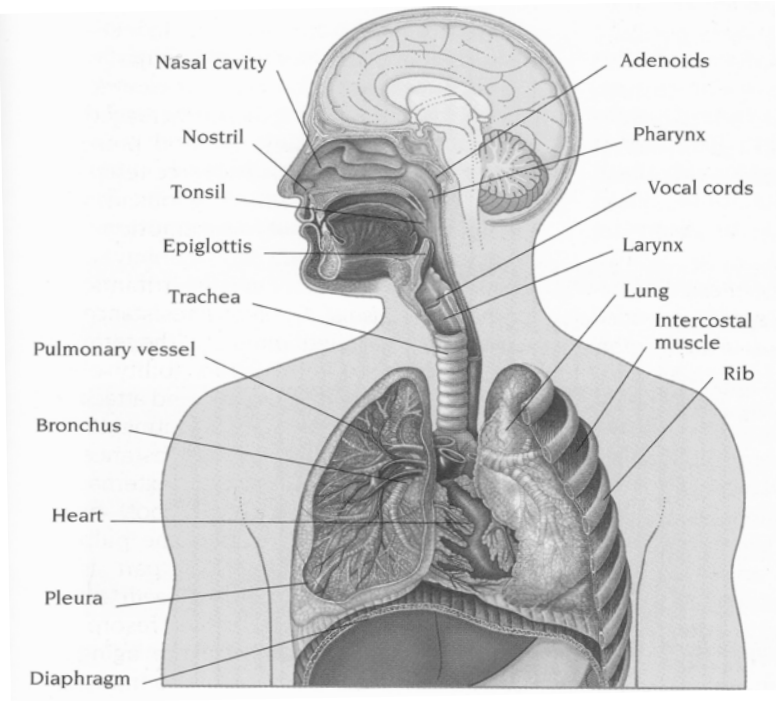


Fig. 2.1 The respiratory system (Peters 2002:487)

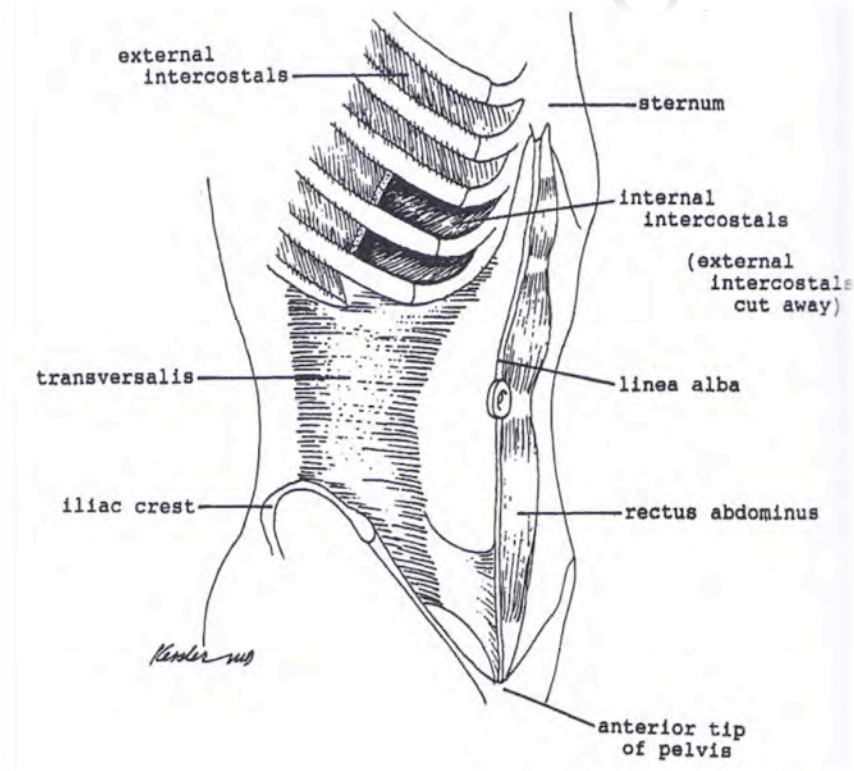


Fig. 2.2 The right side of the trunk (Brown 2008:24)

The mechanical process of the muscles working against each other and the semi-rigid structures provided by the ribs, sternum and spine, create an environment of differing volumes and pressures which gives rise to air movement. Air moves into the body because there is a difference in atmospheric pressure inside and outside the body. This pressure gradient exists because of the action of the diaphragm muscle moving downward and the external intercostals moving upward and outward, which creates a partial vacuum in the lungs. Since the external pressure is greater than the internal, air comes into the body through the nose and/or mouth, runs through the throat, the trachea and bronchi and then enters the lungs (see Fig. 2.1) (McKinney 1994:46).

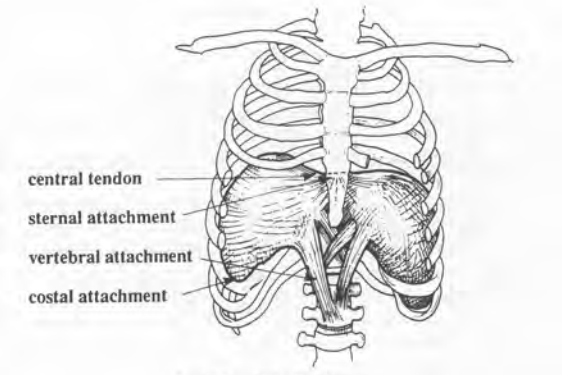


Fig. 2.3 Different views of the diaphragm and rib cage (Olson 2010:6)

The "suspension phase" of the breath cycle is the short time between inspiration and starting to sing (Olson 2010:6). This is the moment when most singers engage their support muscles. Breath support is a balanced tension between the muscles of inhalation and those of exhalation. The purpose of support is to provide enough breath pressure to the vocal folds for singing (McKinney 1994:53). The support muscles (see Fig. 2.4) include the rectus sheath, the *rectus abdominis*, the external and internal obliques and the *transvers abdominis* (Miller 1996:25).

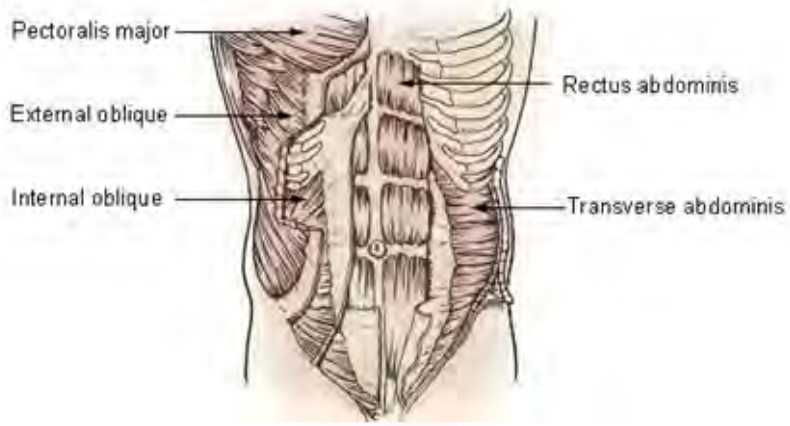


Fig. 2.4 Muscles of the trunk <Mikereinold-TAmuscle>

Breath support is greatly influenced by posture and good body alignment (Brown 2008:18). A singer's stance should have a flexible poise such that the parts of the vocal instrument can be placed in their most efficient working position (McKinney 1994:40). The strongest breathing muscles are attached to the inner surfaces of the lumbar spine, which is the most flexible part of the spine. If the curvature of the spine is too great, the crura, the longest fibres of the diaphragm, will be elongated and not able to contract at an optimal degree (see Fig. 2.4). The psoas major and minor muscles attach to the sides of all the lumbar vertebrae and extend to the pelvis and thigh. These are strong postural muscles and they help to prevent excess curving of the spine (Brown 2008:18).

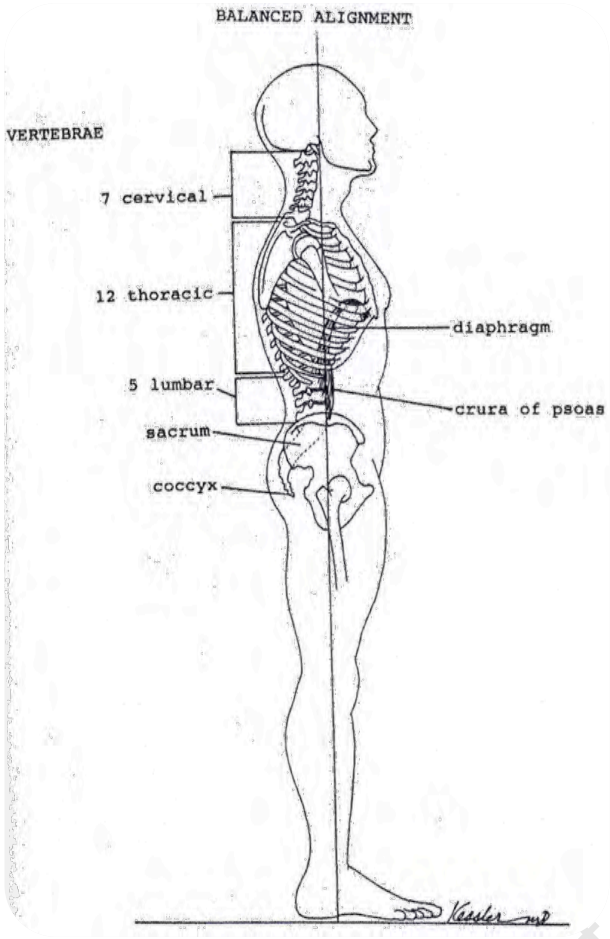


Fig. 2.5 The alignment of the spine (Brown 2008:19)

When singers learn the correct posture, breathe in properly and manage the breath flow, a balanced tension is then established between the muscles of inhalation and the muscles of exhalation (McKinney 1994:53).

2.3 Anatomy of the larynx

The larynx, or voice box, is found at the top of the trachea or wind pipe (see Fig. 2.6). It consists of cartilages and is connected to the hyoid bone which is found at the base of the tongue (Olson 2010:1). The plate-like thyroid cartilage that forms part of the Adam's apple is situated below the hyoid bone. The cricoid cartilage is ring-shaped and is attached to the triangular arytenoid cartilages. The hinged epiglottis is attached to the thyroid cartilage and acts as a lid to prevent food and liquid entering the trachea (Olson 2010:2).

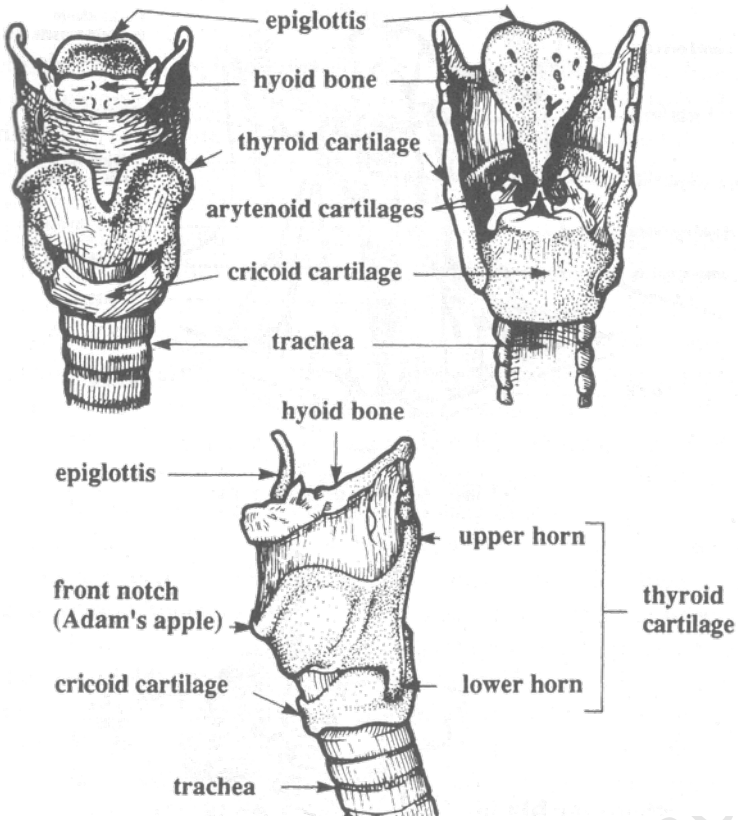


Fig. 2.6 Alternate views of the cartilages of the larynx (Olson 2010:3)

The muscles of the larynx either adduct the vocal folds (bring them closer together, making them thicker and shorter) or abduct them (move them further apart, making them longer and thinner). The intrinsic muscles are the thyroarytenoid (also known as the *vocalis* or vocal folds), which is the principal muscle of phonation[1]; the cricothyroid which is the pitch changing muscle as it tenses to make the folds lengthen; and the criocoarytenoid and interarytenoid muscles (Olson 2010:2). The extrinsic muscles of the larynx are divided into the suprahyoids which raise the larynx and the infrahyoids which lower the larynx (Olson 2010:3).

The thyroarytenoid muscles form the two vocal folds, consisting of external and internal divisions and vocal ligament. They extend posteriorly from the inner surface of the thyroid notch, or Adam's apple, to their attachments to each of the two arytenoid cartilages at the vocal process and the body of the arytenoid. These vocal folds are covered by a thin mucosal lining called the epithelium, which can freely move over the underlying muscles. The

[1] Phonation is the act of producing vocal sound. A further explanation is given in Section 2.4.

epithelium is continuous with the mucous lining that covers the entire laryngeal tract's surfaces from the mouth through to the trachea. When the thyroarytenoids contract, they shorten and thicken; when they relax, they can be stretched. During inhalation, these muscles are the most separated and when producing sound they are drawn closely together (Brown 2008:173).

The posterior criocoarytenoids are a pair of muscles that abduct the vocal folds. They rise from the posterior surface of the cricoid cartilage and insert into the posterior area of the muscular processes of the arytenoids. Their function is to open the glottis for the intake of air.

The lateral cricoarytenoids are a pair of muscles that adduct the vocal folds. They close the glottis opening by drawing the muscular processes of the arytenoids towards a mid-line. They rise from the upper borders of the cricoid cartilage on either side and insert into the anterior area of the muscular processes of the arytenoids. When they adduct, the arytenoids rotate forward.

The interarytenoids are considered a single muscle and its function is to close the posterior opening between the arytenoids. The muscle runs from the posterior, lateral surface of one arytenoid to the other (Brown 2008:173). A transverse portion of the muscle draws the median margins of the arytenoids together while an oblique portion acts on the topmost angle, the apex.

The cricothyroid muscles have two parts, the *pars recta* and the *pars obliqua*. The former draws together the thyroid and cricoid cartilages anteriorly, with the inferior horns of the thyroid cartilage acting as a pivot (Brown 2008:174). This action functions to elongate and tense the vocal folds, which are suspended between the thyroid cartilage and the arytenoids (Brown 2008:175). The latter (the *pars obliqua*) further stretches the vocal folds by pulling the inferior horns of the thyroid cartilage forward from their ligamentous attachments to the cricoid cartilage (Brown 2008:176).

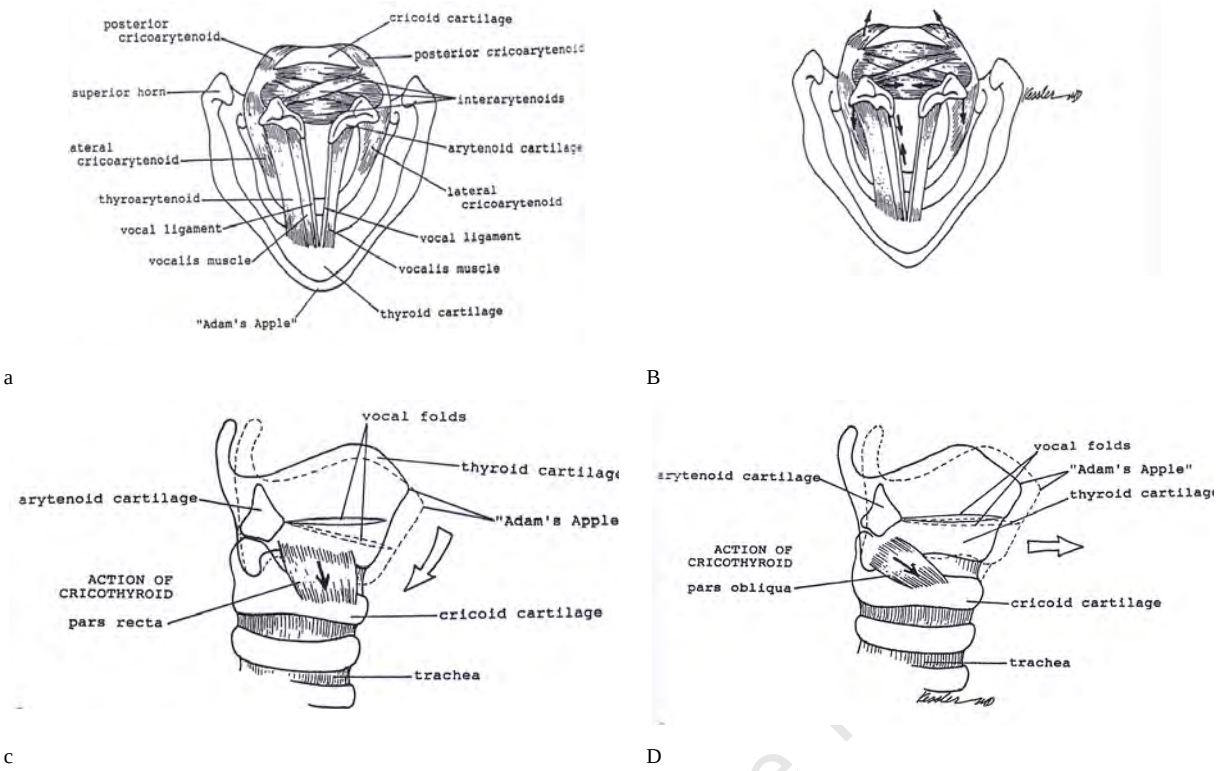


Fig. 2.7 The intrinsic laryngeal muscles (Brown 2008:174, 175)

In Fig. 2.7 the intrinsic laryngeal muscles and the direction of their actions are shown. In Fig. 2.7 c) and d) the action of the cricothyroid muscle and its effect on the actions of the vocal folds is illustrated (Brown 2008:174; 175). The mechanics of the muscle movements alone, cannot explain the intricate, subtle coordination required for singing. The state of the tissue of the larynx and its response to air movement are major factors in laryngeal action. The mucous membrane (outer visible coating), the submucosal layer, the elastic vocal ligament and the *vocalis* muscle constitute the soft tissue of the vocal folds (see Fig. 2.8) (Miller 1996:256).

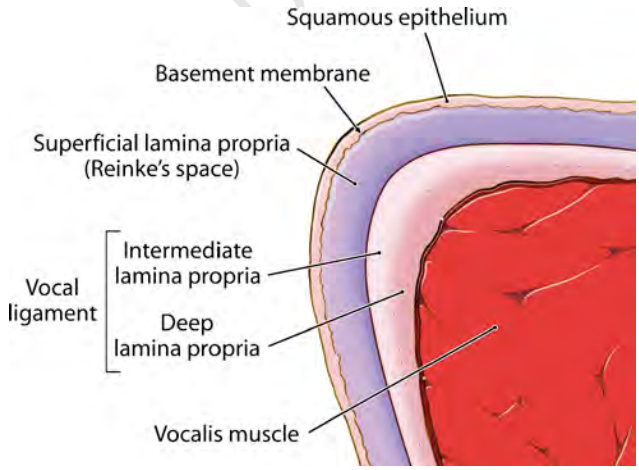


Fig. 2.8 Layered micro-anatomical structures of the vocal fold (Rosen 2008:6)

All of these tissues have elastic properties that may be passive or active. It is the selective control exercised over the various muscle groups, rather than uniformity of action among them, which allows the singer to achieve the fine dynamic muscle balances needed for quick changes in range, dynamic, speed, sustaining tone and vocal colouring. Therefore, efficient phonation is mostly dependent on the balanced interaction between the intrinsic muscles and vocal fold tissues in response to the different vocal demands of pitch, volume, vowel colour and to the application of the right amount of subglottic pressure and air flow (Miller 1996:257).

The brain coordinates vocal production through specific nerve connections and signals. Signals to the larynx for moving laryngeal muscles come from the motor branches of the recurrent laryngeal nerve and the superior laryngeal nerve. These are called motor nerves. Signals from the larynx structures for feeling travel through the sensory branches of the recurrent laryngeal nerve and the superior laryngeal nerve (see Fig. 2.9). These are known as sensory nerves. The recurrent laryngeal nerve is so called because on the left side of the body it travels down into the chest and returns (or recurs) up into the neck and ends at the larynx <Voiceprob-understand>.

The importance of correct posture and body alignment was mentioned earlier. When singing, correct spinal alignment promotes a healthy nerve supply to the organs of the voice. The nerve supply to the muscles of the body is not direct, but rather an alternating current. Therefore, nerves cannot activate muscles constantly; instead they provide a series of impulses. Muscle activity always involves antagonism between two sets of muscles. Nerve impulses tend to alternate between the agonists and the antagonists, one relaxing while the other contracts. This is called diadochocinesis. For normal efforts the alternating supply of energy results in smooth movement, but not always. In singing, small muscles are performing a delicate activity which produces sound. The fluctuation in the energy of these muscles can be heard in the tone as vibrato (Vennard 1967:192).

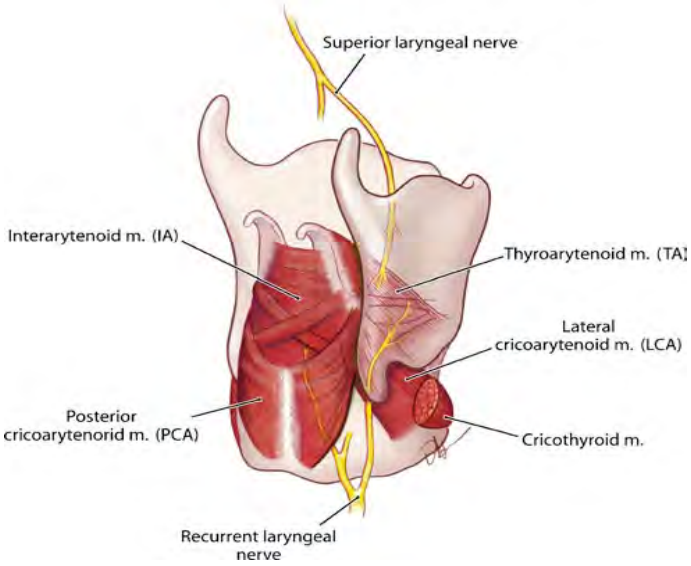


Fig. 2.9 Neuromuscular structures of the larynx (Rosen 2008:4)

2.4 Phonation

Phonation is the act of producing sound. The movement of air between the vocal folds causes them to vibrate and the result is vocal sound. Before sound is created, air pressure builds up under the vocal folds. This is called subglottal pressure. The adducting laryngeal muscles bring the folds together while the subglottal pressure creates a vacuum effect, suctioning air between the folds to begin the vibration (Olson 2010:9).

There are three components of phonation: voiced sound, resonance and articulation. Voiced sound is the basic sound produced by vocal fold vibration. This can be described as a buzzing sound, but voiced sound for singing is very different to that of speech. Voiced sound is amplified and altered by the vocal tract resonators (throat, mouth cavity and nasal passages) and these produce a person's recognisable voice. The vocal tract articulators (tongue, soft palate and lips) alter the voiced sound and produce recognisable words <Voiceprob-understand>[2].

The process of phonation begins as a column of air pressure is moved out of the lungs and towards the vocal folds by the coordinated action of the diaphragm, abdominal muscles, chest muscles and rib cage. The vocal folds are then moved to the mid-line by laryngeal muscles,

[2] For further detail on the components of phonation, see Miller 1996a:228.

nerves and cartilages. The vibratory cycle occurs repeatedly (see Fig. 2.10 for a representation of one cycle.) The rapid pulses of air created by the repeated vibratory cycles produce voiced sound. An increase in air flow abducts the folds wider apart and they stay apart for longer during a vibratory cycle thus increasing the amplitude of the sound pressure wave. Pitch is altered by an increase in frequency of the vocal fold vibration. The resonators and articulators amplify and modify the sound, giving it the distinctive qualities of voice (McKinney 1994:76; Andrews 2006:26).

The myo-elastic-aerodynamic theory (or muscle elasticity theory) of phonation is the most basic and widely accepted model of voicing. According to this theory, phonation occurs due to a series of processes:

- Muscular forces adduct the folds, creating medial compression at the midline (muscle action);
- Exhaled air from the lungs creates enough subglottal pressure to overcome the medial compression and pushes the vocal folds apart, allowing air to escape, reducing the pressure enough for the muscle tension to pull the folds back together again (aerodynamic effects);
- The vocal folds recoil back to their resting position, closing at the midline before air pressure forces them open again (tissue elasticity).

This theory postulates that voice is produced through the combination of muscle action, aerodynamic effects and tissue elasticity (McKinney 1994:76; Andrews 2006:26).

Another theory, the aerodynamic theory (air action theory) is based on the Bernouilli effect which states that, as air moves from a wider space to a narrower space, it increases in flow and decreases in pressure. When air passes through the glottis, which is narrower than the spaces below and above, it increases in flow and pulls the vocal folds back together because of the negative pressure created by the air flow (Andrews 2006:26). For further discussion of pressure and the Bernouilli effect see Chapter Three. Breath is flowing through the glottis while the arytenoid cartilages are pulled together by the interarytenoid muscles. As a result of the Bernouilli effect, the breath flowing past the vocal folds causes them to be sucked together and vibrate before the arytenoids are fully together. Once the arytenoids have been pulled together this same air flow sucks the glottis closed, cutting off the air flow until breath pressure pushes the folds apart and the whole cycle begins again (McKinney 1994:76).

The main difference between these two theories is that the myo-elastic-aerodynamic theory mentions the muscle tension or elasticity while the aerodynamic theory credits the Bernouilli effect. It is possible that both theories are true and operate at the same time to initiate and maintain vibration (McKinney 1994:77).

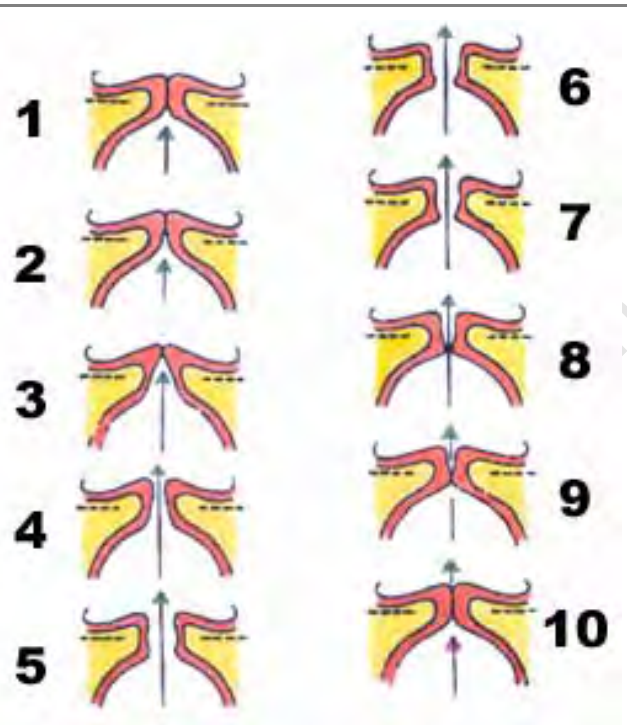
1 Column of air pressure moves upwards towards vocal folds in "closed" position		**6–10** The low pressure created behind the fast-moving air column produces a Bernouilli effect which causes the bottom to close, followed by the top.
2, 3 Column of air pressure opens bottom of vibrating layers of vocal folds; body of vocal folds stay in place		**10** Closure of the vocal folds cuts off the air column and releases a pulse of air
4, 5 Column of air pressure continues to move upwards, now towards the top of vocal folds and opens the top		New vibratory cycle: Repeat 1-10

Fig. 2.10 Diagram of vocal fold vibration <Voiceprob-understand>

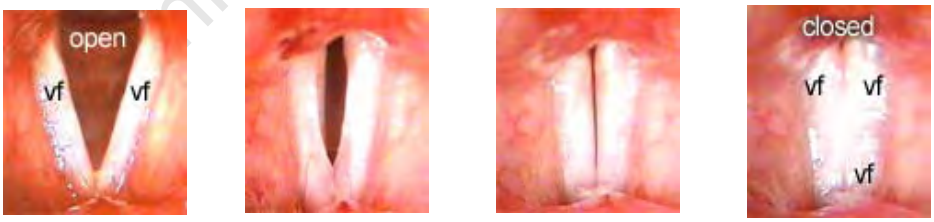


Fig. 2.11 The movement of the vocal folds (vf) as seen from above <Voiceprob-learning>

Titze further proposed the three-mass model of vocal fold oscillation where the large stabilising mass is the body and the two smaller masses are the inferior and superior portions of the cover[3] (see Fig. 2.8). When the area of the glottal opening at the bottom of the glottis is

[3] The cover refers to the epithelium, membrane and Reinke's space of the mucosa of the vocal fold (Andrews 2006:24).

larger than the top, a convergent glottis is formed, which causes greater relative intraglottal pressure, forcing the folds apart. Conversely, when the area at the top of the glottis is larger, a divergent glottis is formed, causing lower intraglottal pressure and the vocal folds pull together (see Fig. 2.11). Each of these actions happens during every vibratory cycle (Andrews 2006:27).

A mucosal wave is a pattern of oscillation created by a continual opening and closing of the two masses of the vocal fold cover during phonation. Every opening and closing of the folds is one vibratory cycle or phase. In one phase of the mucosal wave the folds open at the bottom, open at the top, close at the bottom and close at the top (Andrews 2006:27).

Voice onset is the initiation of sound as the folds begin to vibrate. There are three different kinds of onset defined by the timing of the air flow and the vocal fold closure (Andrews 2006:27, 28):

- Breathy onset: air flows through the glottis before the folds are adducted and vibrating;
- Simultaneous onset: air flows through the glottis as vibration and adduction of the folds begins;
- Hard glottal attack: air flows through the glottis after the vocal folds are adducted and vibration begins with a jolt.

Once the sound has been initiated in the larynx, all a singer can have control over is the shape of the vocal tract and the formation of the articulators (Olson 2010:11).

The vocal tract (see Fig. 2.12) is the principal resonator of the voice. This tract is the tube of air space from the vocal folds to the lips. The pharyngeal section of the tract lies between the top of the larynx and the back of the mouth, the oral section is inside the mouth itself and the nasal section is behind the nasal cavity. Within the vocal tract are articulators which work together to give different shapes to the vocal tract. Articulators include the hard palate, which doesn't move but can reflect sound, the soft palate, jaw, tongue and lips which can all be manipulated. The shape of the resonator determines the colour of different vowels (Olson 2010:9).

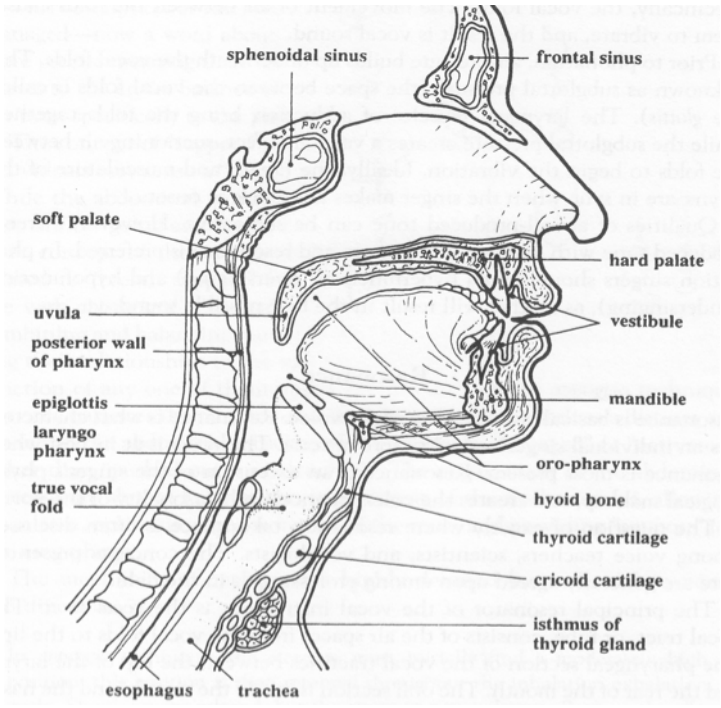


Fig. 2.12 The vocal tract (Olson 2010:10)

2.5 Physiology of vibrato

There is agreement among scientists that vocal vibrato is natural in voices trained in the Western European Classical tradition. Vibrato is said to result when the laryngeal and respiratory muscles are toned and well coordinated, free of unwanted tension and when controlled exhalation is used. Vibrato is a reflex laryngeal muscle response to natural tremors originating in the central nervous system. It is closely associated with resonance as it has been found that most singers who perform with vibrato, exhibit the singer's formant (or ring in the voice) (Walker 2006:42).

Research has shown that the main cause of vibrato in the voice is a group of muscles that regulate the fundamental frequency of the voice. Studies have been conducted using electromyography (EMG) technique,[4] to ascertain which muscles are involved in producing Western Classical vibrato. A study involved four adult males singing a sustained vowel beginning with straight-tone and ending in vibrato. The EMG signal from their cricothyroid muscle and the voice signal were recorded. The signal from the straight-tone production showed a steady interference pattern whereas the vibrato produced a modulated signal. The timing between cricothyroid muscle modulation and the oscillation of the fundamental

[4] Electromyography (EMG) is the study of electric activity in muscle (Miller 1996:2).

frequency was very large which suggests that other muscles are also involved in regulating vibrato (Shipp, Doherty & Haglund 1990:300).

The muscles in the larynx that usually oscillate synchronously with vibrato were found to be the cricothyroid, thyroarytenoid and cricoarytenoid muscles (Hirano *et al*. 1995:10). Synchronous movements of the soft palate, tongue, pharyngeal wall and lower jaw during vibrato singing were observed. The diaphragm, however, does not oscillate (Hirano *et al.* 1995:11). The air flow during vibrato does vibrate and this is due to changes in the glottal resistance, not because of pulmonary pressure (Hirano *et al*. 1995:32). Another type of vibrato production found in other cultures and styles of music, is that which involves the pulsation of the subglottal pressure (Shipp, Doherty & Haglund 1990:303; Sundberg 1995:35).

Titze (as quoted in Walker) gives a possible explanation for the physiological cause of vibrato based on the hypothesis that a broad spectrum of tremors is naturally and continuously occurring in the body (Walker 2006:37). A split second before phonation, a muscular sequence in the larynx is activated by the singer's memory of a vibrant pitch and what it feels like, as well as the physical coordination to produce it. At the same time, tremor frequencies are superimposed onto this muscle activation. Vibrato is achieved when antagonistic pairs of muscles, such as the cricothyroid and thyroarytenoid, differentially oscillate to centre the desired pitch through this quavering environment (Titze 2002:2273.) In order for vibratory oscillations to take place, the muscles involved in vocal production must be toned and coordinated to an extent that they can balance each other antagonistically (Dejonckere 1995:7).

A videofiberscopic study conducted by Hirano *et al.* (1995) observed the differing glottal space in trained singers when producing vibrato tones and straight-tones. The singers had difficulty in producing the straight tone and suppressing their vibrato. In some cases, the glottal space was wider for a vibrato tone than straight-tone and these singers narrowed their glottal space to suppress their vibrato for a straight-tone. This narrowed glottis or excessively adducted folds, produced a pinched, strained tone. In other cases, the opposite was true: the glottal space was narrowed for a vibrato tone and widened for a straight-tone. Widening of the glottis or excessively abducting the vocal folds, in order to suppress vibrato and produce a straight-tone created a flat, shallow tone (Shipp, Doherty & Haglund 1990:303; Hirano *et al.* 1995:18, 27). These findings are exemplified in Fig. 2.13 and Fig. 2.14.

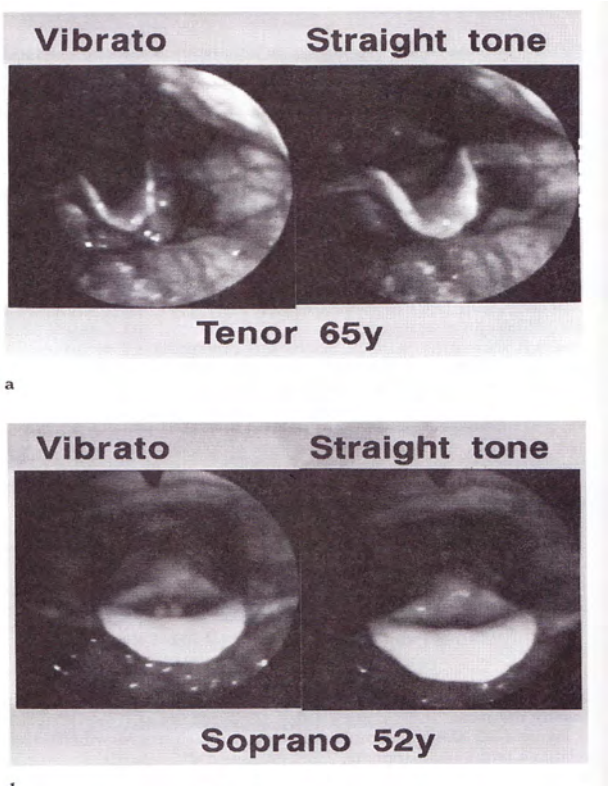


Fig. 2.13 Photographs showing examples of widening the supraglottis for vibrato tone of tenor and soprano (Hirano *et al.* 1995:28)

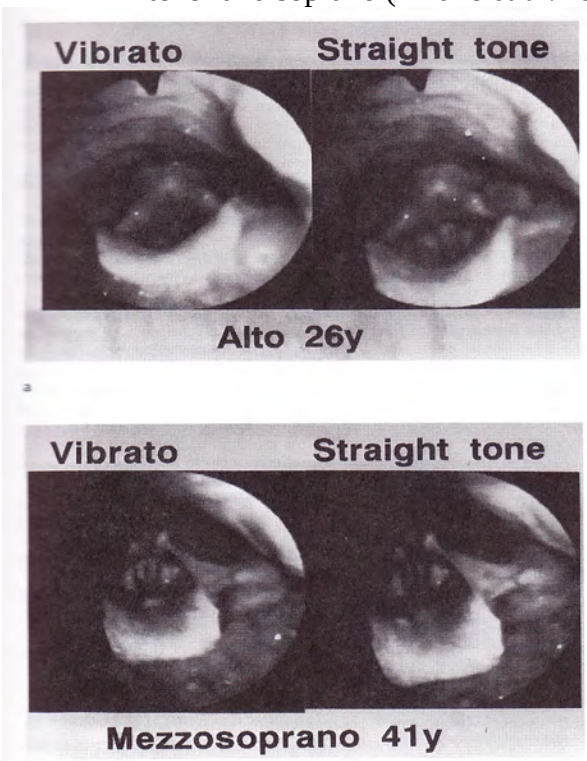


Fig. 2.14 Photographs showing examples of narrowing the supraglottis for vibrato tone of alto and mezzo soprano (Hirano *et al.* 1995:29)

To sustain a pitch, the cricothyroids and vocal folds must pull against one another to maintain the posture of the laryngeal cartilages and the required vocal fold tension to produce the desired pitch. The antagonism involved in sustaining that position, together with the oscillation of tension in the muscles as they flex and release in sympathy with the bioelectric impulses that control them, causes the tension in the vocal folds to fluctuate and thus a vibrato (Kirkpatrick 2008:552).

Healthy vibrato production is said to be a coordination of breath support, air flow and subglottic pressure (Kirkpatrick 2008:555). A study was conducted that measured air flow rates during vibrato and voluntary straight vocal tones. Subjects were asked to sing the vowel /a/ and the air flow was measured by a pneumotachographic system. The findings were that the air flow rate for vibrato was usually 10% higher than that for straight-tones, in all vocal registers. The explanation for this is that the greater average glottal resistance in straight-tone singing results from the constantly working musculature needed to inhibit the vibrato. The physiological control of vibrato was found to be a combined laryngeal and respiratory mechanism with the laryngeal factor most dominant (Large & Iwata 1971:63).

2.6 Conclusion

This chapter has discussed the basic physiology of the processes of respiration and phonation. An introduction to the physiology involved in vibrato and straight-tone singing was also given. The acoustic properties of vibrato are interdependent with aerodynamic and muscle activities related to vocal sound production (Large & Iwata 1976:46). The following chapter explains the acoustics related to vocal production and vibrato.

Chapter Three

Acoustics of vocal production

3.1 Introduction

Vocal production is a physiological activity, but understanding the process of phonation necessitates further scientific explanation. Acoustical concepts central to singing and vibrato production include resonance, pressure and formants. This chapter aims to give a scientific account of the subjective idea of vocal aesthetics and also insight into how humans perceive pitch. The concepts explained and discussed here expand on the physiology of phonation and also pave the way to understanding opinions about vocal health problems and straight-tone usage.

3.2 Acoustics of phonation

Vocal sounds are produced by a regularly pulsating or patterned air flow through the glottis. This train of impulses is the raw material called the voice source or vocal source signal (Baken 1991:19; Sundberg 1995:36). As it is driven by the pressure in the lungs, the flow of air increases gradually, reaches a peak and then decreases suddenly until it stops. After a short pause, the pattern repeats and it is called the "glottal wave" (Baken 1991:20). This is shown in Fig. 3.1.

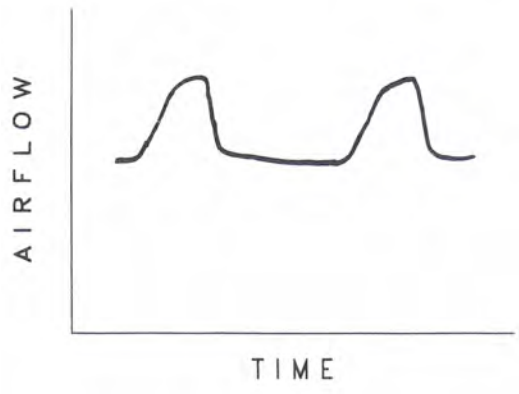


Fig. 3.1 Two successive glottal waves with vertical increasing air flow (Baken 1991:21)

The sudden decrease in air flow creates an impulse-like shock wave which excites the vibration of the air molecules in the vocal tract. The rate at which these shocks occur determines the fundamental frequency[1] of the voice and is measured in hertz (Hz) (Baken 1991:20). The frequency of the voice source corresponds to the vibration frequency of the vocal folds and this determines the pitch (Sundberg 1995:36). The time between the start of one cycle to the start of another is referred to as "period," usually measured in milliseconds (see Fig. 3.7). The intensity of vocal sound is related to the magnitude of the impulses (Baken 1991:20). The larynx delivers a complex wave to the vocal tract which consists of a series of pure tones or harmonics. The amplitude decreases gradually with increasing frequency (Baken 1991:20; Sundberg 1995:36). Therefore, the glottal source signal provides a palette of frequencies which can be selected or filtered by the vocal tract to create the final vocal output (Baken 1991:20).

3.3 Pressure

Pressure represents potential energy which is energy waiting to be released. The higher the pressure, the greater the potential energy. Kinetic energy, or the energy of motion, is another way energy can be stored. The faster gas molecules (in air) move, the greater their kinetic energy. One should consider the flow of air from the subglottal space, through the constriction of the glottis and into the supraglottal space. The input and output of air (molecules) through these spaces are the same and the same number of air molecules passes through each point every second (Baken 1991:25).

When passing through the glottis, the air molecules have to speed up, hence their kinetic energy increases. Total energy (kinetic and potential together) cannot increase, because one cannot create energy out of nothing, therefore, if the kinetic energy increases, the potential energy must decrease. This means that the pressure decreases. Thus, the air flowing through

[1] Fundamental frequency and pitch are not the same although they are related. Fundamental frequency is a physical attribute and pitch is a perception (Baken 1991:20). Any sound waveform that is perceived as having a musical pitch is periodic, in other words, it has a shape that repeats itself. This sound will have a series of harmonics and the lowest of these is the fundamental. The musical pitch of such a sound is determined by the fundamental frequency (White & Louie 2005:167).

the glottis is at a lower pressure than in the wider spaces below and above. This phenomenon is called the Bernouilli effect which plays an important role in the closing phase of the vocal cycle (Baken 1991:26). In Fig. 3.2 the air pressure within the glottis is lower than the spaces above or below it.

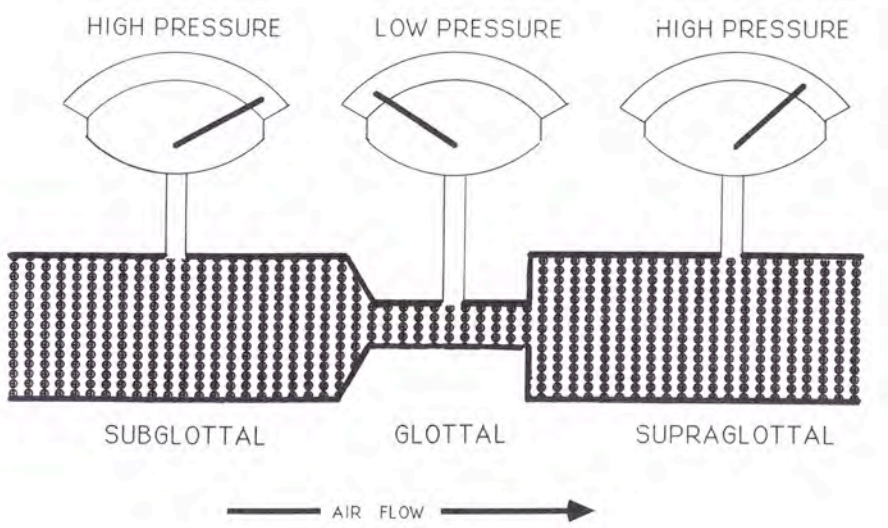


Fig. 3.2 The Bernouilli effect (Baken 1991:25)

Sound is our perception of changes in air pressure (Baken 1991:33). What we hear in a voice is due to the shaping of the vocal source signal by the resonant and filtering actions of the vocal tract. When considering the vocal source signal one must understand something of the source spectrum (Baken 1991:33).

Air pressure can be represented on a sine wave, with pressure on the vertical axis and time on the horizontal. The sine wave can almost totally be characterised by its fundamental frequency (repetition rate) and the extent of its pressure change (amplitude.) Very few sounds in the natural world are simple sine waves, most are complex. Any complex sound, such as that produced by the larynx, is composed of a series of sine waves of different frequencies and amplitudes.

If the repetition rate of the complex wave is perfectly regular, it is periodic. In this case, all the component sine waves will be multiples of the complex wave's fundamental frequency (Baken 1991:34).

3.4 Resonance

Singing teachers and performers may define resonance as a vocal quality that projects well, is easily produced, is felt as a vibration in the mask of the face, and has rich harmonic content. A speech-language pathologist might define resonance more in terms of a function of the cavities of the vocal tract, which selectively amplify and filter the complex overtone structure, after the vocal folds have produced the tone (Salvador 2010:19). Working on resonance essentially means improving the tone of the voice and its projection. Teachers may talk of placement of the voice and bringing the vowels into the mask of the face. Laryngeal relaxation, a relaxed jaw and tongue and enough breath support are all important technical requirements when working on resonance (Salvador 2010:20).

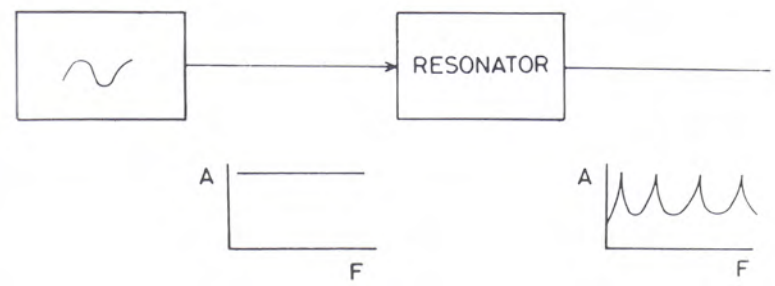


Fig. 3.3 Schematic illustration of the phenomenon of resonance (Sundberg 1991:51)

A resonator is any system that can be compressed and has weight. The air column in the vocal tract is one example of a resonator. Sound in a resonator decays slowly. When one strikes a resonator it will sound for a while instead of the sound stopping immediately. This phenomenon of resounding is called resonance. In the vocal tract, the decay is quite quick but still audible (Sundberg 1991:49). The frequency of the original sound makes a difference to the conditions applied in the resonator. Sounds with certain frequencies pass through the resonator very easily and are radiated with a high amplitude[2] from the resonator. These frequencies fit the resonator perfectly and are called resonance frequencies. Tones with resonance frequencies resound if the resonator is struck. In the vocal tract resonator, resonances are called formants and the resonance frequencies are called formant frequencies (Sundberg 1991:50).

[2] Amplitude is the strength of a signal or sound (White & Louie 2005:19).

Figure 3.3 illustrates the function of the vocal tract resonator. If a sine wave of constant amplitude (A) goes from low to high frequency (F), the frequency-dependent sound transfer of the resonator (vocal tract) imposes great variations in the amplitude. The amplitude culminates at the resonance frequencies (Sundberg 1991:51).

3.5 Formants

The spectograph[3] is valuable in identifying certain aspects of the trained voice which can be classed as formants. A formant can be defined as a region of strong acoustic energy and on spectograms they appear as dark areas. The first formant, found at the bottom of the spectrum, between 500 and 800 Hz in a male voice, is responsible for the "depth" in the singing voice. The second formant which lies between the first and third, is the vowel-defining element (Miller 1996a:278). The third formant is often referred to as the singer's formant and it produces the "ring" of the voice that allows the voice to carry over an orchestra and in a large hall (Miller 1996a:279).

Formants are very important to voice sounds as they determine vowel quality and contribute to individual voice colour. There are four or five formants in the vocal tract of interest. The lowest two determine the vowel colour, while the others are significant for personal voice colour. Singers can change the shape of their vocal tracts by manipulating their articulators such as the jaw, tongue, lips, pharynx and larynx (Sundberg 1991:51).

[3] The spectrograph is an instrument that can be used to measure subjective aspects like "roundness" and "ring". This device provides spectograms, which are graphic representations of the harmonic components of sung phonation. A spectograph shows how a sung pitch always produces overtones or partials which, in trained singers, are between 4000Hz and 5000Hz (Miller 1996a:276). The frequencies of the partials constitute a harmonic series; therefore, the frequency of partial *n* equals *n* times the frequency of the fundamental. This means that the frequency of any partial can be calculated given the frequency of the fundamental. This is particularly relevant to vibrato tones because they vary in frequency (Sundberg 1995:36).

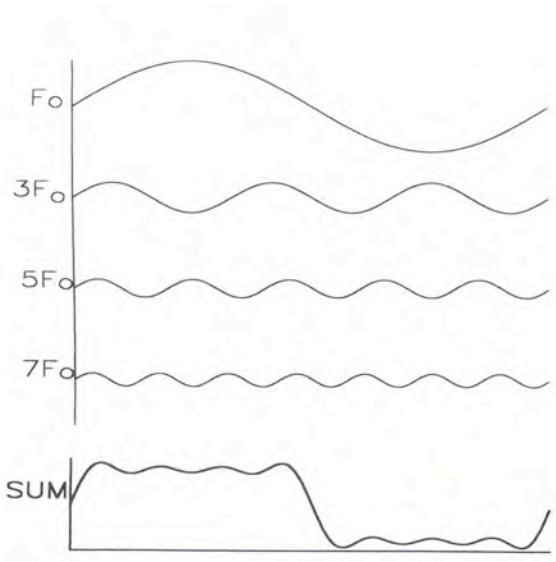


Fig 3.4 A complex sound wave (Baken 1991:34)

Any complex repetitive wave is the sum of sine waves of different frequencies and amplitudes. In Fig. 3.4 the wave at the bottom shows the sum of the four "harmonics" above it. The component sine waves have frequencies 1, 3, 5 and 7 times the fundamental frequency. However, they have different amplitudes (Baken 1991:34).

Formant frequencies have a great effect on the spectrum[4] of the voice as the vocal tract filters the voice source. The spectrum of the voice source is smooth and slopes off at an average rate of about 12dB per octave. The spectrum of a radiated vowel, however, has peaks and valleys because the partials that lie closest to a formant frequency get stronger than adjacent partials in the spectrum. Therefore, the vocal tract resonances "form" the vowel spectrum and hence the term "formants". It is by means of the vocal tract that singers form vowels (Sundberg 1991:52).

Partials that are not multiples of the fundamental frequency create noise in the singing voice. When the singing is clean and noiseless, it produces spectograms with very little data displaying between partials. A picture like this of the ideal characteristics confirms that a singer has sufficient technique to distribute all the acoustic energy within the right regions of

[4] Spectrum, in Physics, can be defined as "the range of frequencies of sound waves" <Merriam-spectrum>. When a signal that varies over time is analysed according to frequency, its frequency domain representation is called the spectrum and its time domain representation is called the waveform (White & Louie 2005:366).

the spectrum. Therefore, the spectograph is very useful in diagnosing and correcting vocal problems such as breathy singing, which alters the balanced relationships between the partials, and pressed singing, which produces noise or undesirable colour (Miller 1996a:278).

In a trained voice, there is considerable acoustic strength in the lower and upper regions of the spectrum regardless of the vowel being sung (see Fig. 3.5). The classical balance of the singing voice means that there is proper balance between upper, middle and lower portions of the spectrum (Miller 1996a:280).

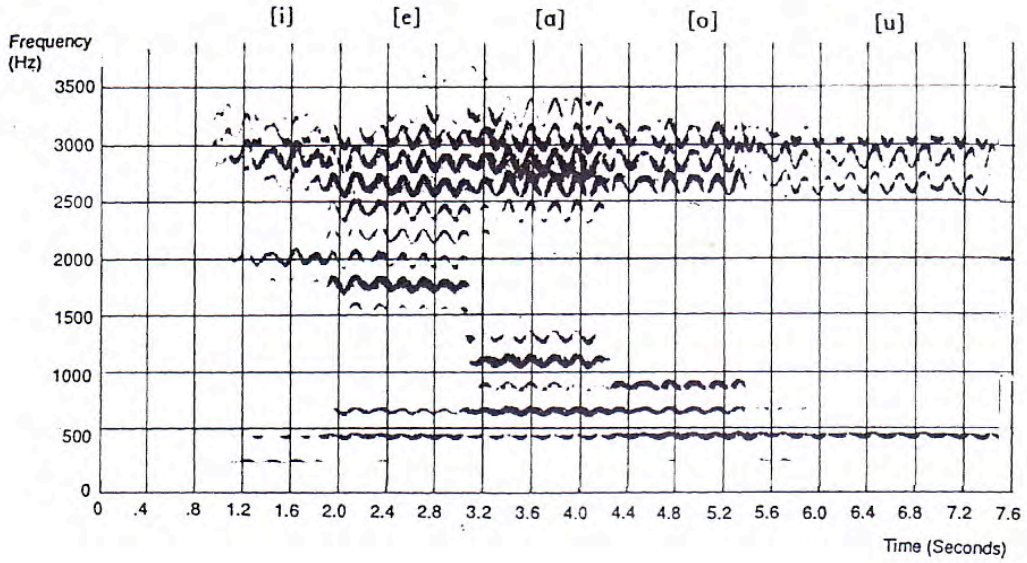


Fig. 3.5 Spectogram of the vowels *i e a o u* on the pitch A3 sung by a professional lyric tenor (Miller 1996a:279)

The partials of the voice spectrum, when travelling from the glottis to the lip opening, are fed through a filter called the vocal tract. This tract is a resonator and its frequency curve is characterised by peaks at the formant frequencies and valleys in between. Therefore, partials that lie close to a formant frequency become stronger than the other partials. This means that the volume (or amplitude) of a partial depends on two things: firstly, the number of the partial and how loudly it was produced, and secondly, how far the partial is from a vocal tract formant frequency. This again is relevant to vibrato as all the partials of vibrato tones vary in frequency and so continuously vary their distance to the nearest formant frequency (Sundberg 1995:36).

The frequency curve of the vocal tract depends, therefore, on the formant frequencies, which are tuned by the shape of the vocal tract. If the tract is narrow in the pharynx and wide in the

mouth, the first formant appears at a frequency as high as, for example, 900 Hz, and if the tube is wide in the pharynx and narrow in the mouth, the second formant may appear at a frequency as high as 2500 Hz. As the formant frequencies depend on the shape of the vocal tract, it is implied that the formant frequencies will be modulated if the vibrato production also involves changing the shape of the vocal tract (Sundberg 1995:37).

Subglottic pressure is the tool for varying the loudness of the voice: loudness is directly correlated with an increase in the subglottic pressure. The acoustical result of this increased subglottic pressure, is that the amplitudes of the source spectrum partials increase, more so for the higher partials than for the lower partials (Sundberg 1995:38). Fig. 3.6 illustrates the process of sound generation.

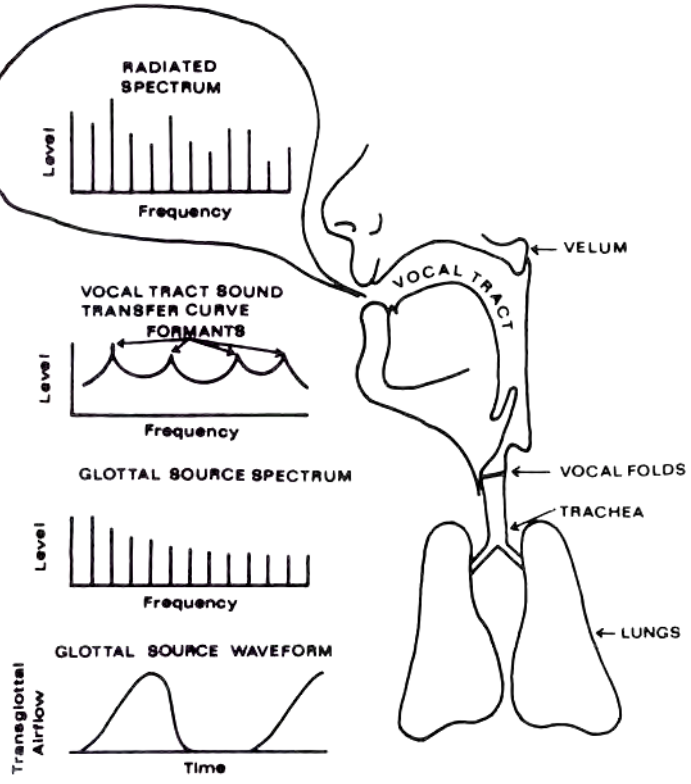


Fig. 3.6 Schematic drawing of the voice organ and generation of vocal sound (Sundberg 1991:50)

3.6 Acoustical description of vibrato

In Western operatic singing, vibrato is an undulation of the fundamental frequency (Sundberg 1995:35). “Vocal vibrato is a periodic fluctuation, which includes variations of frequency amplitude (Hz), rhythm (vibrations per second), intensity (bD), timbre (formants), and/or the relationship between sound and breath” (Isherwood 2009:271). Spectographs of voices are wavy because of vibrato. Through the use of the spectograms singers could be made aware of aspects of vibrato in their singing (Miller 1996a:277).

Since vibrato physically corresponds to a periodic, sinusoidal modulation of the phonation frequency, vocal vibrato can be described according to four parameters: (a) rate (number of undulations per second), (b) extent, (amplitude of waveform), (c) regularity (how similar the frequency excursions are to each other) the more skilled, the more regular and (d) waveform of the undulations (like a sine wave). Of these four, rate and extent have been researched most (Sundberg 1995:39). See Fig. 3.7 for an illustration of these parameters.

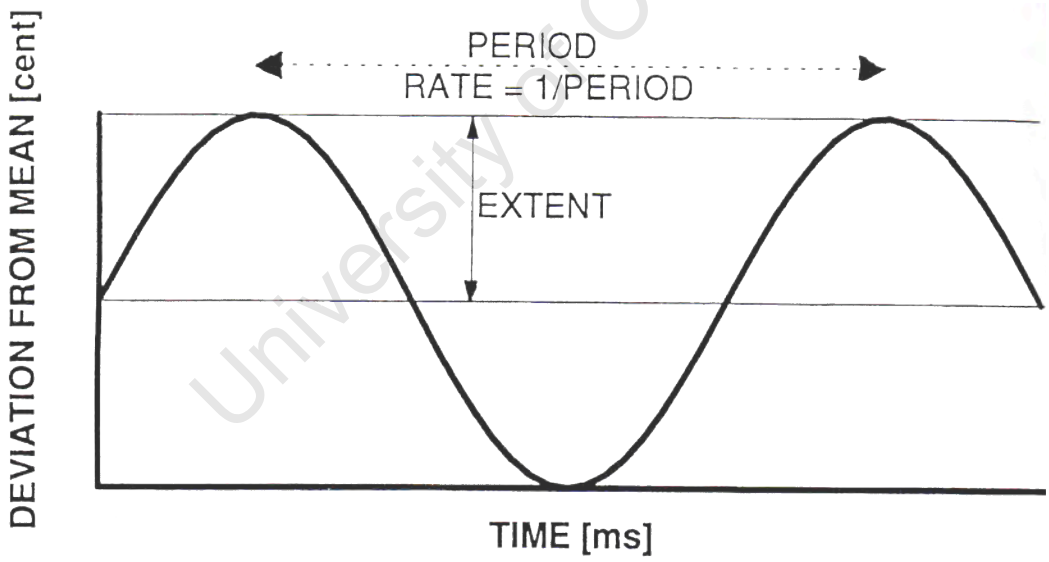


Fig. 3.7 Definition of vibrato rate, period and extent (Sundberg 1995:38)

Vibrato is similar to the trill, tremolo and trillo. Vibrato is characterised by an undulation of the fundamental frequency of about 5–7 undulations per second and an extent of about one semitone. The trill often has a wider undulation sometimes amounting to several semitones. The trill starts slowly and increases in speed ending much like vibrato, but with an

exaggerated extent. The trillo is an ornament found mostly in Early Music where the same pitch is repeated firstly with silent intervals and gradually the repetition rate increases. At the beginning of the trillo, the amplitude varies and the fundamental frequency varies from a wide extent at the beginning towards more vibrato-like at the end (see Fig. 3.8). Vocal tremor seems to be very similar to vibrato in a physical sense; however, the regularity of the fundamental frequency variation seems to be greater in singing (without a tremor or tremolo) (Sundberg 1995:39).

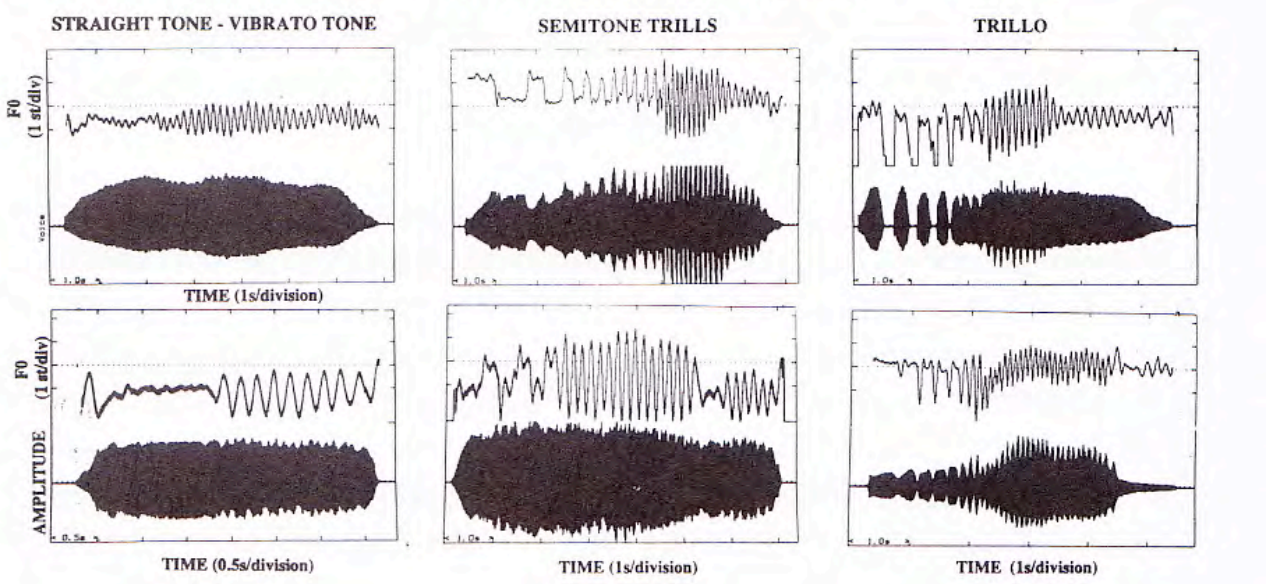


Fig. 3.8 Examples of fundamental frequency (F0) and amplitude patterns during straight-tone, vibrato, trill and trillo as produced by professional singers (Hakes *et al.* 1987:151, 152, 155; Sundberg 1995:40)

The rate of vibrato varies between tones in a song and it can accelerate before changing pitches. Females have a slightly faster average vibrato rate than men. Emotional involvement when singing seems also to increase the rate of vibrato (Sundberg 1995:41). Age tends to have a negative affect on vibrato rate; in other words, it slows as one gets older (Sundberg 1995:42).

In scholarly performances of Early Music, singers are required to have considerable skill in controlling ornaments. A study involving four internationally acclaimed Early Music singers analysed studio recordings of them singing straight-tone, vibrato, trills and trillo. It is conspicuous that there is huge variation in rate and extent of the fundamental frequency

oscillation in these ornaments as performed by different singers. Although the performers who took part in the study are renowned for their precision, there is great individuality between how they produced ornaments (Hakes *et al.* 1987:148, 156). Vibrato is more perceptible in the higher harmonics and since modern methods of singing tend to concentrate energy in the higher harmonics, the vibrato seems more prominent than it probably is (Uberti & Lindley 1981:490). The perception of vibrato and straight-tone is important to understand the aesthetics behind its use.

Vibrato is usually perceived as one pitch (Isherwood 2009:271). Walker asserts that a truly straight-tone does not exist (Walker 2006:41). In a study conducted by Harald Jers and Sten Ternstrøm (2005), graphic frequency plots show that when singers produce a "straight-tone," the tone shows some irregular pulsing, although narrower than in the vibrato measurements. These pulsations are too subtle for the human ear to assimilate, so the tone is perceived as being straight. Therefore, straight-tone singing is merely an auditory perception and not an acoustic reality (Walker 2006:42). Seashore explains the confusion around vibrato use by suggesting that not everybody can perceive it, that it can be perceived as smaller than it really is, that some people assume there is no vibrato present when undesirable or unpleasant types of vibrato have been left out and that people habitually listen to tone quality or aesthetic instead of listening analytically (Seashore 1967:42). These suggestions may also explain some of the historical controversy and debate around vibrato.

There is a positive correlation between loudness and vibrato extent. Pitch can have an effect on vibrato extent especially for some singers in their upper register, where the extent may increase. There is a slight trend for slow rates to correspond with wider extents (Sundberg 1995:43, 44). Choral singers, for example, have an irregular vibrato with an average extent of about 0.1 of a semitone. In a study involving eight male singers who were proficient solo and choral singers, the two different modes of singing were compared. It was found that in solo singing, their fundamental frequency was softer than in choral singing, but the singer's formant was louder and this is attributed to the differences in sound pressure level, glottal voice source and articulation (Rossing *et al.* 1986:1975–1980).

A pleasing vibrato is said to have fundamental frequency undulations of between 5 and 7 per second. If lower than 5, it sounds unacceptably slow and if quicker than 8 it sounds nervous. Extents that exceed two semitones are undesirable particularly when combined with a slow

rate (Sundberg 1995:50). Mostly, a vibrato would be less than about one semitone in extent. The undulations of the fundamental frequency cause the frequencies of the harmonic partials to undulate in synchrony. Therefore, undulations happen in the overall amplitude of the tone (Sundberg 1995:50).

Ramig and Shipp analysed the vibrato produced by nine opera singers and compared it to the vocal tremor of patients with Parkinson's disease, amyotrophic lateral sclerosis, spinal muscular atrophy, essential tremor and adductor spastic dysphonia. It was found that vocal vibrato in singers is part of the same continuum as vocal tremor in patients (Ramig & Shipp 1987:162). This does not mean that vibrato and tremor would have the same neurological origin, merely that many physiological adjustments can result in the same or similar acoustic output (Ramig & Shipp 1987:166).

Since the pitch in a vibrato tone constantly moves up and down, the question arises as to which pitch the listener perceives. Also, since the vibrato is a combination of pitches, one may ask whether a pitch without vibrato is more accurately and precisely perceived (Sundberg 1995:51). In a study by Sundberg, subjects were first asked to match the pitch of vibrato tones and then the same subjects were asked to match the pitch of vibrato-free tones. This method made it possible to determine the extent to which the accuracy of the pitch perceived was affected by the vibrato. Results indicated that vibrato did not reduce the certainty with which the subjects perceived the pitch (Sundberg 1995:52). However, in a study involving children's perception of pitch, there were more positive responses to straight-tone pitches. Kindergarten children were asked to match pitches from a child with 100% pitch accuracy, an adult female singing with a straight-tone with 100% pitch accuracy and the same adult singing with vibrato with 79.53% pitch accuracy. Children with different levels of certainty in singing abilities were included in the pitch-matching exercise. Responses to the non-vibrato model were the most consistently accurate across the board of children with certain and uncertain singing skills (Yarbrough *et al.* 1992:30).

The changes in pitch found in vibrato are so quick and the variation is usually not so far from the actual pitch, therefore the listener will grasp the tone as a whole. For example, one of Caruso's tones, when measured on sound waves shows a vibrato crest at C sharp and a trough at B, but most observers perceive the pitch to be C. As long as the fluctuations of pitch in a tone fuse into a steady average pitch, it is believed that the variation in pitch will be

acceptable (Metfessel 1929:218). However, another study, where 30 musician and 30 non-musician participants (nearing adulthood in age) had to match a generated tone to a musical tone performed with vibrato, it was found that neither group located the pitch of the vibrato tone at the average of the frequency fluctuation. Also, the responses from non-musicians generally perceived the vibrato pitch at a lower frequency than the musicians. Therefore, it can be inferred that the aural perception of vibrato can depend on a person's musical training (Brown 1991:15, 27).

Musical intervals are often expressed in cents which is a unit of pitch based upon the equal tempered octave such that one equal-tempered semitone is equal to 100 cents <Hyperphysics-cents>. In a study measuring the average vibrato extent of 25 singers singing Schubert's *Ave Maria,* from selected pitches in the song the average deviation from the actual pitch was about 71 cents. In this study, a tone's vibrato extent was found to have a negative correlation with tone duration (shorter notes had wider extents) and a positive correlation with intonation (intonation improved with a wider extent) (Prame 1997:616.) These results are contrary to the expectation of a wider vibrato on longer notes than shorter ones and a greater variation in pitch or wider vibrato extent having a negative effect on intonation.

In artistic singing, there are certain characteristics of vibrato that have the most positive effects on the listener. The first ideal is to have a constant vibrato that is continuous through the singer’s entire range. Secondly, the amplitude and intensity of the vibrato should not be obtrusive to the ear but have enough intensity to be heard (Schoen 1926:288).

There are specific qualities of the complex sound signals that a singer makes which cause us to hear the voice as beautiful. They are, having a smooth, balanced, clean, projected, consistent and comprehensible signal. The smooth signal refers to an even, continuous vibrato of moderate rate and extent. A balanced signal means that both bright and dark frequencies are heard in the sound. The signal must be clean; in other words, there should be no random frequencies heard that do not relate to the natural harmonic overtones of the fundamental pitch. A projected signal is one that has a high percentage of overtones in relatively high pitch ranges which are easily amplified in our ears. The signal needs to be consistent in all the areas mentioned, as it passes from pitch to pitch, range to range and loud to soft. Lastly, a comprehensible signal allows the consonants to be heard naturally and intelligibly (Robinson 2001:7, 8). All these qualitites of consistency and balance in a singer’s vibrato contribute to

an ideal vocal sound.

Apart from contributing to the aesthetics of sound, Sundberg (1995:58) suggests three reasons why vibrato is useful to singers:

a) When singers hear several tones at the same time in consonant intervals such as thirds, fifths and octaves and perceive this as inaccurate, they come to this conclusion not only through pitch perception, but also through beats. If an interval is sung slightly out of tune, beats occur: the beats are quick for a large error in tuning and slow for a smaller error. If the interval is sung with vibrato, no beats occur. Therefore, vibrato eliminates beats that occur when a consonant interval is not produced in accordance with pure tuning.

b) Vibrato can possibly make the voice more discernible against a loud orchestral backing. Vibrato causes the partials to vary in amplitude and it is likely that a signal with strong high partials that vary in amplitude is more readily detected than a signal with a constant spectrum.

c) Vibrato is often missing when a singer has phonatory problems. Furthermore, vibrato tones use less glottal adduction and vibrato-free tones use less air flow. This may indicate that when singing with vibrato, the voice production is not so pressed or over-adducted as in straight-tone singing. The vibrato may be a way for singers to solve difficult vocal tasks without apparent difficulty in meeting artistic and aesthetic goals.

Acoustical concepts have been explained in this chapter in order to further understand the working of the human phonatory system. The human perception of vibrato that has been described can help in diagnosing vocal faults. The aesthetics and usefulness of vibrato have also been delineated in scientific discussion.

Chapter Four

Vocal health

4.1 Introduction

The use of straight-tone singing is claimed to be a vocal fault (McKinney 1994:199; Kirkpatrick 2008:551) and excessive application is said to cause strain (Smith 2002:41). It is therefore important to understand how strain occurs physically in the glottis. As a starting point the characteristics of normal functioning of the vocal folds in phonation should be understood. Knowledge of other breakdowns or faults in the phonatory system is also useful in achieving a wider understanding of vocal health.

4.2 Characteristics of healthy functioning vocal folds

In order for vocal folds (also known as vocal cords) to vibrate efficiently, certain characteristics of normalcy should be present. Firstly, the midline of the folds should be closed during phonation. If the folds cannot meet at the midline, air escapes and the voice becomes breathy. Secondly, the top, edge and bottom of the folds need to be elastic and pliable. Changes in this pliability, even in just one spot, can cause voice disorders like scarring. Thirdly, the tension of the vocal folds should be just right and adjustable. If there is an inability to adjust the tension, the singer will fail to reach high notes or will experience breaks in the voice. Lastly, the mass of the vocal folds needs to be just right too. If the soft tissue of the folds is denatured by scarring or swelling, hoarseness may occur as well as altered voice pitch or effortful phonation <Voiceprob-understand>.

Breakdowns in normal vocal functioning can affect the air pressure system, the vibratory system as well as the resonating (vocal tract) system. If the airflow source is not strong or inefficient, the voice will be weak and hampered by shortness of breath. Singers with lung conditions will find it hard to speak loudly or for long periods of time. In the vibratory system, patients with stiffness in the vocal folds, caused by swelling, develop hoarseness. When vocal folds do not approximate properly, air leaks through and the voice becomes breathy. In the vocal tract, when nasal sinuses are swollen and inflamed, the voice becomes nasal <Voiceprob-breakdowns>.

4.3 Vocal misuse and abuse

Most phonation disorders are caused by faulty use of the larynx and are known as functional voice disorders. Vocal misuse and abuse are two such faulty behaviours. Vocal misuse is a behaviour that distorts the effective and efficient working of the phonatory mechanism and effects change in the quality of the voice. The following behaviours, when used habitually, constitute misuse: increased tension or strain in the larynx (including high laryngeal position, hard glottal attack and laryngeal squeezing), inappropriate pitch and loudness, excessive talking, ventricular[1] phonation and aphonia and dysphonia[2] of psychological origin.

Vocal abuse is defined as inappropriate, excessive and harmful vocal practices (Boone 1983:2; Andrews 2006:280). Abusive activities include excessive, prolonged intensity, strained and excessive use of the voice during swelling or inflammation, excessive coughing or throat clearing and shouting and singing with bad technique (Boone 1983:2; LaPine 2008:25; Colton *et al.* 2011:88). Vocal abuse or misuse can also occur after long periods of talking or singing, singing outside of a comfortable range for too long and projecting in acoustics that are not ideal (LaPine 2008:26). The line between vocal misuse and abuse is rather thin. A pattern of misuse behaviour over time may lead to abuse and possible tissue change (Colton *et al*. 2011:85).

If the folds vibrate continuously with excessive force and duration (abusive behaviour), excess fluid starts to accumulate in the folds. This excess fluid increases the mass of the fold and leads to a slower vibration and, therefore, producing a lower pitch. The singer may then try to produce sounds with greater effort which can worsen the situation. A similar sequence over a long period of time can lead to abrupt contact of the edges of the vocal folds, which can cause the folds to change shape. Changes on the edge of the folds can further increase its mass and contribute to the folds' not approximating properly. When the folds are not closed

[1] Ventricular phonation is the use of the false cords for phonation and is also known as dysphonia plicae ventricularis (Wilson 1987:57).

[2] Aphonia is the complete loss of voice as a result of surgery or emotional stress (Peters 2002:46). Dysphonia is defective production of vocal sounds as a result of disease or damage to the larynx or the nerve supply to the larynx (Peters 2002:187).

properly, they may only make contact on the thickened parts, which allows air to escape through the gaps and creates a breathy tone quality. The increased mass also contributes to the perception of the pitch being lower. This breathy and low sound is often described as hoarseness (LaPine 2008:26).

Positive alternatives to vocally abusive behaviours can be found in a four-step vocal hygiene programme. The first level of such a programme would tackle behaviours such as throat clearing, whispering, grunting or noisy vocalisation, yelling, screaming or talking loudly, noisy environments, excessive talking, caffeine consumption, systemic dryness, environmental dryness and inadequate rest or sleep (Heuer *et al.* 2006:235–236). The next level of treatment of vocal problems would be to identify and address behavioural problems in the singing technique. The therapeutic tools for this may include changing behaviour with drills, practice material and other small step changes in behaviour to do away with inappropriate action and reinforce more natural and correct actions. In this step of treatment, exercises in breath control, note attack, oral resonance, tone focus or placement, glottal fry, loudness versus projection, prosody,[3] pitch, bridging exercises[4] and recitative can be focused on (Heuer *et al.* 2006:236–244). The third level of treatment has to do with managing emotional stress and therapeutic tools involve a focus on relaxation (Heuer *et al.* 2006:244–247). The fourth level of treatment would be to consult a mental health professional (Heuer *et al.* 2006:247–248).

4.4 Analysis of voice problems

Efficient vocal fold vibration is a dynamic blend of correct muscular contraction and balanced respiratory support. When the contraction of the muscles or air support is changed either systematically or actively, the movement of the vocal folds is affected. A variety of physical changes, including acute illnesses, may also affect the mechanism of the larynx and change the nature of the vocal tone as discussed in Section 4.6 (LaPine 2008:25).

Singers need to be constantly aware of how their voices are working in terms of both breathing and action of the vocal folds. The human voice can be analysed subjectively (pitch,

[3] Prosody is a linguistic term referring to "the patterns of stress and intonation in a language" <Freedictionary-prosody>.

[4] Bridging exercises are designed to bridge the gap between speaking and singing and may consist of slides or siren sounds and lip trills (Heuer *et al*. 2006:243).

loudness and quality) and objectively (frequency, intensity and amplitude). The subjective analysis of voice production is more common than the objective because measuring instruments such as spectograms and stroboscopic equipment are not readily available. Pitch could be too high or low for a particular age or gender of the singer, loudness could be too loud or soft for the environment. A negative quality or lack of tone clarity could be described as hoarse, breathy, strident, strained, metallic, stuffy or nasal. Resonance has also been used to describe vocal quality. Even though these poor vocal qualities are not all agreed upon in terms of their definition, there is a clear relationship between poor vocal quality and physical health (LaPine 2008:24).

There is a strong correlation between the physiology of the vocal folds and acoustics and acoustic analysis could be beneficial in objective diagnosis. Many acoustic signs relating to fundamental frequency or amplitude may be associated with any given vocal pathology. Acoustical parameters can be measured by various instruments, such as the spectograph mentioned in Chapter Three, or computer programs (Colton *et al.* 2011:20). Other measurable physiological signs of vocal pathology are aerodynamics (including air flow and pressure), vibratory behaviour (to do with vocal fold contact and mucosal wave) and muscle activity (which can be recorded by electromyography)[5] (Colton *et al.* 2011:27).

4.5 Hypofunction and hyperfunction

Hypofunction is the lack of sufficient action, while hyperfunction is excessive action. Hypofunction in the voice is due to not enough activity in the laryngeal mechanism and is primarily caused by insufficient closure of the vocal folds, resulting in a breathy tone. The reasons for this lack of proper closure and resultant breathy tone are several: poor posture, shallow breathing, lack of suspension phase of breathing,[6] singing too softly, wrong vocal modelling (imitating singers with unhealthy singing habits), failure to recognise good vocal quality, lack of involvement in the music and timidness or other personality factors (McKinney 1994:82–83). Hypofunction of the singing muscles can cause irregular vibrato rhythms and "wobbling-like" changes of pitch, colour and intensities. These problems are

[5] Electromyography is a recording of electrical activity in muscle. Electrical activity is measured during rest and activity through small electrodes attached to the skin or needle electrodes inserted into the muscle (Peters 2002:198).

[6] The suspension phase of breathing is the time between an inhalation and an exhalation when the support muscles start working (McKinney 1994:50).

common among female singers who have sung with a soft, weak falsetto voice for years (Gu 1995:147). Ways to correct hypofunctional phonation include humming, using more energy by singing louder, using more energy with gentle lifting exercises, imitating an opera singer, establishing good posture and breathing habits, activating the breath support mechanism by exercises, projecting, becoming involved in the music and showing emotion, adopting correct tonal goals by listening to good singers, vocalising on forward vowels, vocalising with nasal consonants and imitating a tight sound as a means to an end (McKinney 1994:86).

Hyperfunction (excessive contraction) of the singing muscles used in the abdomen, chest, neck, larynx and mouth can affect the voice negatively and often occurs when students misunderstand the concept of support and therefore use too much strength to create a hard and inflexible support base (Gu 1995:146). Hyperfunctional phonation means demanding too much from the laryngeal mechanism and the vocal folds approximate too tightly together. This causes a tight, pressed, tense, hard, edgy or strained sound (Boone 1983:6; McKinney 1994:87). When this is coupled with hyperfunction in the breathing system, the sound quality becomes harsh, strident, raspy, grating, rough, constricted or even strangulated (McKinney 1994:87).

If hyperfunction is allowed to persist, it may result in serious vocal problems that require the attention of a medical specialist (McKinney 1994:87). Physical signs of respiratory hyperfunction are an obviously distended abdomen, a “fixed” thorax, elevated shoulders with the associated neck muscles in a hypertonic[8] state and the neck pushed forward when taking a big breath (Boone 1983:5).

The pitch, volume and timbre of the vibrato in hyperfunctional phonation often can be irregular and diminished in undulation. However, some singers who push the chest and abdomen muscles in order to make a big, rich sound cause an excessively undulating vibrato in pitch and timbre. Hyperfunction of the muscles of the larynx (internal and external), the neck muscles and the mouth may induce an irregular rhythm, a nearly straight-tone or tremolo or even a spasmodic bubbling vibrato. Hyperfunction of the tongue can also cause a big and strange vibrato in which the undulations of the timbre and pitches are exaggerated (Gu 1995:147).

[8] Hypertonia is increased rigidity in a muscle causing continuous muscle spasm episodes (Peters 2002:293).

Causes of hyperfunctional phonation include singing too high or too low, singing or speaking in a noisy environment, singing or speaking too loudly and with too much force, screaming, shouting or yelling, having the wrong concept of breath support, incorrect breathing techniques, postural tension and rigidity, wrong vocal models and tension from personal problems such as fear, inferiority, insecurity, embarrassment etc. (McKinney 1994:89). Ways to correct hyperfunctional phonation include doing exercises for relaxation of general body tension, providing a studio atmosphere conducive to relaxation and self-confidence, establishing good posture and breathing habits, reducing excess tension in the support mechanism, maintaining the beginning of the yawn position, exercises for balanced or soft attack, making the student aware of desired tonal goals, vocalising with consonants that help to free the jaw and deliberately using a breathy sound as a means to an end (McKinney 1994:92).

Vibrato faults often result from hypertension in the singing muscles. The following methods are useful to relax the muscles and correct the faults:

a) combining deep abdominal inspiration with short and sharp inspiration and exhalation, like a dog's panting;
b) vibrating or shaking the larynx, neck or lower jaw to remove a spasmodic vibrato and improve the focused singing voice;
c) singing while pulling the lower lip can relax the hyperfunction of the mouth;
d) singing while sticking the tongue out can ease a vibrato problem due to the tension of the tongue (Gu 1995:148).

4.6 Medical issues affecting the larynx

Hoarseness is a very common complaint of patients seeking voice therapy. It is usually associated with an acute inflammation of the vocal cords. As hoarseness progresses, phonotrauma[9] and inappropriate compensations made because of vocal fold swelling can lead to chronic inflammatory conditions. Hoarseness also may be related to systemic[10] disease, chemical irritation, neurologic conditions or trauma. Hoarseness may start as a result of an infection or trauma (like persistent coughing), but it is how the patient uses the already hoarse

[9] Phonotrauma is "any abuse or misuse of the vocal folds, most common in those with professional voices, which gives rises to various lesions–eg, polyps, nodules, degenerative polyps, cysts, varices, papillomas, and other benign conditions" <Medicaldictionary-phonotrauma>.

[10] Systemic means something that affects the whole body rather than a specific part of it (Peters 2002:537).

voice, when the folds are swollen and irritated, that can lead to full-blown vocal disorders. When the mucosa of the larynx is dry, it increases the risk of irritation and injury (Andrews 2006:280).

Vocal nodules or polyps are both benign masses that develop usually on a specific part of the vocal cord. They are both brought on by excessive force, strain or harmful use of the folds over a long period of time. Both cause low pitch phonation, breathiness and other changes in voice quality. The type of nodules that singers usually experience are soft, fleshy, pink and pliable which can reabsorb into the fold after conservative voice rest. These types of nodules are sometimes called screamer's nodules because they result from brief, short-term vocal abuse or misuse. A trained singer should, in theory, never experience long-term vocal abuse or misuse. The way to manage use-related lesions (polyps or nodules) is to identify and eliminate the behaviour that causes them (LaPine 2008:26). With the proper identification and treatment, taking careful note of individual behaviours, the voice should return to normal quickly (LaPine 2008:27).

During a persistent cough the vocal folds are abruptly compressed with a repeated, forceful glottal attack. This compression increases the fluid lying over the thin layer of mucus that covers a healthy vocal fold, leading to powerful, abrupt contact of the edges of the vocal fold. This forceful contact leads to oedema or swelling. The oedema decreases the vibratory rate of the vocal fold, leading to lowered pitch. Together with the persistent cough, a person often complains of feeling that there is something stuck in the throat, or a globus sensation. This can lead to even more throat clearing which can further injure the vocal folds (LaPine 2008:27).

Post-nasal drip can accompany allergic reactions as well as the common cold. It can lead to persistent throat clearing because of the globus sensation. Throat clearing causes abrupt, redundant glottal attack which is created when air pressure builds below the folds. This buildup of pressure causes the folds to compress together tightly to withhold the pressure; then the folds are blown apart with force and this is a harmful sequence in vocal fold motion. The repetition of this sequence leads to vocal fold swelling and possibly some changes in vocal production. Throat clearing is associated with rapid, forceful attack of voice and leads to vocal fold swelling which makes the folds heavier and thus a decrease in pitch. Hydrating can assist thin secretions and increase swallowing, which has a massaging affect on the larynx

(LaPine 2008:27).

Musculoskeletal stress particularly in the chest and neck, can manifest in a tight vocal tone and limited vocal range. Musculoskeletal tension can displace the larynx and ultimately affect the balance of elasticity in a laryngeal muscle. This tension affects the extent to which the extrinsic and intrinsic laryngeal muscles can regulate the length of the vocal cords and may lead to a muscle tension dysphonia. The excessive contraction of the extrinsic laryngeal muscles changes the mass, length and tension of the vocal folds. Sound becomes difficult to produce and one might complain of vocal fatigue or tension-fatigue syndrome. Muscle tension dysphonia causes difficulty in initiating sound, sustaining sound and an inability to produce sound reliably (LaPine 2008:27). Musculoskeletal tension can be a primary or secondary cause of dysphonia. The tension may be the original cause of the dysphonia, or it could be related to the compensations the patient makes as a result of physical problems (Andrews 2006:281).

Gastroesophageal Reflux Disorder (GERD) is associated with stomach secretions that escape into the esophagus and then pool on or near the vocal folds. These secretions are caustic and cause the vocal folds to become inflamed. The inflammation changes the mucosal edges of the vocal folds and creates an unwanted vocal change like glottal fry, making the voice sound hoarse or raspy. Treatment of GERD by a medical professional should let the voice return to normal functioning (LaPine 2008:27).

Contaminants such as any type of smoke should be avoided. They can dry out the mucosa of the larynx. In smokey performance environments it is useful to leave the environment every so often to rest the voice. Extra hydration with water can also help (LaPine 2008:27).

4.7 Suggestions for good vocal hygiene

The best precautionary measures against vocal dysfunction are producing a healthy, relaxed, easy vocal tone as well as drinking enough water and sleeping enough (LaPine 2008:25). Good hydration is one of the most important things for maintaining vocal health (LaPine 2008:27). However, Miller cautions that good hydration should happen before and after singing and not constantly during a performance because of the singer's anxiety-related dryness (Miller 2004:177). Rest of the voice is important after demanding use or surgery.

Complete voice rest, for example, after surgery means not singing or speaking, not even coughing or yawning out loud. Conservative rest is, for example, sixty minutes of quiet talking after a performance. Whispering, however, should be avoided (LaPine 2008:28).

Good posture makes it easier for the voice to work. Tilting or turning the head can alter the configuration of the airway and change the effort needed in singing. It is important not to ignore pain in the larynx. If vocal quality is affected together with experiencing pain, a person needs medical attention or adjustment of technique. Singers should be aware of the Lombard effect, which is to increase the volume level of speaking or singing when the environmental noise is increased in order to hear themselves better (LaPine 2008:28). Louder phonation over a long duration can lead to strain.

For singers it is useful to know what symptoms or warning signs of vocal pathology to look out for in their singing. Increased effort and loss of endurance can be a result of mucosal damage and singers suffering from this will feel as though their singing has become heavy and laboured. They lose their stamina in singing and it takes longer to warm up the voice. High notes and flexibility become difficult and the voice tends to become louder and "harder," which could bring about a change in repertoire for the singer or even a change in classification (Davies & Jahn 2004:128).

Impairment in high notes or (often in the case of men) in the passaggio can be a result of vocal fold swelling, making it very difficult to sing high and softly. Sometimes singers will try to mask the swelling by pushing the chest voice higher through the passaggio, but this is altogether undesirable (Davies & Jahn 2004:129). When a singer notices excessive airflow, breathy onsets and a tendency to run out of air, this can be the result of poor technique or it could be from muscle tension dysphonia (a high laryngeal position and failure of the cords to close properly). If high singing is accompanied by breathiness, this could be a result of mucosal swelling. Singers can notice an unpredictability in their voice when suffering from mucosal injuries, and this could have a negative emotional effect on the singer, such as lack of confidence when singing. Larger than usual fluctuations in vocal capability over time, especially in highly trained singers, can be a result of vocal fold swelling (Davies & Jahn 2004:130).

If squeaky sounds begin to emerge, sometimes higher than the singer's normal range, it is not

a sign of a “whistle” register (the voice's very highest register) or great vocal skill, but a result of stiffness in the swollen folds. The latter causes a dampened oscillation, which means that the vocal folds are vibrating in a segmental fashion. Multiple simultaneous fluctuations can also occur at different frequencies in front of and behind the restricted sections and this results in a perceived diplophonia.[11] Sung notes that lack brilliance, clarity and resonance and take on a hoarse, harsh, raspy or gravelly quality, should raise suspicion of swelling in the folds. If the speaking voice is also affected it means that the situation is serious and the swelling has progressed beyond mild (Davies & Jahn 2004:130).

Changes in vibrato can be a good indicator of underlying pathologies in vocal dysfunction. If the vibrato becomes slower and the extent widens or becomes unsteady, these are indicators of excessive and/or faulty muscular movement (Davies & Jahn 2004:131). When a singer experiences swelling they may try a multitude of different compensating habits, often unconsciously. They will add muscular effort to their singing and this can contribute towards pathological problems. Constricting the pharynx, supra-laryngeal valving or tightening, “clamping” with the false vocal folds, squeezing in the back of the throat, drawing the tongue back, tucking in or over-extending the jaw, attacking sound with a grunt, scoop, glottal shock, pinch or aspiration are all habits that can be difficult to get rid of once they are relied upon (Davies & Jahn 2004:131).

There are tasks that a singer can perform to detect early signs of swelling and generally monitor the voice. They are not, however, a conclusive measurement of diagnosis and if they are poorly performed, the singer should consult a medical professional. These tasks include singing legato and staccato very softly in the upper range of the voice (see Fig. 4.1) (Davies & Jahn 2004:132). Men should focus on the passaggio, the light chest and the lower falsetto range. Women should focus on the upper section of their voice. Singers should try to produce the least amount of sound with the most accuracy and clarity (Davies & Jahn 2004:133).

[11] Diplophonia is double vibration in the vocal mechanism, for example, one vocal cord vibrates at a noticeably different rate from the other cord (Wilson 1987:343).

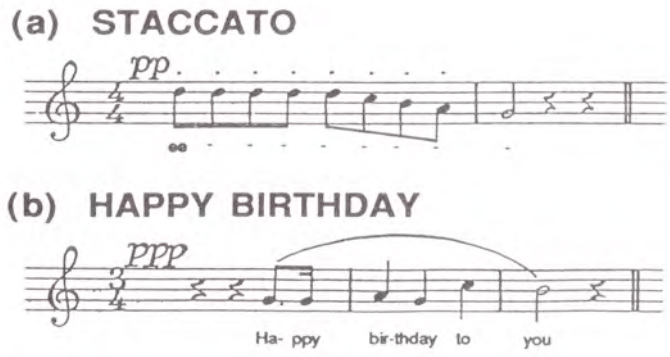


Fig. 4.1 Suggested vocalises (Davies & Jahn 2004:132)

A singer should suspect mucosal swellings if these tasks in Fig. 4.1 can only be produced loudly. If breathiness increases as pitch increases while singing the tasks, this can also be a sign of swelling. Other indicators of swelling when performing these tasks are the perception of delayed phonatory onsets (DPO) and intermittent aphonia (IA). Staccato is likely to expose the former and legato the latter. DPO is seen to be the lagging of the voice by a fraction of a second or longer behind when it should have started and can start with a hiss of air. IA means that sound stops sporadically for a fraction of a second or longer. These stoppages may be silent or contain some leaked air. (Davies & Jahn 2004:134).

4.8 Vocal faults related to vibrato

A good vibrato should have both intensity (loudness) and pitch variation. Intensity changes as a result of the periodic amplification and rarefaction[12] of the overtones with the fundamental. Pitch change results from the action of nerve impulses that act on the intrinsic muscles of the larynx (Brown 2008:96). As explained in 2.5, when the muscular coordination of antagonistic muscle groups involved in singing is in adequate balance, there will be small movement in sympathy with the oscillations of the bioelectric system powering the body, which results in vibrato (Dejonckere 1995:7; Kirkpatrick 2008:552). Good muscular pulsation happens automatically and one's psychological state can affect the achieving of this balance (Dejonckere 1995:7). Vibrato is not only a result of muscle tremors; aerodynamic properties such as velocity and quantity of air passing through the glottis affect the speed of vibrato oscillations. Vibrato is a delicate balance between airflow and subglottic pressure (Kirkpatrick

[12] Rarefaction is a trough or decrease in air pressure caused by the passage of a sound wave. Air particles pressed together (compression) is the opposite of rarefaction where they are spread out (Everest & Pohlmann 2009:4, 5).

2008:552). Breath support is a major element of controlling one's vibrato. Support is not only breath management but also the control of the valve action of the glottis while singing (Kirkpatrick 2008:553).

When vibrato becomes irregular or its extent is too wide or when the frequency is too slow or too fast, it becomes objectionable (Dejonckere 1995:7). An irregular vibrato means that the coordination is out of balance and patience is needed to gradually improve on the singer's technique. When the singer is singing healthily, they should have a normal vibrato. There is no way of controlling vibrato directly. If a singer gets the correct concept of vibrato quality in their mental ear it might be possible to control it indirectly (Vennard 1967:194).

A tremolo or bleat results from too much glottal pressure and too much airflow (Miller 2004:126 & Kirkpatrick 2008:555). Also, if the muscle activity in the larynx is too intense, violent tremors can occur which result in a jittery tone and visible shakiness (Kirkpatrick 2008:552). A bleat can result from trying to sing too loudly. Softer singing, sighs and decrescendos can help to remedy the fault (Kirkpatrick 2008:555). Also, if asked to think of a straighter tone, the singer might remove some of the pressure at the glottis (Miller 2004:126). In Italian-trained voices, sometimes the air pressure used is too high and the voices tend towards tremulous vibrato (Miller 2004:127).

In the case of too slow a vibrato, or wobble, thinking of a straight tone is not useful. A wobble results from too little energy in the singer’s body (Miller 2004:126). If all muscles relax so much that there is too little antagonism, the body becomes slack and the singing sounds feeble and under-energised (Kirkpatrick 2008:552). It could also be caused by applying too much pressure for dramatic effect or a big tone. In other words, there is too much subglottic pressure in relation to airflow and the tone becomes pressed (Kirkpatrick 2008:555). If too much weight or dark quality is carried up through the range the voice will eventually develop a wobble (Brown 2008:96). Some German-trained singers show a slower vibrato rate than Italian-trained singers. This is because of a tendency in the north and east European teaching method to artificially darken the voice which results in a slower vibrato rate through excessive protruding of the stomach wall and dropping the jaw and larynx too low (Miller 2004:127).

To treat a wobble, the singer should be given short, energetic and agile motifs to inspire greater flexibility and freedom in the voice and conclude the motifs with a sustained note,

retaining the same energy (Miller 2004:126, 127). The singer could also be asked to produce exercises with quick crescendos which will require them to lighten their vocal production a little and engage the exhalation muscles more intensely. Lightening their tone should make it less pressed and will allow more airflow, and engaging the exhalation muscles more should increase the speed of air through the glottis, producing a more youthful-sounding vibrato (Kirkpatrick 2008:555).

Faux vibrato is similar to wobble and happens when a singer forces a vibrato with pulses of the abdominal muscles. This is particularly difficult to correct as it usually occurs in response to being told to sing with vibrato or to mimicking a sound that they do not understand. It is useful for a singer with a *faux* vibrato to try to sing with a straight-tone or practise the *messa di voce*[13] (Kirkpatrick 2008:555). The *messa di voce* is a useful exercise for exploring the dynamic capabilities of the voice as well as discovering the relationship between air flow and subglottic pressure (Kirkpatrick 2008:555).

The absence of vibrato, or a straight-tone is referred to as "a symptom" of tight or unhealthy sound production (McKinney 1994:88). If one group of muscles becomes rigid and overpowers the opposing muscles, balance is lost and tension, fixedness and lack of dynamic control results, which causes the vibrancy to be subdued and the tone to be quite straight (McKinney 1994:89; Kirkpatrick 2008:552). This infers that the voice which has no laryngeal tension should have a normal vibrato that is always present. Having almost no vibrato is considered undesirable. Whispering is straight as it consists of resonance tone only. Breathy singing is almost always straight. Spread singing is likely to be straight, though if the singer understands support, vibrato will come in. If vibrato is kept out of fortissimo, it is considered to be yelling. Straight-tones are not always spread or breathy but they are likely to be so, creating a weak and stifled tone (Vennard 1967:204). Singers who have no vibrato do not free their larynxes enough for subtleties of tone to be possible and at the same time they do not give enough breath pressure, therefore the tone is likely to be weak. If the tone produced is soft and allowed to become weaker, vibrato will slow down or even stop. The quality of tone without vibrato is dull or, if louder, spread (Vennard 1967:205).

One explanation of straight-tone is that there is no diadochocinesis, in other words, the

[13] *Messa di voce* is a vocal technique of 18th-century *bel canto*, consisting of a gradual crescendo and decrescendo over a sustained note (Apel 1979:523).

laryngeal muscles are static and there is no exchange of pull between the muscles. The mechanism is so rigid that delicacy like a vibrato is not possible. To cure the absence of vibrato the singer must focus on better breath support and a more dynamic adjustment of the vocal cords. Appeals to the emotion through imagination can help as the singer must gain freedom and produce sound with more abandon (Vennard 1967:205).

If a singer sings with an unhealthy straight-tone, he/she often has a high laryngeal position and sings with a rather breathy tone. To improve the laryngeal position is it useful to ask him or her to cry or whine as they sing. Using this natural or primal sound lowers the larynx, the pharynx widens and the glottis closes more fully. Straight-tone singers also need to address their breath support. The *messa di voce* exercise is very applicable to straight-tone singers. They should start with a breathy tone and crescendo with a cry out to forte and then decrescendo to a breathy tone once again. If the glottal closure at the loudest is not enough, it is useful to tell them to pick up something heavy, because one of the larynx's primary functions is to help with strenuous activities (Kirkpatrick 2008:555).

An abnormal vibrato usually presents itself as part of various singing problems rather than being the primary complaint. Psychological help may be necessary when a singer has lost confidence in their singing, resulting in a spasmodic vibrato. Matching or masking a vibrato sound is a useful way to learn to adjust a vibrato. When a student listens to a recording of their vibrato it helps them to recognise their sound and compare it to others. Instruments for acoustical analysis help to show vibrato represented on a graph and this helps students to adjust their vibrato efficiently (Gu 1995:148).

Other methods of improving vibrato problems include:

a) using Western Classical breathing exercises for hypofunction of the support muscles;
b) exercising the chest voice in the lower range to improve an irregular, wobbling vibrato caused by years of singing softly and weakly;
c) visual assistance from acoustical analysers can help vibrato problems caused by poor sensibility for music, but this is particularly difficult to remedy (Gu 1995:149).

To conclude the discussion on vocal health in general, it is important to describe a multidisciplinary approach to the treatment of vocal problems.

4.9 A multidisciplinary approach to vocal health

Vocal health involves health care professionals such as physicians who specialise in managing laryngeal function, certified voice teachers and coaches with a knowledge of voice production and use, speech-language pathologists who can devise vocal hygiene plans and objectively assess the voice, and qualified psychologists who can address the behavioural relationship between personality and performance (LaPine 2008:29). A team approach ensures that all key factors, including the singer's techniques and physical characteristics, are considered when developing a rehabilitation programme (Morrison & Rammage 1994:159).

In the ideal interdisciplinary team, the ear, nose and throat specialist should be the leader and facilitator of the medical and non-medical specialists which usually include a speech therapist and singing teacher. Depending on the requirements of the specific vocal problem, a psychologist or neurologist can also be called on to assist in the treatment of the patient. Ideally, each of these team members should have some experience in the care of singers and professional voice users (Tait-Jones 2010:8).

4.10 Conclusion

The opinions above refer to vocal vibrato faults, treating a straight-tone as a vocal fault. Despite this stance, straight-tone singing is being asked for by some choral directors and Early Music practitioners. Vennard (1967) does concede that straight tones are not always badly produced and this leaves space for asking how a singer may achieve a well-produced straight-tone. The next chapter, Chapter Five, discusses findings from select interviews about straight-tone and vibrato usage and compares and combines these findings with relevant literature.

Chapter Five

Interview findings and correlated literature opinions

5.1 Interviewee profiles

Three professional singers and three experienced Western Classical singing teachers were interviewed on their views of straight-tone singing. Their identities remain anonymous, as explained in Chapter One.

The three teachers (Teachers X, Y and Z) are internationally renowned, very experienced and have all had professional singing careers in Western Classical music. Teacher X has had 30 years of operatic performance experience throughout Europe and is now a sought-after singing teacher. Teacher X is known for his/her interpretation of Baroque and Classical repertoire. Teacher Y is a well-respected and experienced singing teacher at a music conservatory and has had a successful international operatic career. Teacher Y also has experience training a community choir. Teacher Z is an experienced operatic singer and has taught Classical singing for approximately 30 years. Teacher Z has been significantly involved in choral singing projects as a vocal coach.

All three performers (Performers A, B and C) selected for interviewing have current international careers and are experienced in Early Music performance. Performer A is best known for performing music from the pre-classical era and has won international acclaim. Performer B has considerable experience in interpreting Early Music. Performer B has a choral background and this, together with having a particularly 'pure' quality of voice, a tone with less obvious vibrato, is of interest to the study. Performer C is well known for interpretation of Baroque and Classical styles and performs predominantly in Europe. Performer C has a wide range of performance experience in opera, oratorio and art song and this versatility is of interest to the study.

5.2 Preliminary survey

The interviewing process started with a short preliminary survey to establish initial responses to the research topic. The close-ended questions required a simple yes or no answer.[1]

[1] See Addendum C for the posed questions.

However, at times, interviewees provided extra information other than providing a mere yes or no. The preliminary survey questions for the teachers centered around whether straight-tone is healthy and if they would advocate its use. The preliminary survey questions for the performers focused on their use of vibrato and straight-tone singing in their performance experience, trying to determine to what extent they were conscious of their vibrato when performing. Answers to both the performers' and teachers' preliminary surveys are incorporated into this chapter (see also Addendum D).

5.3 Interview findings

The findings from the performer and teacher interviews, together with the preliminary survey findings are not presented separately but are discussed as a whole. Although the interview questions asked of the performers differed from those asked of the singing teachers, they shared common themes. These themes of versatility, consciously addressing vibrato, limiting vibrato for reasons of blend, the production of straight-tone, alternatives to straight-tone for the purposes of blend, vocal approach to Early Music, ways of producing straight-tone healthily and redefining vibrato form the section headings of this chapter and comparisons are made to opinions in literature.[2] Each interview varied in terms of the extent to which each question was answered and the particular themes focused on. Interviews, lasting one hour on average, were conducted on a one-to-one basis in person or via Skype.[3]

5.3.1 Versatility

Performers and teachers alike were asked their opinions about the possible benefits and/or disadvantages of being versatile across all the Western Classical styles; in other words, being able to sing many styles appropriately. In Chapter One, the need for versatility across various vocal styles was named as one of the reasons for the study. This question puts the subject of vibrato adjustment and straight-tone singing into a broader context of the requirements for vocal adjustment in different styles.

Teacher Y and Performer C indicate that versatility is not necessarily a healthy or beneficial approach for young singers as they will find it difficult to make the necessary vocal adjustments required by the different styles. Teacher Y explains that young students need to

[2] See Addendum C for the full interview questions.
[3] Transcriptions of the interviews appear in Addendum D.

find their primal voice, feel comfortable in their own voice and let their technique settle before experimenting with all the styles. Teacher Z, however, does recommend versatility of styles at the beginning of a singer's training, but within reason. A young singer should not, for example, start with Romantic opera or Strauss Lieder. Teacher Y and Performer C indicated that versatility is something towards which to strive.

With young developing soloists, it is important to be cautious not to confuse them with regard to their vibrato use. When voices are young, one expects them to have a tone that is devoid of vibrato and fairly colourless (McRae 1988:138). Children should never try to imitate an adult's sound or volume; however, those children who have had healthy vocal training, are able to sing with a natural vibrato (Skelton 2004:48).

Performers A and C indicated that versatility creates a well-rounded musician and singer, and Performer A emphasised that singers need to sing a variety of repertoire to develop a good sense of style as they have to compare the musical and vocal requirements of each style. This interviewee furthermore indicated that it is better to be versatile between styles than to specialise, as singers learn flexibility of technique and imagination. Performer C argues for versatility because it teaches a singer to express emotions and techniques over a wide variety of styles. Teacher Z states that singers have to train specific performance aspects in each style. By doing so, the singers will grow in their general ability.

Teacher X believes that the basic singing technique from style to style does not differ. He/she explains that the basic technique should be based on the skills required in the *bel canto* tradition, which focuses on agility and legato, and that this can be applied to all later styles. Teacher X furthermore suggests that it could be problematic when students start their singing education with works from the late Romantic period, as they miss out on acquiring skills relating to aspects such as phrasing and rhetoric in the music, elegant articulation of singing with words and the elegant use of melisma, as well as vocal freedom, if not exposed to singing repertoire from composers such as Bach, Handel and Mozart to Schubert. The mentioned aspects are pushed to their limits in Romantic music, but a singer should have mastered basic skills.

Teacher X explains that many challenges arise in Western Classical vocal repertoire in the late 19th and early 20th centuries such as a big increase in the air pressure used in the vocal

mechanism because of the need to project over louder instuments and larger orchestras. The teaching of agility was sacrificed in favour of teaching how to sustain long tones and producing a tone that would project over an orchestral texture. The latter is a far louder sound than anything that would have been required before this time. Teacher X explains that the focus on agility in the fast-moving melismatic style meant that the voice had to be trained to work on moderate air pressure, because without moderate air pressure, a singer cannot sing coloratura. Teacher X believes it is important to train fast-moving exercises and not only slow sustained exercises especially in young singers.

Similarly to Teachers X and Z, Miller believes that a well-trained and musically sensitive artist should be able to sing a wide variety of performance literatures without changing their basic technique (Miller 2004:193). While it does not make sense to sing Lieder with the same style as opera, the singer uses the same instrument, the voice. It is not logical to learn specialised voice techniques for each style; a singer should rather master a deep understanding of the differences in musical style (Miller 2004:234). It seems that according to current tastes in Early Vocal Music, singers need to be flexible enough in their technique in order to vary the type of vibrato required by the music. Therefore, a singer's instrument or voice should be able to produce varying types of vibrato without compromising basic technique. Even though unrealistic, it would be ideal if a singer could be infinitely flexible and able to reinvent his or her voice to suit any situation (Elliott 2006:2). A singer need not reinvent their technique or their voice in order to be able to appropriate their vibrato.

Performer B's answer to the question of versatility was unique in that he/she spoke about versatility being about hearing and reacting to sound. Performer B advocates versatility in that singers should be working with different instrumental accompaniments and not only with piano in order to explore their natural vocal flexibility and volume. This is especially helpful when considering an historically informed approach to performance practice. Today, equal temperament is accepted as the tuning system, but when singers sing *a cappella* they tend towards non-equal-tempered intonation (Howard 2007:300). Meeting historically informed criteria of temperaments can be difficult to achieve especially for beginning singers. Even though just intonation and “mean tone” tunings are challenging to sing, the historically accurate performer should strive to satisfy this ideal (Fugate 2010:273).

The opinions above about versatility are not mutually exclusive, but rather demonstrate a

variety of understandings of versatility. The answers refer mainly to musical development, and versatility seems to be encouraged by all the interviewees for several positive reasons, but with exercising appropriate caution in young, developing voices.

Teacher Z included singing in a choir as an aspect of versatility. He/she believes that the goal of every teacher should be to teach students to be versatile. Teacher Z explains that he/she teaches students, both choristers and soloists, to have a healthy voice and not to harm it. This approach allows them to sing both in ensembles and solo.

5.3.2 Consciously addressing vibrato

It is conspicuous that out of six interviews with three teachers and three performers, only one interviewee had experienced vibrato being addressed both in their lessons and in performance career. The others would only talk about vibrato (if at all) when there is a fault to be remedied. Several remedies for faulty vibratos were discussed in Chapter Four, which dealt with vocal health. According to Vennard, teachers should not badger the singer about their abnormal vibrato because this may only make it worse as they could become nervous (Vennard 1967:194). This assertion is supported by all three of the teachers interviewed. Neither Brown or McKinney mention whether vibrato should be addressed in the absence of a vocal fault (McKinney 1994; Brown 2008).

All three teachers prefer to avoid using the term vibrato when teaching their students. Teachers X and Y indicated that addressing the subject of vibrato in teaching their students could result in the student manufacturing a vibrato incorrectly and this could lead to tensing, squeezing or pushing. Teacher Z does not talk to students about vibrato unless it is excessive, whereas Teacher X prefers not to use the term, even when correcting a student's faulty vibrato. All three teachers offer alternatives to using the term, such as focusing on good breathing techniques, breath pressure and flow, control and an open throat and by referring to depth, quality, ‘slenderness’ or different colours of the tone.

Only one of the performers interviewed had the experience of vibrato being addressed both in singing lessons and by a conductor. Performer C has had no experience of his/her vibrato being mentioned or discussed directly in voice lessons or by colleagues or conductors. Performer B started singing as a chorister where it was taken for granted that the choristers

would have little vibrato. For Performer B, music-making focuses on style, diction and speech and when coaching other singers, he/she concentrates more on aspects of style and conveying text and does not mention the singer's use of vibrato. From the three performers interviewed, it seems that their appropriation of vibrato is mostly unconscious.

Performer A has had experience of vibrato being addressed in singing lessons where the teacher wanted to build the ability to vary the speed of his/her vibrato. As a result, Performer A can consciously control his/her vibrato by making it narrower or wider, faster or slower. Performer A believes the ability of singers to vary their vibrato speeds, consciously or unconsciously, is very important for the sake of a singer's coloratura and versatility. The subject of vibrato was introduced and discussed often at the beginning of Performer A's solo career when he/she started working with a prominent Baroque conductor. Performer A will address the issue of vibrato when singing with other singers or other obbligato instrumentalists. These performers will sometimes adjust their vibrato instinctively or discuss whether to start a note straight and then add vibrato or not. Performer A believes it is a 'bizarre' concept to avoid talking about vibrato for the reason that students could become too self-conscious about their vibrato production. Addressing it when there is a fault like a wobble, Performer A believes, is very important and observes that there seems to be an 'epidemic' of very unhealthy vibrato amoung young singers at the moment.

5.3.3 Limiting vibrato for reasons of blending

Terry has a very strong view which is against the use of vibrato in choirs. He advocates a pure, transparent tone and believes that vibrato present in individual voices "severely invalidates and blurs the blend; here the tone loses the impact of a focused tone" (Terry 1991:178). Terry is concerned about blend, not letting individual voices stick out, and achieving a clear sound in his choir. In the same vein, Sublett mentions instances where continuous or "solo" vibrato is not appropriate in choral singing; for example, when very precise articulation is required, when dissonance is a feature and when a piece of choral music was intended for a very reverberant acoustic (Sublett 2009:541). Alessandrini stipulated that with vocal ensembles, in the context of *a cappella* Early Music, the singers should keep their vibrato to a minimum so that intonation is not affected (Alessandrini 1999:635).

Views on adjusting or eliminating vibrato in choral singing, such as those of Terry, Sublett

and Alessandrini, are the basis for the reluctance of many singing teachers to allow their students to sing in a choir while they are in the process of becoming a soloist. Other teachers are happy for their students to participate in ensemble singing for musical reasons, but propose technical cautions. Olson asserts that altering the vibrato rate for different styles need not affect a singer's healthy vocal production. Solo singers need to be aware of their vocal production and understand their voices while singing in a choir (Olson 2008:564). However, Olson also cautions that if a young singer in a choir is required to produce a sound that is devoid of vibrato, he/she might be challenged or confused in their solo vocal development (Olson 2008:561). Rossing's study of comparing the voice source spectra and formant frequencies in choral and solo singing (mentioned in Chapter Three) supports some singing teachers' reluctancy for their students to sing in choirs, especially for students who would find it difficult to learn two slightly different vocal techniques at the same time (Rossing *et al*. 1986:1980).

Teacher Z explains that a singer cannot be an individual in a choir and that singers always have to take something away from their voices in terms of colour. Teacher X states that it is easier for lighter voices to blend in choirs than big voices, recommending ensemble singing to his/her students as opposed to big choirs where the students would have to hold back vocally and limit the spectrum of overtones or colours in their voices. The latter situation is noted as difficult to correct in solo singing students. Teacher Y would not encourage his/her students to participate in a choir where the choir conductor demanded a “white” or breathy sound, because this is not a healthy sound ideal. Vennard and Miller refer to the use of “cathedral tone” which reduces the upper partials in the singing voice and this results in a breathy tone quality. Vibrancy and solo quality is not the goal in this type of singing. Since “open” or breathy singing is not considered to be a good quality tone, and employing it can be damaging to the voice, it should not be advocated for reasons of blending (Vennard 1967:204; Miller 1996:16). It is recommended that developing voices should avoid choirs where singing without vibrato is used across the board and rather find a group where singers are permitted to use a vibrant sound (Olson 2008:562).

Miller suggests that choral music is vocal music and both need to be efficient. Early choral music was not intended for the solo singer and the singers of this music were not expected to give recitals in which the individual quality of the voice was valued (Miller 1996:57). Later choral music can be better suited to solo voices. In traditional choral repertoire, voices are

called to blend at all tessitura and dynamic levels and most young solo voices find this problematic (Miller 1996:58). The threat to vocal health is not about singing loudly, but rather in trying to submerge the voice into the surrounding bland sound (Miller 1996:58).

5.3.4 The production of straight-tone

Teacher Z, in response to the question of whether a straight-tone can be produced healthily, stated that a singer can sing without vibrato, but only in lower dynamics and not in the high register. Teacher Y believes that if students do not know how to sing with a straight-tone, they will probably constrict and sing with excessive tension. Teacher X suggests that if singers try to eliminate vibrato they stop the natural movement of the vocal folds and very often to achieve that they are actually stopping or squeezing the air flow and using the larynx like a valve. Those singers who tend to squeeze and eliminate vibrato also tend to squeeze and push with a tight larynx. Without the vibration, if singers squeeze and stiffen the vocal folds, they are less likely to go through the passaggio and produce the notes beyond it. Teacher X believes that eliminating vibrato is dangerous because it can create vocal or muscular habits which will interfere with getting into the top register.

Performer C is against the use of straight-tone singing especially for long sustained periods of time. Performer B also states that straight-tone singing is rejecting something natural and a singer cannot do it for long. Performer A suggests that eliminating vibrato as a general rule or as an aspect of a singer's technique is unhealthy, but believes it is not unhealthy if used for sections of music for reasons of style. When a straight-tone is required, caution about jaw, abdomen and tongue tension is voiced by Performer C, Edwards, Teacher Z, Sherburn-Bly, and Sublett (Edwards 2003:26; Sherburn-Bly 2007:66; Sublett 2009:542).

Scientific and pedagogic reasons for solo singers avoiding straight-tone singing in a choir are, for example, that it can cause undue stress on the vocal mechanism, it can fatigue the voice, it may involve insufficient air flow and breath support, a singer's muscle memory could be undone, the tone of the voice could spread, a singer's pitch can become inaccurate, overtones could be lost, the ring in the voice could be lost and the individual tone quality of the voice could be affected (Olson 2008:563; Olson 2010:75).

5.3.5 Alternatives to straight-tone singing for the purpose of blending

If young singers sing in choirs, it is up to the choir conductors involved to advocate the healthiest vocal production to their singers and to equip themselves with knowledge of sound vocal technique. There are healthy ways of producing straight-tone and there are also alternatives to its use in choral singing.

Performer B explains that blending for its own sake is not what he/she would advocate as it stamps out individuality. He/she explains that it is useful to sing with a like-minded singer who will react the same way to the text and that this is as much of a blend as singers need. According to Performer B, “singing must be effective and not dutiful.”

There are several ways of working with young voices in a choir without demanding a “white” sound or a straight-tone (Edwards 2003:26). An example of alternative vocabulary for straight-tone singing could be “sing with a pure, clear, focused tone that is right in the centre of the pitch” (Sublett 2009:542). When singing styles or genres that require limited vibrato, it may be better to explain the target sound, for example, “clear voice parts in polyphony”. If the singers have to lessen their vibrato, it is more effective and healthy to ask them to “modify” their vibrato instead of singing “straight” or “without vibrato” (Walker 2006:44). This use of alternative vocabulary echoes the singing teachers' (X, Y and Z) opinions of not addressing vibrato directly, for psychological reasons. An alternative to using a “white sound” throughout is to choose a diverse repertoire of excellent quality which will have a variety of vocal demands, so that the singers do not tire too early in the rehearsal (Edwards 2003:26; Sherburn-Bly 2007:69).

The aim of the choral conductor is not to bring the solo singers down to the level of amateur, but rather to work for a more efficient vocal production from the less proficient singers. Balancing is a better goal than blending (Miller 1996:58; Edwards 2003:26). The concept of balancing comprises physically placing voices within the choir according to their individual quality, instead of stifling their voices into an anonymous, “white tone” (Edwards 2003:26). Arranging voices so that they are acoustically matched can improve blend, phrasing and overall tone quality (Atkinson 2010:28). If similar voices are placed next to each other in a choir, it brings about less contrast within the ensemble and emphasises similarities, therefore contributing towards blend. Giving each singer sufficient space around them, eighteen inches

or more, could have the same positive effect on the vibrato and therefore blend. If the singers are placed in a mixed formation, they are immediately aware of their individual sound contribution and this could also help bring about vibrato adjustment (Walker 2006:45).

A further alternative to straight-tone in order to achieve blend is ensuring that all the singers use the same healthy vocal technique. Vocal modeling is a way to achieve this, where the choir director or an excellent singer in the choir demonstrates a confident, well-supported and well-balanced, healthy sound to the other singers. Carefully chosen recordings of singers can be used as examples for the choristers to model their sound on and develop similar good habits. It is necessary to regularly emphasise the breath-to-sound connection in an interesting way, so that the singers are less likely to tighten their throat muscles or stiffen their abdominals and, as a result of this, they become more vocally flexible and musically expressive (Edwards 2003:26). Choristers need to listen closely to balance, intonation and producing the same vowels as ways of improving blend (Walker 2006:45). Teacher Z, who has had much experience of working with choirs, likewise believes that a choral blend is better achieved when every singer has the same approach to vowel placement, phrasing, attack, 'register' blending and intonation, than when they merely limit their vibrato.

From the opinions and suggestions above, it can be concluded that choral singing should encourage healthy vocal technique instead of insisting on a bland sound across the board. Suggestions of considering varied repertoire, seating positions for voice balancing, similar technical approaches and careful listening are given as healthy alternatives to straight-tone singing.

5.3.6 Vocal approach to Early Music and other styles

Teachers were asked how a singer should approach Early Baroque or Renaissance vocal music in terms of their vibrato. Teachers Y and Z gave similar responses to the question, suggesting that the singer should sing softer than usual, while maintaining free, directed breath flow and focused tone. Teacher Y suggested thinking like an instrument and teacher Z emphasised the need to sing softer in order to handle ornaments. It is conspicuous that none of the teachers mentioned adjusting the vibrato. Teacher X believes there should be no difference in approaching Early Music and later styles, stating that the basic vocal production with regard to musical style from Monteverdi to the early 19th century is not that different.

Particular vocal demands in Early Music of the 16th to 18th centuries are considered below. These include issues of range and tessitura, the range of dynamics, the extent of breath management, the level of dramatic impact and rhetoric, vocal flexibility in terms of ornamenting and coloratura, the effect of the particular acoustic of the intended performance venue and the clarity of dissonances within the harmonies.

At the advent of opera, the solo voice began to emerge. In the music of Monteverdi, range and tessitura[4] demand the technique of the modern singer. According to Miller, to sing roles like those in *L'incoronazione di Poppea* with a straight-tone is to ignore the technical demands of phrase management and dynamics as well as to weaken the dramatic impact of this work. Handel, above all other composers of this time, demanded the ultimate in breath management, laryngeal flexibility and balanced resonance. Therefore, the singing instrument would have needed to work efficiently (Miller 1996:130).

There is debate about the intensity of sound produced in Early Vocal Music. If the range and pitch level of much Early Music was moderate, singers would have been able to use a more relaxed and flexible flow of air to support and sustain their tone (Elliot 2006:17). In a sound of less intensity or volume, the vibrato is less obvious. Miller referred to some researchers who believed that smaller voices were better suited to the acoustics used in the earlier periods and that the modern type of singing, such as with continuous vibrato, would have been out of place (1996:131). This may be true for some chamber music of the time (see *camera* singing in Chapter One), but when considering the actual locations for which operas of the 17th and 18th century operas were intended, it is clear that it would have been essential to maintain good resonance and intensity levels to project the voice in these venues. In the Basilica of San Marco, for example, compositions by Gabrieli and Schütz (see *cappella* singing, in Chapter One) would not have been heard if sung with small voices, because of the immense space (Miller 1996:131). As a result of this increase in vocal intensity and resonance, it can be surmised that there would have been an increase in vibrato production.

The performers in this study were asked what their vocal approach to Early Music would be,

[4] Tessitura is the general "lie" of a vocal part, whether low or high in its average pitch. It is different from range because it does not account for a few isolated notes that are extremely high or low in pitch (Apel 1970:839).

as opposed to later styles. They were asked to discuss whether use of vibrato is ornamental in Early Music. Performer C does not see vibrato as an ornament in Early Music as this view would mean holding the sound straight for the rest of the time and if the vibrato were to be suddenly added to the voice, a wobble would result, because suddenly air would be pushed in order to make a bigger sound. This response highlights the importance of defining vibrato carefully. Performer A states that the problem with calling vibrato an ornament (cf. Neumann 1978:511) lies in the definition of the term "vibrato". Performer A believes "a fulsome vibrato can certainly be considered an ornament in Early Music, but having a rod-straight sound […] is [not] what was being talked about as an aesthetic."

Performer A states that in Early Music, the vibrato should be modest. Faults such as tremolo distract from the harmonies. Performer A suggests that a vibrato that draws attention to itself is detrimental to the sound ideals of Early Music. However, he/she suggests that it could be useful to "warm" a sound with vibrato for reasons of colour. Performer B goes as far as saying that continuous vibrato is "pointless" in early repertoire because it obscures the harmonies, dissonances and pitches, and the consonants cannot be heard. Performer B explains that in Early Music, the text is of primary importance for reasons of rhetoric and persuasion. The type of vibrato that interests Performer B in terms of Early Music is one that happens naturally when the note "warms up a bit", a vibrato that "rings with beautiful beats". Elliott's opinion on vibrato use in Early Music is similar to those of Performers A and B. She concedes that current tastes in the practice of Early Vocal Music in general have shifted from using a straight, "white" tone to that of a more natural vibrato, but that singers still need to take into consideration the harmonic progression of the music, articulation of ornaments and the ideal of a gentle, unforced tone production. A wide, continuous vibrato cannot inflect the different levels of dissonance against harmony. A consistent vibrato might blur the subtle distinctions between trills, trillos and rapid passages. It is therefore important to be able to vary the type of vibrato used when singing Early Music. Varying the type of vibrato can intensify the emotion of the music and text (Elliott 2006:16–18).

Toft suggests that four different types of vibrato were in use in *bel canto* singing, namely, a) a waving or undulating motion, b) the *tremelo,* c) vibration and d) *vibrazione*, *voce vibrata* or vibrated note (2013:93). These types support the notion that a singer's vibrato should be flexible in Early Music.

Performer A advocates the use of straight-tone for short sections in musical works for reasons of style. This opinion differs from those of the three teachers interviewed who would not encourage a mixture of straight-tone and vibrato within one piece for the sake of style or taste. Performer A also states that he/she is "allergic" to a sound with a consistent vibrato that is the same on every note, calling this "one the most boring things artistically" he/she could imagine. On the contrary, Jerold views singing with a straight-tone as just as artificial as an ornamental exaggerated vibrato (Jerold 2006:167). While Performer A is in favour of vibrato from a vocal standpoint, he/she believes that the use of vibrato should be treated in a flexible way. In repertoire of all periods a singer should choose to use more or less of it, "like any good spice!" Miller states that, although vibrato is believed to be a natural element of vocal timbre, the practice of using no vibrato for certain aesthetics or styles can be appropriate. However, the reasons for eliminating vibrato are not necessarily always founded on historical fact (1996:187).

Stark states that some Early Music specialists reject continuous vibrato because of the lack of historical reference to vibrato. However, a lack of such information does not prove that vibrato was not an ordinary part of trained singers' tone at the time. He suggests that as there is no evidence to support that early singers repressed the natural vibrato in their voices, straight-tone singing could be construed as an "idiosyncrasy" of the Early Music movement (Stark 1995:81). Before the 20th century "correct singing technique" was advocated instead of a "continuous vibrato". It was assumed that a well-trained singer would not have had a pronounced or uncontrolled vibrato (Sadie 1992:982). Vibrato was usually only mentioned when it was obvious or offensive. If vibrato was present in the 17th century, it was probably small and shimmering, not altering the pitch of a note to a noticeable degree (Elliott 2006:3).

Elliott states that a small, controlled vibrato in singing was fashionable in the late 19th century (2006:138–139) and this opinion is in keeping with Ferrante's study discussed in Chapter One (cf. Ferrante 2011). Opinions about appropriateness of voices and their vibrato to certain styles is a subject that is often affected by the fashion of the day. Performer A notes that

vibrato speed has changed as a fashion over the decades. Old recordings of singers in the more distant past demonstrate this; for example, Amelita Galli-Curci, sang with a very fast vibrato that was almost a tremolo. Performer A compares this vocal trend to the vibrato of instrumentalists: for example, Jascha Heifetz had a faster vibrato on the violin compared to present-day Itzhak Perlman, who has a slightly slower or wider vibrato on the violin.

Various acclaimed performers believe that some vocal literature calls for stylistic concerns above the beauty of vocal sound (Miller 2004:193). It is suggested that the charm and interest of any historically informed performance depends on its gesture and rhetoric, not only on a polished sound. “If we were freed from the anachronistic ideal of beautiful musical surface, perhaps we would get even closer to the vitality of past traditions” (Kleinerman 2004:35). This opinion refers to the indiscriminate use of continuous vibrato throughout any style of music, instead of understanding the wealth of historical performance practices of the past, where beauty did not always rely on a perfectly consistent resonance in either vocal or instrumental music. This does not, however, claim that singers should alter their basic technique, but merely argues that a subjectively beautiful element of singing should be exchanged for one that expresses or communicates better.

The seemingly opposite opinion is that a singer should not sacrifice musical and vocal integrity for the purposes of emotional indulgence. Miller suggests that character portrayal should not be seen as permission to replace beauty of timbre. Kraus stated: “Never let the text or the drama rob you of the beauty of your voice […] Art is dependent on beauty and truth, not on imitation and pretense” (Kraus in Miller 2004:195). For some singers, the subjective idea of beauty or aesthetic is seen as paramount in vocal expression and the communication of text and drama as secondary. For others, communication and style is more important than consistent beauty of sound.

Performer A commented that the appropriateness of certain types of voices for particular music styles is more about colour matching than vibrato quality. Performer A suggested that if a voice quality “fits” well with a particular instrument, for example a Baroque oboe, there is a colour match. Miller speaks about vocal appropriateness in terms of size of voice. He advocates that every voice is a different instrument and singers should sing repertoire that is appropriate to their level of sound and if they have a small voice, they should find employment in ensembles or vocal styles that do not require loud dynamics (2004:172). Even

though Miller does not stipulate what kinds of styles would be appropriate for a smaller voice, his suggestion is valuable in terms of healthy vocal production in that singers should not extend themselves beyond what is naturally possible with their voice. According to Jerold, some performers prematurely decided that early singers had very light, nearly straight-toned voices and that today's natural vibrato must be what was referred to as artificial or pronounced in early sources. However, performers and historians believe that singers who have large voices with a normal vibrato should not be excluded from performing Early Music (Jerold 2006:167).

5.3.7 Ways of producing straight-tone healthily

As was seen in the sources regarding Early Music vibrato or straight-tone singing, it was suggested that there are different types of vibrato that singers can learn to employ. Jackson invents four different types of vocal production, relating to vibrato use in Late Renaissance choral singing. These included senza vibrato (SV), stylistically appropriate vibrato (V), straight-tone (ST) and style-excessive vibrato (SE). Senza vibrato is a tone with no audible vibrato but it has resonance and vibrancy. Straight-tone, in his study, is referred to as "without" vibrato, which often produces a breathy quality. Style excessive vibrato is where pitch and intensity changes are inappropriate for late-Renaissance music performance. Stylistically appropriate vibrato is a vibrato that is suitable for this period of music because the pitch fluctuation does not affect the intonation.

Jackson's findings, from a judging panel of conductors, were that SV was just as resonant, easy to sing and with as efficient breath support as the other two vibrato techniques (V and SE). ST, in his study, was found to be the hardest to produce, the least resonant and it interfered with breath management. Conductors were asked to rate each type of singing according to intonation, clarity of imitative entries and balance and blend. Where the clarity of entries was best when ST was employed, SV and V scored higher for intonation and balance and blend. Jackson's study shows how careful use of healthy and stylistically appropriate vibrato can be the best approach for late-Renaissance performance (Jackson 2007:33). It is conspicuous that Jackson's senza vibrato and stylistically appropriate vibrato scored highest for blend in particular. Jackson's findings question Terry's view of eliminating vibrato for the sake of blend. However, Sublett's idea of avoiding continuous vibrato for the sake of articulation is validated by Jackson's study as his judges found that clarity of entries

was best when straight-tone singing was used (cf. Sublett 2009:541).

In answer to the question of how to sing quarter-tones successfully, Teacher Y believes that, apart from needing a very good ear, there would be no space for vibrato, while Teacher X believes that the voice would still be able to have a very natural vibrato. Teacher X explains that a quarter-tone is still quite a large interval and it only becomes a problem of intonation when the vibrato is such that the oscillation is wider than the natural vibration of the voice. It is difficult to produce a quarter-tone unless there is a real sense of legato. Teacher X explains that there is no need to slender or focus the voice more than it already is, since any time a singer squeezes or closes the pitch becomes much more difficult to control, because of the radical change of air pressure, and this leads to a tone that is either flat or sharp. Whereas if a singer stays open-throated and has the air sitting properly, supported by the lower abdominals, then they will have very moderate continuous air pressure and will be able to produce a quarter-tone on a naturally vibrating vocal tone.

Performers and teachers alike had ideas on how to produce a straight-tone healthily, if they condoned its use at all. Performer A notes that straight-tone singing is withholding the vibrato and, while traditional schools of singing thought believe this is the worst possible thing a singer can do for a voice, Performer A does not entirely agree. Sherburn-Bly lends support to this belief as she suggests that the careful use of “simple tone” singing can be a useful and effective tool for shifting between different vocal colours and styles with dramatic effect (Sherburn-Bly 2007:69). Edwards states that professional adults who specialise in early, contemporary or choral singing will understand their voices sufficiently so that they can adjust the amount of vibrato or straight-tone they produce, but he cautions that young singers do not yet have this ability. He furthermore suggests that straight-tone singing is “hazardous” to the vocal health of a singer and echoes Teacher X's caution about solo singing students singing in a choir, stating that voice teachers have considerable trouble freeing voices that have been, for many years, asked to sing with a straight-tone, leading to a too high larynx and an easily fatigued voice (Edwards 2003:25, 26).

Performer A believes that even though straight-tone is inhibiting the vibrato, it can be done with more thought than mere “physical gripping”: much as the laryngeal muscles are involuntary, insofar as a singer can control them, it is possible for a singer to inhibit the vibrato and control these muscles with their imagination. Achieving straight-tone is

sometimes done by “over-gripping” of throat or laryngeal muscles, which results in a very tense vocal production and a restriction of air flow and therefore soon feels uncomfortable. However, it can be done by will-power regarding what the singer's aesthetic desire is at that moment, rather than “gripping”. Titze has a similar opinion that straight-tone in itself does not mean a technique is healthy or unhealthy. He states that a person with a vibrato-free voice could have good muscle balance but is merely able to disengage the vibrato somehow. He concedes that it could also mean that the singer is completely out of balance with their muscles (Titze in Olson 2010:76).

Performer A has encountered young developing singers who do not have a vibrato and sing healthily, but he/she believes that once a singer reaches late teens or twenty, singing with a consistently straight-tone becomes associated with a “locking” of the breath and “locking” of the air stream. Performer A has often encountered sopranos who have an unconscious desire not to grow up, as they are afraid of sounding old or wobbling, so they restrict and do not learn how to truly support the sound with the whole body.

In the pre-survey questions, teachers were asked whether they thought a voice could still be well-placed and supported if the vibrato was consciously limited or virtually eliminated. Teachers X and Y clearly stated that this was not possible, but Teacher Z replied in the affirmative. However, if in a situation where a student *must* minimise their vibrato, Teacher Y suggests to use mostly head voice as this makes the voice lighter and the singer can have better control over the vibrato. He/she also suggests that the singer have the thought of a sound they want to make in their ear as their cords should naturally adjust to create it. Teacher Y stresses the importance of maintaining the singer's breath support and not increasing the subglottic pressure too much. Performers B and C have similar opinions to Teacher Y in that they believe that adjusting the vibrato is not a conscious thing and that most people's ears do it automatically for them. Vennard and Walker give weight to these opinions as they state that any singer with a natural vibrato can learn to sing with a straight-tone if he or she wants to. The key is for the singer to get the sound ideal of straight-tone in their ear, accepting the quality that necessarily comes with it, and the singer will naturally adjust their vibrato to achieve it. However, if a singer tries to sing with their best production and merely inhibits the vibrato he or she will fail. A singer must be willing to let the tone spread (Vennard 1967:205; Walker 2006:44).

Teacher Z speaks of not constricting the breath and keeping the flow, when minimising vibrato. He/she emphasises keeping the voice light and soft, with good focus, taking into account good breath flow, a soft attack and the placement of the larynx. Walker and Sherburn-Bly also mention using a lighter, softer sound when singing with a straight-tone as this allows the laryngeal muscles to operate under less pressure. They caution that soft, light singing should always be supported and the air should flow freely through the glottis (Walker 2006:44; Sherburn-Bly 2007:66). With regard to laryngeal position Sherburn-Bly, together with Teacher Z, suggests that when employing a straight or "simple" tone, a singer needs to take a proper breath, ensuring there is no tension in the jaw or abdomen and the larynx remains in a lowered position. Sherburn-Bly also advocates breathing more often in order to relax the larynx when singing with a straight-tone. Teacher Z believes that it should normally be no problem to sing without vibrato, but warns that singing loudly in the high register with no vibrato could harm the voice because of the amount of power required, and this usually results in overly heavy subglottic pressure. Olson adds to this view as she suggests avoiding higher ranged voice parts altogether, if required to sing with straight-tone, because vibrato is more perceptible in the higher tessitura (2010:65). With regard to subglottic air pressure, Elliott suggests that when lessening their vibrato, singers should adjust the pressure of the air flow supporting the tone, reducing the pressure in the throat, instead of just removing vibrato by tightening (2006:17).

Other suggestions for producing straight-tone healthily that were not given by interviewees, include using modified or brighter vowels and changing the mouth shape (Sherburn-Bly 2007:66; Sublett 2009:542). Further recommendations are that a singer should be very warm vocally before singing straight-tone, solo singers should practise alone more often than singing in a choir in order to establish the correct muscle memory and singers should use straight-tone sparingly and, whenever it is used, remember good breath flow, support, energy and resonance (Walker 2006:44; Sherburn-Bly 2007:69; Olson 2010:65).

It is important to remember that there are opinions that do not advocate minimising vibrato at all, such as Teacher X's opinion that instead of thinking about minimising vibrato, a singer should rather maintain moderate air pressure, open throat and support, and the vibrato should not affect intonation negatively. He/she does not believe in making the voice more slender or focused than it already is.

5.4 Redefining vibrato

In Chapter One, vibrato was described and defined historically, in Chapters Two and Three it was described scientifically and in Chapter Four in relation to vocal health, therefore, medically. This chapter redefines vibrato in terms of its functional use in different aesthetics. According to physiological and acoustic definitions, vibrato is seen as a natural phenomenon (Vennard 1967:193). Healthy vibrato production is the result of coordination of breath support, air flow and subglottic pressure (Kirkpatrick 2008:555). In voices of any age, if there is sufficient energy in the voice and freedom at the vocal folds, vibrato will occur. Vibrato, or vibrancy, will result if singers are taught to breathe and enunciate properly (Miller 2004:125). All three teachers interviewed agreed that vibrato is the natural result of a well-supported and well-placed voice.

Vibrato or "vibrancy" is referred to as a diagnostic indicator of healthy singing and a natural component of vocal timbre (Miller 1996:187; Kirkpatrick 2008:555; Olson 2010:64). Two interviewees believe that a continuous vibrato is the ideal aesthetic of Western Classical singers today, and one stated that vibrato should always be present in a healthy voice. However, not all interviewees agree with this ideal of an ever-present vibrato, pointing out that there are different types of vibrato, but that most singers have some form. The attack of the sound should be clear and without vibrato, as is particularly important in Early Music repertoire.

It is clear from this chapter that opinions on straight-tone singing vary. Fashions and tastes to do with vibrato have an effect on the choices of performers and their targeted sound ideal.

Chapter Six

Conclusions

6.1 Introduction

Arising from the need to adhere to demands of music stylistic aesthetics and the quest for singers to be versatile, this study set out to explore perspectives of Western Classical straight-tone usage. The questions asked were:

- What are the opinions of select performers and teachers of Western Classical singing on straight-tone singing?
- How do concerns of vocal health and stylistic aesthetics contribute to the opinions on straight-tone singing?

There are clearly opposing views about straight-tone singing found in literature throughout the history of vocal instruction and also in current opinions. This study aimed to present a multifaceted collection of views on vocal production with specific reference to straight-tone singing.

The research methodology of this study was qualitative in design as opinions about straight-tone singing were sought from select professionals through one-to-one interviews. Three experienced teachers of Western Classical singing were interviewed as well as three internationally renowned performers, known for their experience in interpreting Early Music. Their findings have been placed in relevant literature to provide a holistic view on straight-tone singing and vibrato. This study has thus combined literature-based and select professional opinion-based research into straight-tone singing.

6.2 Findings

Chapters two to four provide background information on a healthy functioning voice and discuss possible vocal problems that a singer may encounter for behavioural or physical reasons. Findings indicated that teachers and performers of Western Classical vocal music should have a basic understanding of vocal physiology to apply consciously on a day-to-day basis or in order to give substance to what they might know instinctively. Furthermore, understanding the basic healthy functioning of the voice and its components is necessary to

facilitate the diagnosis of vocal faults.

Chapter Two provides an overview of the anatomy of a singer's breathing apparatus and the physiology involved in breath support. A detailed examination of the components of the larynx is given as well as theories of how sound is produced by air flow and the laryngeal mechanisms. The occurrence of vibrato was found to be a natural phenomenon resulting from tremors in the central nervous system and the antagonistic working of the small laryngeal muscles, in particular the cricothyroid and thyroarytenoid muscles. A key finding was that when some singers produce a straight-tone, they widen the glottis creating a flat, shallow tone, while other singers constrict the glottal space for a straight-tone and this creates a pinched or strained tone. It was also found that in straight-tone singing, there is a greater glottal resistance.

Chapter Three describes acoustical concepts of pressure, resonance and formants which are essential for the understanding of voice production and vibrato. The Bernouilli effect was found to have an important function in the cycle of phonation. The air column in the vocal tract is described as a resonator and its function is to filter and amplify the frequencies of the vocal source. The spectrograph, which produces spectograms showing the various overtones and singer formants produced by a well-trained voice, is a useful tool for diagnosing and correcting vocal faults. A key finding of this chapter is the objective science behind the subjective aesthetic of beauty of vibrato.

Chapter Four contextualises vocal faults and vocal health. The behaviours that constitute vocal misuse and abuse are discussed as well as faults related to vibrato such as the wobble and bleat. Vocal faults were found to result from incorrect singing techniques, medical or psychological problems. Faults related to vibrato were found to relate to the fine coordination and balance of the muscles in the larynx. Since straight-tone could be seen as a fault by McKinney and Kirkpatrick, using it for long periods would create strain on the voice and could cause harm. Straight-tone is said to result from one set of laryngeal muscles overpowering the others causing the delicate muscular balance to be lost. In order to reintroduce vibrato into the tone, it is suggested that a singer work on improving their breath support and adjusting their vocal cords with more energy. Singers and singing teachers are encouraged to be extra vigilant and conscious of changing vocal behaviours, sounds or medical afflictions and some remedies and suggestions are given.

Chapter Five discussed opinions of select teachers and performers about straight-tone singing in the context of different styles and aesthetics. These opinions are placed within the scholarly discourse. Opinions differ with regard to the historical use of straight-tone singing and also with choral blend. The interviews shed a subjective light on the objective foundation of this study and offer real-world experiences that both compliment and contrast with opinions in literature.

Key findings in Chapter Five indicated that only one of the three performers has had experience of his/her vibrato being addressed during singing instruction and in his/her professional career. Teachers interviewed are reluctant to use the term "vibrato" in a teaching environment for psychological reasons of avoiding confusion and self-consciousness especially in their younger students. In the context of Early Music, interviewees had differing opinions about the use of continuous vibrato. While it is conceded that vibrato is a healthy choice for the voice, opinions from the interviews and literature suggest that a singer must have an adaptable vibrato for the stylistic constraints of Early Music. A continuous vibrato contributes to the ideal of consistent beauty of tone. The Early Music philosophy of text having greater importance than the consistent beauty of singing tone is not supported by all sources.

Those sources that advocate the use of straight-tone singing for reasons of style caution that it should not be used for long periods of time and must be used with great care and vocal skill. When straight-tone singing is required in choral singing it can cause confusion in solo singing students in terms of their developing technique. Teachers interviewed, together with other literary sources, identified vocal difficulties that some solo singing students face as a result of their choral experience, such as habitual tensions and limited vocal colour or resonance.

One of the main outcomes of the interviews is that the development of technique should be the focus when teaching young singers. It is crucial that young singers discover their own voices during an important stage of their musical development.

6.3 Limitations of the study

This study incorporated a small sample of interviewees in the fields of Western Classical vocal performance and teaching even though the professionals who were selected for interviewing represented a diverse group of backgrounds geographically and all three performers have extensive experience in performing pre-Classical, or Early Music. The nature of the study is in essence qualitative and made use of case studies. The findings are not conclusive and generalisations cannot be made.

For a quantitative study into trends of opinions about straight-tone singing, a larger sample group would be essential. However, even on this small scale of six interviewees, the group's opinions diverge so clearly on subjects to do with straight-tone singing. This further highlights the current controversy about straight-tone singing shown in literature.

A wider group of participants could have produced a more complete illustration of how much straight-tone is used in performance today in order to further support the need for research on the subject.

6.4 Implications and recommendations

The findings of this study imply that it is possible to produce straight-tone healthily, but not for long periods of time. There are ways of singing straight-tone with caution and with paying attention to basic technique and rehearsal strategies, both as a soloist or within a choir or ensemble. There are also very strong opinions, however, against using straight-tone singing, both as an aesthetic and as an issue of vocal health.

The study on straight-tone singing and vibrato should be extended and the following recommendations for further research are made:

- This study should be extended to include a bigger sample to provide more conclusive answers. A broader interview sample group would also provide further useful opinions on how to produce straight-tone and why, if at all. Also, more questions could be asked of the same interviewees in follow-up interviews which were not a feature of this study;

- Opinions of professional ensemble singers should be solicited on the topic;
- A survey of viewpoints of conductors of Early Music and of choral music should be undertaken to ascertain when and if they advocate straight-tone in their performances;
- Instrumentalists with experience in various Western Classical styles, including Early Music, should be consulted for their views on straight-tone and vibrato use in chamber music performances;
- Ear, Nose and Throat specialists and voice therapists should be interviewed with regard to their experience of patients who perform with a straight-tone;
- A study on the balance between the stylistic aesthetic education of singers and technical training should be completed.

6.5 Conclusion

This study is important for both singers and teachers alike. The information is useful for teachers of young, developing voices so that the necessary vocal health cautions are adhered to. Also, for advanced students and their teachers, it is important to consider the use of straight-tone singing for stylistic and aesthetic reasons because it is sometimes asked for by conductors of certain choirs and Early Music projects. While it is ultimately a singer's choice to choose repertoire and which vocal techniques to use, it is important to have clearly defined definitions of vibrato and straight-tone singing before choosing or rejecting either.

Since music production and therefore also vocal music will always be concerned with subjective taste and aesthetic, there can be no conclusive answer as to whether straight-tone singing should be employed or not. However, considering the vocal health implications, it is clearly important to be cautious in its employment. This study challenges singers and vocal teachers to advocate a sound quality only if they understand how it is created and are able to explain why it is to be preferred.

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Addendum A
Formal letter to participants

8 Dinglewood Court
Dingle Avenue
Kenilworth
7708

Dear

I am contacting you regarding the research for my Master's dissertation at the University of Cape Town. My supervisor is Associate Professor Anri Herbst and my research topic is:

Western Classical Perspectives on Straight-tone Singing.

The main objective of this study is to determine opinions of if, how and in what way a singer can produce a straight-tone healthily when it is professionally demanded of them. Specific performers and teachers of Classical singing will form the target group for this study.

My course of study is Masters in Classical Voice at the University of Cape Town. My activities outside of the university include solo performance in a variety of musical styles and also ensemble singing and directing in Cape Town and the surrounding areas. I am currently a piano accompanist for undergraduate singers at the University of Cape Town and act as coach for their repertoire.

I would appreciate your willingness to participate in this study. You should feel free to withdraw from this project at any stage should you not be comfortable with the information that is requested from you. Research participants will remain anonymous throughout the study and their identity will be kept strictly confidential. All information given will be treated with strict confidence. The final research results will be made available to you in the form of a PDF file at your wish.

The interview or questionnaire will be approximately one hour in duration. The nature of the research will be qualitative. Ideally, the interview period will take place during March and April 2013.

My heartfelt thanks for reading this letter. I look forward to our further correspondence.

Yours sincerely,

Antoinette Blyth
Candidate MMus

South African College of Music
University of Cape Town
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Addendum B
Research information sheet and request for consent to participate

I, Antoinette Blyth, have received approval from the Faculty of Humanities (South African College of Music*)* UCT to undertake an MMus research project entitled:

Perspectives on straight tone singing in Western Classical Music

Objective:

The research aims to compare professional opinions on the use of straight-tone singing within the Western Classical musical tradition.

Methodology:

This study will comprise of several interviews and questionnaires to ascertain professional opinions about Western Classical usage of straight-tone singing. International performers who have utilised straight-tone voice production will be questioned about their experience with this style of singing. Teachers of singing from a variety of countries including South Africa, Norway and England, will be interviewed on their views of healthy production of straight-tone singing if they indeed condone the use at all. The methodological paradigms to be used in this study are a mixture of quantitative and qualitative.

Participant's involvement:

There will be no personal risks to the participant in this study. The participant will not be given professional benefits for their participation and will not be remunerated. There will be no cost for the participant.

- I agree to participate in this research project;
- I have read this consent form and the information it contains and had the opportunity to ask questions about them;
- I agree to my responses being used for education and research on condition my privacy is respected, subject to the following:
  - I understand that my personal details will be used in aggregate form only, so that I will not be personally identifiable.
  - I understand that I am under no obligation to take part in this project;
  - I understand I have the right to withdraw from this project at any stage.

Signature of Participant: ---------- **Name:** ----------

Signature of researcher: ----------

Date: ----------

Antoinette Blyth (Researcher)
Telephone: (021) 650 2626
Email: aeblyth@gmail.com
Supervisor: Associate Professor Anri Herbst

Addendum C
Interview questions

Questions for performers

Preliminary survey:

1. Do you deliberately think about your vibrato when you perform? (Y / N)
2. Do you consciously vary your vibrato for different styles of music, for example, Baroque to Romantic? (Y / N)
3. Do you consciously vary your vibrato when you perform in different acoustics e.g. dry to very resonant? (Y / N)
4. Do you consciously vary your vibrato when singing in an ensemble? (Y / N)
5. Have you ever consciously repressed your natural vibrato? (Y / N)
6. If so, have you done this frequently in performances? (Y / N)
7. Would repressing your vibrato be something you could sustain for long periods of time? (Y / N)

Interview:

1. How do you define vibrato?
2. How was the subject of vibrato addressed when you started as a singer (solo or in a choir)?
3. Can you discuss this statement?

   'When blending in an ensemble, a singer needs to adjust their vibrato.'
4. Are there other types of adjustments you make to your voice in order to blend, such as limiting your colour, resonance or dynamic?
5. Do you believe it is unhealthy to eliminate natural vibrato from your singing?
6. What, if any, are the major vocal differences between how you sing Early Music and how you would sing music beyond the 18th century?
7. When I listen to performers of Early Music, there seems to be a specific type of vocal production common to all. What vocal qualities do you think a singer needs to perform Early Music successfully and stylistically?
8. What is your view on this statement? 'In Early Music, vibrato should be used solely as an ornament.'
9. What kinds of discussions or requests, if any, have you had from conductors or musical directors about how you produce vibrato?
10. All young singers are expected to be versatile in a variety of Classical styles.

    (a) What vocal health benefits could there be to versatility across the styles?

    (b) Could such versatility hamper a young singer? If so, how?
11. What would your advice be to young singers wanting to specialise in Early Music on how to start their vocal training?
12. Should young singers explore their full vocal potential first in a variety of genres within Western Classical music or should there be a specific technical approach from the outset?

Questions for singing teachers

Preliminary survey:

1. Do you think continuous vibrato in the singing tone is the ideal sound for Classical singers? (Y / N)
2. Do you believe that vibrato is a natural result of a well-supported and well-placed voice? (Y / N)
3. Do you believe the absence of vibrato is a sign of tension or strain in the voice? (Y / N)
4. Do you believe the absence of vibrato is due to incorrect technique? (Y / N)
5. Can a voice still be well-placed and supported if the vibrato is consciously limited or virtually eliminated? (Y / N)
6. Have you taught singers who sing healthily without a perceptible vibrato? (Y / N)
7. Is singing without a perceptible vibrato a way of singing that you would normally encourage with young singers? (Y / N)
8. Would you ever encourage a mixture of straight-tone and vibrato-tone singing within one song for reasons of style or taste? (Y / N)

Interview:

1. How would you describe the method of vocal technique that you teach?
2. 'Versatility in all Classical styles should be exercised by all young singers.'
   (a) What is your view on this statement?
   (b) What possible vocal health benefits would there be to versatility across the styles?
   (c) Could such versatility hamper a young singer? If so, how?
3. Could you please respond to this statement?

   'Addressing the subject of vibrato with your students can be a valuable way of enhancing the quality of their sound.'
4. How would you instruct a student to limit their vibrato or produce a sound without a perceptible vibrato?
5. Does singing with a straight-tone or very minimal vibrato harm to the voice? If so, how?
6. How should a singer approach early Baroque or Renaissance solo music in terms of their vibrato?
7. What would your approach be to teaching a singer with a piece of music that involves quarter-tones?
8. Singers in traditional a cappella choirs are expected to blend in order to create a homogeneous sound. Blending often requires adjusting the colour of an individual's voice to match the others. What is your advice to students who want to sing in such choirs?

Addendum D
Interview transcriptions

Interview with Performer A

Preliminary survey:

1. Do you deliberately think about your vibrato when you perform?
   Yes
2. Do you consciously vary your vibrato for different styles of music, for example, Baroque to Romantic?
   Yes
3. Do you consciously vary your vibrato when you perform in different acoustics e.g. dry to very resonant?
   No
4. Do you consciously vary your vibrato when singing in an ensemble?
   Yes
5. Have you ever consciously repressed your natural vibrato?
   Yes
6. If so, have you done this frequently in performances?
   Yes
7. Would repressing your vibrato be something you could sustain for long periods of time?
   No

Interview:

1. How do you define vibrato?

An undulation of the small laryngeal muscles, tensing and relaxing of these small muscles which are under involuntary control rather than direct muscular control. Strong views on an ideal speed of vibrato. A healthy speed is about 6 oscillations or 5-7 per second. It's very interesting that vibrato speed has changed as a fashion over the decades. Old recordings of singers in the more distant past sang with a very fast vibrato, almost a tremolo like Galli-Curci etc. Compare to instrumentalists – Heifitz faster vibrato than the present fashion like with Perlman who had a slightly slower or wider vibrato. Dangers are in speed and width. A healthy vibrato forms a wave that goes slightly above and below the pitch, if it goes too wide you stop hearing the true centre of the pitch. Varying the speed of your vibrato: the ability to vary it is important in terms of your flexibility for coloratura. Oftentimes when a run feels awkward or uncomfortable it is because the oscillations of your vibrato don't line up with the speed of your semiquavers. And then its all sort of lumpy and bumpy. If you can alter your vibrato speed consciously or unconsciously, then you can sing coloratura at a variety of speeds so you can be flexible for different conductors.

Straight-tone singing is withholding the vibrato. Traditional schools of singing thought think this is the worst possible thing you can do for a voice. Don't agree entirely. Straight-tone is inhibiting that vibrato, but it can be done with more thought than mere physical gripping. Much as these are involuntary muscles, insofar as we can control them, we do it with our imagination. Achieving straight-tone is sometimes done by over-gripping of throat/laryngeal

muscles which results in a very tense vocal production and a restriction of air flow, therefore it feels horrible in no time flat. It can be done by will-power rather than gripping and what your aesthetic desire is at that moment. That being said, I do feel that as a teacher I've found, young/developing voices that don't have a vibrato and sing healthily, but once you reach late teens or 20, singing with a consistently straight-tone becomes associated with a locking of the breath and locking of the air stream. Also an unconscious desire not to grow up, often with sopranos – afraid of sounding old or wobbling. They restrict and don't learn how to truly support the sound with the whole body. I'm as allergic to a sound with a consistent vibrato that's present the same on every note - it is one of the most boring things artistically that I can imagine. I am in favour of it from a vocal standpoint, but I think it is something that has to be very very flexible. In repertoire of all periods you choose to use more or less of it, like any good spice!

2. How was the subject of vibrato addressed when you started as a singer (solo or in a choir)?

It was addressed by a teacher I had as a teenager at 16 or 17. Strangely enough only this teacher and myself address the subject – we are the only two teachers and singers that I've come across that discuss it in detail – I'm a little shocked at this. Teacher studied under Appelbaum/man who studied with Vennard – he must have talked about it. He tried to get me to vary the speed of my vibrato and I do this with my students although I don't insist on it as much as I ought to probably. But I can change my vibrato speed quite easily and make it wider and narrower, faster and slower, quite easily. Bizarre concept not to talk about vibrato for the idea of self-consciousness. There's an epidemic of very unhealthy vibrato at the moment. Dangerously slow and wider vibratos from young singers trying to sing too big for the size of their instrument and for how developed their breathing technique is. They produce a vibrato that sounds like they're 60! 4.5-5 a second – they sound worn-out before they've begun. And this is one of the things that turns the layman off classical singing right away. The wobble!

3. Can you discuss this statement?

'When blending in an ensemble, a singer needs to adjust their vibrato.'

Have done so little ensemble singing, so not an expert in it. But even in duets, I certainly think about it and adjust, but in terms of chorally, I wouldn't be the person to ask. But in chamber music I would consider it. Also performing with an obbligato instrument. Something to talk about, like shall we start that straight and then add the vibrato. Sometimes it's instinctive and sometimes you talk about it.

4. Are there other types of adjustments you make to your voice in order to blend, such as limiting your colour, resonance or dynamic?

One changes that all the time, depending on the orchestration and what colour you want according to the mood, text, key and era. There's a notion that you have a voice and it's always going to be the same. Basically it is, but as a good artist you change the timbre as often as you can to suit different repertoire. Otherwise it's tedious. In the professional at a fairly high level, you change your colour instinctively, or through advice from coaches.

5. Do you believe it is unhealthy to eliminate natural vibrato from your singing?

Not unhealthy for sections of the music for reasons of style. Unhealthy to eliminate it as a general rule or as an aspect of your technique.

6. What, if any, are the major vocal differences between how you sing Early Music and how you would sing music beyond the 18th century?

The length of phrases is quite different. 19th century phrases are longer phrases that are more evenly supported, they require breadth in the support and in the way you shape them. There is a breath requirement that is quite different, it's much more consistent and it's greater. You need to sing louder over a bigger orchestra and then also you tend to have a more consistent vibrato. It's very important in later repertoire that the vibrato is even from one note to the next. Notes need to start with vibrato. Early Music singers tend to swell (wedge) into notes from straight into vibrato, this is inappropriate for later music. For a beautiful bel canto line you need an uninterrupted vibrato as the pitch changes. Not every note in Baroque music should start straight. The demand is different in terms of line. In Baroque you think more in terms of gesture – you're not thinking so much about vibrato but rather of the phrase line, rhythm of the dance (light and heavy etc.) Example of Bist du bei mir (upbeat downbeat.) You use straight-tone for a lonely feeling etc.

7. When I listen to performers of Early Music, there seems to be a specific type of vocal production common to all. What vocal qualities do you think a singer needs to perform Early Music successfully and stylistically?

Two things have distracted us along the way. One of which: Emma Kirkby when she started was not a trained singer and her voice was not very developed and it certainly suited a lot of that music. But this came to be what was expected of that music. Her voice never did have a lot of vibrato. It was not entirely a decision as much as a coincidence. The countertenor voice also tends not to have a lot of vibrato. Also in older, e.g. Alfred Deller there's a lot of straight-tone there. Secondly, there has been a lot of misunderstanding about writing because of the choice of words in terms of what's a healthy undulation vs what's a shake and what's a wobble. Martha Elliott Singing in Style – useful handbook – she has things to say about vibrato and stylistic singing. My own feeling is that you never want a vibrato to interfere with the music or with what's happening harmonically. The appropriateness of voices to certain kinds of music has a lot to do with timbre rather than actually to do with vibrato. Vibrato that in any way draws attention to itself is a detriment in Early Music. On the other hand it's nice to be able to warm a sound with vibrato, for reasons of colour. But I think that when you hear a timbre of a voice and it goes perfectly with certain instruments, then you have a match. For example, my voice with Baroque oboe and strings, it's a match. So it's more about colour than vibrato quality. Tremolo and other vibrato faults distract from the harmonies.

Lessening a wider vibrato: so much to do with breath and muscular support. Train against a metronome. "Open throat" can actually make the trachea too rigid. When you inhale don't do anything that compromises that freedom. Over opening can create rigidity and it's difficult for the folds to meet on the onset and you get less freedom to undulate and vibrate ideally. Clean onsets (uh uh) without air escaping – training this clean articulation before you can sort out vibrato problems.

Trill is different to vibrato physiologically. Trilling: whole larynx goes up and down. Different animal to vibrato. You have to let go of control in order to flip into a trill. A good trill is a good test of throat relaxation. Like starting a car, boiiiinggg flabby and wiggly mechanism. Tarzan type song.

8. What is your view on this statement? 'In Early Music, vibrato should be used solely as an ornament.'

To some extent it is a problem with definitions. A fulsome vibrato can certainly be considered an ornament in Early Music, but having a rod-straight sound I don't believe is what was being talked about as an aesthetic. Instrumentalists specialising in Baroque don't use absolutely no vibrato. It's inaccurate – it's an interpretation of.... A pleasing "shake" different words in different times and countries etc. Human voice hasn't changed that much. A mature developed, even a not developed voice like a folk singer has a little vibrato, sometimes a lot. It's something that just happens. I'm sure it happened in the 17th and 18th century centuries as well. They probably also had ugly wobbles too then that didn't please people. This is more likely what was being talked about. Vibrato should be a modest thing. In Strauss big emotional crescendo you might want the sound to develop and you want it to be plummy.

9. What kinds of discussions or requests, if any, have you had from conductors or musical directors about how you produce vibrato?

Absolutely. Started working with [renowned Baroque conductor] at the start of my career, it was something that came up a lot.

10. Should young singers explore their full vocal potential first in a variety of genres within Western Classical music or should there be a specialised technical approach from the outset?

You're not going to make a living doing just one thing and you won't be a rounded musician just doing one thing. I share the passion, but they should sing a variety of different types of repertoire for a few years to balance it out. There are students who don't like that but I think it's healthier vocally and artistically to be educated and then you choose. Don't advocate trying to develop a young voice fast anyway. A lot of Early Music is a very good thing for pretty much all young voices because they aren't tempted to sing too big too fast. Because they learn flexibility, delicacy of phrasing, all kinds of things for all types of music including later music. The most dangerous thing to do with a young singer is to encourage rapid growth. Or anything that makes the sound of the voice old, mature and developed, sounds all very exciting when you're 17 – but this will screw you up. Every young voice should be trained as it were, as an Early Music singer and as the voice develops and matures, more possibilities and colours reveal themselves – you start working into different repertoire.

Basically phrasing is everything in music of any era. If you understand phrasing – what harmony is doing, how it's directing vocal line in Baroque music then you start understanding phrases, phrase shapes – this gives you a foundation for the 19th century and so on repertoire. It's a fantastic training ground musically and vocally. I don't like too much ghettoisation (isolating) anywhere. Not good for your technique to be singing music that extends your technique all the time, best to come back to lighter repertoire: Schubert and Mozart. Mix it up. Beginning to understand the style and phrasing etc and developing a solid and versatile technique. You won't understand baroque phrasing if you haven't done 19th century phrasing. You need the comparison between the styles. Need to be open to different styles. At age 19 you don't know where you'll end up, where your voice might want to take you. But if you don't have a good sense of style from different periods you're a bit stuck. You might be asked to sing Mozart and it'll sound like Handel or your Elijah sounds like Handel. It's much more interesting to be versatile between styles: flexibility of technique and imagination. You need the stylistic input and exposure otherwise all your styles will sound the same. Better to be versatile. Flexibility of technique and imagination.

Interview with Performer B

Preliminary survey:

1. Do you deliberately think about your vibrato when you perform?
   No
2. Do you consciously vary your vibrato for different styles of music, for example, Baroque to Romantic?
   No
3. Do you consciously vary your vibrato when you perform in different acoustics e.g. dry to very resonant?
   Probably, though it's barely conscious
4. Do you consciously vary your vibrato when singing in an ensemble?
   Yes. Again, it comes so naturally to do so that I may not be that conscious of it unless variation in my colleagues focusses my thinking that way.
5. Have you ever consciously repressed your natural vibrato?
   Yes, rarely
6. If so, have you done this frequently in performances?
   No
7. Would repressing your vibrato be something you could sustain for long periods of time?
   What I do doesn't feel like repression

My focus all the time is on the words and the best and most effective diction to embody them. When that works, in my experience, vibrato becomes immediately less of an issue because it no longer features at the onset; good consonants give one a ringing vowel and altogether the best sound for musical phrasing; as such a note continues to ring it naturally becomes "warmed" with a little vibrato - that one might be the one that very occasionally and only for particular special effects I might find myself suppressing.

Interview:

1. How do you define vibrato?

There are different types, most singers have some sort because if you sing long notes without any, it sounds restricted, because it is natural that when you hit a note, it will start to ring. The one that interests me is one that happens naturally when the note warms up a bit, starting from a good consonant or vowel, clear what note you're on, dissonance and harmony is clear, start without vibrato. I'm only interested in a vibrato that starts later on, sustains, resonates, rings beautiful "beats". Continuous vibrato at the beginning of the sound is pointless in Early repertoire, as it obscures the harmony and pitch and you can't hear the consonants. With a powerful voice, vibrato happens sooner, it is useful as an amplifying device – but I still would like to hear the consonant first. But this is not speaking anymore, it's more like shouting.
It is interesting that Strauss only expected to hear about 40% of the text in his songs. In Early Music, text is of primary importance, rhetoric, persuasion. Interesting that in Pop music – words have started to matter again!

2. How was the subject of vibrato addressed when you started as a singer (solo or in a choir)?

It wasn't really, but choir teacher auditioned for/chose singers who sang with little. Those who had bigger vibrato would go do something else. I wasn't aware of it. Even from early on, it was all about speech and diction. As a coach, I won't mention the word vibrato but I rather ask the singer to respond to requirements of the style and speaking the text.

3. Can you discuss this statement?
'When blending in an ensemble, a singer needs to adjust their vibrato.'

I'm not conscious that much. Ring together with another singer, naturally adjust. Use the same vowels and coordinate the diction and the stress. I'm not big believer in blend for its own sake, don't stamp out individuality. Like-minded people react the same way to a text and this is as much blend as you need.

Singers today are used to competing with other singers and with the piano. Use the lute and harpsichord so you can hear the whole voice, explore flexibility and natural volume. Balance with the instruments.

4. Are there other types of adjustments you make to your voice in order to blend, such as limiting your colour, resonance or dynamic?

This is an instinctive process. Everyone needs to be heard, all parts needs to have their place, space to express themselves. Whole becomes more than the sum of the parts. Don't limit individual colour, just be aware of the rhetoric and diction, each will feel they can contribute and feel fulfilled.

Not enough people have had the chance to experience this expressive freedom. Singing must be effective and not dutiful.

A singer's hands need to be up by the heart, not in the despair position: "I'm a good student" position, this is not freely expressive. Use the body to sing, natural gestures when you speak. Helps projection, resonance because shoulders are more relaxed. Make the body available. Embody the song when you learn. Hands up by the heart, helps difficult music part. Keeps balance, voice centered where it should be. Brain sections that deal with hands and words are very close together, so they are meant to interact. Canto lirico *is only noise and no sense. It's a contradiction in terms, because you don't hear the words.*

5. Do you believe it is unhealthy to eliminate natural vibrato from your singing? You spoke of eliminating your vibrato for special effects, can you give an example of such a special effect?

If you're playing an innocent character, you can use a childlike sound. Make it whiter. Vibrato was a special effect in earlier times. It's a matter of taste. Some people want to bask in a beautiful sound and not work so hard in listening. Wonderful beautiful sound can also be a special effect, but it can be a sound without a message. Lazy modern listeners prefer background.

Straight-tone is rejecting something natural, so you can't do it for too long. Depends on the

repertoire and what you want to achieve. Vibrato helps with tuning. The "all purpose sound" is not applicable to Early Music.

6. What is your view on this statement? 'In Early Music, vibrato should be used solely as an ornament.'

We're talking degrees. If it is the type that is busier, thrilly and catches your attention, it's an ornament. But the ringing vowel that warms up is a slight, natural vibrato and doesn't attract attention. One musn't compromise pitch or confuse a suspension or dissonance.

7. What kinds of discussions or requests, if any, have you had from conductors or musical directors about how you produce vibrato?

Hardly at all. Didn't learn the all-purpose sound from bottom to top – this makes all sound the same, stamps out individuality. I'm more direct about what I want. Throbbing vibrato like St John's Passion "Tod": holding vowel and maybe letting the body flutter, half-way down the windpipe. Flutter in Purcell's King Arthur the "Cold Genius" – thinks this is something that singers of the time would not have dreamt of doing normally, instead of it being a written-out vibrato or ornament. More of a special effect.

8. All young singers are expected to be versatile in a variety of Classical styles.
   (a) What vocal health benefits could there be to versatility across the styles?
   (b) Could such versatility hamper a young singer? If so, how?

One mustn't be up against anything too loud especially as a young singer. Take huge care. Unless they're precocious. Singing should be speaking voice plus 50%. Versatility should be about being used to different instrumental accompaniment. Debussy, because of his sensitive use of the piano, together with 19th and 20th century art songs, is more healthy for the singer. It would be great to hear Debussy's piano. Versatility is about hearing and reacting to the sound. What they hear they will give back. Conservatoires should have lutes. Singers should be working with instrumentalists all the time, not being separated. Stop competing with the piano all the time. "Nun beut die Flur" from Haydn's Creation: there are only a couple of places that need to be loud, otherwise it's much more speech level.

9. What would your advice be to young singers wanting to specialise in Early Music on how to start their vocal training?

At this point we're down to individuals, teachers vary so much, some are specialist teachers, some are not and are just good teachers. Step one is singers need to find people to sing with: singers and instrumentalists. Practising on your own all the time is not an organic activity. You need to live the music in groups. Training in bel canto era (Handel - ends with Rossini) – defined by Robert Toft book: includes information from the accounts of singers, good training, long messa di voce on all the vowels – endless exercises. All the singers knew their rhetoric, like Bach taught. Be versatile and imaginative. Be a good musician, particularly for Early Music.

Interview with Performer C

Preliminary survey:

1. Do you deliberately think about your vibrato when you perform?
   No
2. Do you consciously vary your vibrato for different styles of music, for example, Baroque to Romantic?
   No
3. Do you consciously vary your vibrato when you perform in different acoustics e.g. dry to very resonant?
   No
4. Do you consciously vary your vibrato when singing in an ensemble? (Y / N)
   No
5. Have you ever consciously repressed your natural vibrato? (Y / N)
   Not that I'm aware of
6. If so, have you done this frequently in performances? (Y / N)
   Not applicable
7. Would repressing your vibrato be something you could sustain for long periods of time? (Y / N)
   Not applicable

Do not think about vibrato. Think about breath. Amount of breath used influences vibrato and sound. Healthy voice always has vibrato. The white sound without vibrato, a sound often associated with Baroque music, is a sign of a voice that's not very developed yet. The vocal cords don't close enough yet and they allow breath through. Voices with uncontrolled vibrato – that is a sign of being old or bad treatment.

Interview:

1. How do you define vibrato?

Can't have sound without the vibration of the two membranes together and that by definition would create some sort of vibrato so vibrato is a product of air moving through the vocal cords. It's like damping the strings of an instruments so they can't vibrate, then there won't be any sound.

2. How was the subject of vibrato addressed when you started as a singer (solo or in a choir)?

Wasn't addressed at all. Only if there was a troublesome vibrato – then it would be spoken of. Too much, take it away. Never been spoken to about it personally.

3. Can you discuss this statement?: 'When blending in an ensemble, a singer needs to adjust their vibrato.'

Yes and no. With untrained voices they would need to mix in or blend for a homogeneous sound. But when there is a choir of professional singers with proper training and not trying to blend, the result is a better sound because (like an orchestra...) – more formidable. Training

the younger voices, can be detrimental to blend, some voices more developed than others. There'll always be some kind of unhealthy balance going on where the good ones have to tone down and the not so good ones have to try and sound like the better ones. My feeling is that if you have two or three good voices with a solid technique it makes more sense to get the others singers to try and do what they are doing instead of them trying to adapt to the others. If a good developed voice sings in an ensemble, completely on the voice and in their body, their voice won't stand out, but will actually add to the whole and add a fuller sound without sticking out like a sore tooth. Unless there's a budding Wagnerian singer who insists on belting.

4. Are there other types of adjustments you make to your voice in order to blend, such as limiting your colour, resonance or dynamic?

It's quite possible but it's not conscious. Most people's ears automatically do for them. It depends on your voice and what you are singing. Main focus is staying on the breath, making air flow instead of holding on to the breath – that's my battle going on. Occasionally I think of being more supportive than soloistic. But usually this is not a conscious thought.

5. Do you believe it is unhealthy to eliminate natural vibrato from your singing?

Yes. Can cause more problems that be good in the end. Especially if you're sustaining this for long periods of time. When people generally are singing without vibrato, with a white sound, there's always jaw or tongue tension going on (when the vibrato is forcefully eliminated from the voice.) Many times when they've finished singing, their voices will be sore and you sometimes hear it in their speaking voices as well, that their voices are tired and sore. This is because they stretch the vocal mechanism and hold onto it with their tongue. So lots of jaw and tongue tension. In a lot of young singers their often try to imitate a specific singer – they're not letting voice be free and expressing the music, but they're imitating another singer. Inevitably trying to make a tuba sound like a French horn, something is not quite right.

6. What, if any, are the major vocal differences between how you sing Early Music and how you would sing music beyond the 18th century?

Not in the vocal production, but in the use of air. There's a big difference between singing Handel runs and singing Mahler or Strauss lines. That has to do with how the breath flows. How the breath flows influences how the tone sounds, for example runs vs. long sustained lines. It has a lot to do with breath control and expressing the text. Depends on your accompaniment e.g. piano vs orchestra. Never want to push the voice, but there are times you need to use more air and that changes how you sound. More air influences volume and to an extent the size of the vibrato. The force applied to a vibrating string influences the size of it (and then the vibrato?) Repertoire changes the breath application on the voice. The amount of vibrato really depends on the amount of pressure that's exercised on the vocal cords – and that has to do with the amount and the speed of airflow.

7. When I listen to performers of Early Music, there seems to be a specific type of vocal production common to all. What vocal qualities do you think a singer needs to perform Early Music successfully and stylistically?

Not all voices can sing everything. There are certain voices that sing certain music. But the perception over the last 30 years and how it was at the time and the trend now, if you have a

good technique and know how to use your voice, you should be able to sing most things (physical restrictions apart). It would be hard for a soubrette to sing a Wagner role, but it could be perfectly possible for a Wagner voice to tone their instrument down so that they'd be able to sing some of the more dramatic Baroque music. And there's more and more of that happening now in theatres – they are using bigger voices for what would have been traditionally cast for a "baroque singer". Handel wrote for the castrati – which had the best techniques – so people are warming up to the idea that maybe it was bigger voices that were intended for some of these traditionally tweeted and tooted recorded versions of what we have nowadays. So people's perceptions are slowly changing. Young voices starting with Early Music because they have light voices – it's a good place to start. You have to sing what is appropriate to your development at a certain stage. A beginner singer cannot sing "Laschia ch'io pianga" the same way someone who's been singing for 30 years. They might have inherently the same type of voice, but there will be drastic differences because the young singer doesn't yet know how to properly close the vocal cords and sing.

8. What is your view on this statement? 'In Early Music, vibrato should be used solely as an ornament.'

No. Because that would mean I would have to hold the sound which would bring in tongue and jaw tension, in my case and most other young singers. And the moment this kicks in, when they suddenly put a vibrato on the voice, you get a wobble jaw and that's because they're holding the sound when they're making a small sound and then suddenly pushing on the air when they want to make a bigger sound, while still holding the sound with their tongue and jaw and then their jaw starts wobbling. That's when you get a very pronounced vibrato, which is a sign of a fault.

Vibrato could be used for decorative effect I suppose. Squiggle on St John's "Tod" is a definite trill because of how Bach thought - more instrumentally – it would be more precise than just adding more vibrato.

9. What kinds of discussions or requests, if any, have you had from conductors or musical directors about how you produce vibrato?

They don't. Most conductors don't say what they want – they're usually happy with what I do and they're not finicky or fussy. One was very specific about ornaments he wanted, but even he didn't discuss vibrato even in terms of colour.

10. All young singers are expected to be versatile in a variety of Classical styles.
    (a) What vocal health benefits could there be to versatility across the styles?
    (b) Could such versatility hamper a young singer? If so, how?

Not good for very young singers. After 6-8 years of study, you should be able to cover quite a large amount of styles. 27 is still a very young age to attempt things like Wagner roles or even some Strauss, unless the voice has a very solid technique etc. But versatility is good, you have to cover a large range of styles because it teaches you how to express different things. People express different emotions in different ways over the diffferent periods. Like a poet who only writes happy poems – h's not going to sell a lot. He needs to be able to cover the whole spectrum of human emotions in order to be considered a poet. It's the same with singers- you have to be able to convey your emotions and technique over a wide variety of styles. Versatility is not the be all and end all but it is quite important. In the same vein, if you have a

special affinity towards a certain style of music and you are happy performing that. You have to know your strengths and your weaknesses are. And if your strengths are a certain period of music and you're making a career of it then go for it. Don't write off the others because it's still important to be able to do all of these things because it makes you a whole/well-rounded singer, but if Baroque's your thing then rock it!

11. What would your advice be to young singers wanting to specialise in Early Music on how to start their vocal training?

Always to get a good foundation in technique. Go back to bel canto, castrati training, old technique songs, old italian arias and also listening a lot so they get to know the repertoire. Where there's recordings available go and listen to it and see what people do and think would I do it the same way, different approach. That's a good way to start. In the beginning you might want to imitate what people do, as you grow you put your own personality into it. The main thing to learn is to sing without tension, with the vocal cords closing properly, with airflow happening properly. So, breath control is the main thing, and free production – the first two big things to strive for. Start with what you're familiar with in order to work on these.

12. Should young singers explore their full vocal potential first in a variety of genres within Western Classical music or should there be a specific technical approach from the outset?

There must be a definite approach from the beginning. The teacher will hear from the first few lessons what the potential is. But there's no point in trying to develop potential by trying to work across everything. You've got to break it down. (You first sing whatever you're singing.) Start with easy vocal pieces – to get the solid range strengthened and then slowly building onto it, the top and bottom improve as a result and then the breaks and then all is incorporated.

Interview with Teacher X

Preliminary survey:

1. Do you think continuous vibrato in the singing tone is the ideal sound for Classical singers?
   Yes, that's a basic requirement (a shimmer)
2. Do you believe that vibrato is a natural result of a well-supported and well-placed voice?
   Yes, it's a result of the movement of the vocal folds and constant air pressure
3. Do you believe the absence of vibrato is a sign of tension or strain in the voice?
   Yes
4. Do you believe the absence of vibrato is due to incorrect technique?
   Yes
5. Can a voice still be well-placed and supported if the vibrato is consciously limited or virtually eliminated?
   No, not possible
6. Have you taught singers who sing healthily without a perceptible vibrato?
   No
7. Is singing without a perceptible vibrato a way of singing that you would normally encourage with young singers?
   No
8. Would you ever encourage a mixture of straight-tone and vibrato-tone singing within one song for reasons of style or taste?
   No, you can't go from no vibrato whatsoever to vibrato healthily

Interview:

1. How would you describe the method of vocal technique that you teach?

Basically believe that you have to have a very moderate but very constant air pressure so that there are no sudden bumps or pushing or squeezing. Then you have to encourage the larynx to stay open which naturally tends to close if there's any trauma or shock or sudden change or unprepared movement to a very high pitch. You have to take the air pressure very moderately, very smoothly for about a fourth for sopranos and a major third beneath the passaggio at the top of the voice, different for sopranos and tenors. Basically the modal passaggio for the tenor and the second passaggio for the soprano, you would have to start hearing by not increasing the breath pressure but by encouraging the breath pressure to stay moderate and to slightly laugh the sound open so that the larynx opens slightly, just about a third beneath the passaggio – this is where a person would shout if they haven't had the training.

So, basically in order to train that I work a lot on regulating the breath pressure on voiced consonants. Start with the fricative "zz" because this helps to free the false vocal folds above the real vocal folds and gets the shimmer on the voice. This shimmer is a combination in my view of the false vocal folds vibrating and also the real folds being allowed their naturally slap and wiggle movement, which means the sort of oscillation in the vocal folds which produces a natural vibration of the sound. That oscillation is what I call the vibration of the voice. What I call vibrato is when you take that natural vibration of the voice and you slightly

increase the pitch of the oscillation. Very slightly, so not up to the point of being a wobble which is a result of too much air pressure and squeezing the larynx, but a very gradual increase in the intensity of the sound will take this natural vibration to the level of vibrato as an ornament and there I do believe you can vary the vibrato from a state of absolute natural vibration of the voice, of the movement of the vocal folds, to a perceptible intensifying of the sound of the oscillation.

So basically the technique I try to teach is a very smooth and continuous air pressure which then will sit on the support. The support is also something a lot of teachers talk about as a thing. I don't see it like that, I see it as an interaction between the right kind of resistance of the vocal folds or of the voiced consonants in which the vocal folds are still vibrating, through the air pressure. If the air pressure is moderate and continuous in the legato, and meets this moderate resistance through the closure of the vocal folds, or through the articulation of a voiced consonant, with the lips or tongue, then you will feel a reaction in the lower abdominal muscles specifically the slight contraction of the transverse abdominus which has to be engaged. People try to consciously tighten the stomach muscles to locate that muscle. It is a voluntary muscles so there can be a voluntary connection to it. But many people especially if they're young, don't find that connection. And in order to find that connection, you have to encourage them to stay open throated and stay open chested – keep sternum up so that the stomach wall stays relaxed, the chest is naturally open and the shoulders are down. All that is going to encourage a sort of open chimney feel at the back, which will then allow the air pressure to connect properly to the diaphragm and the diaphragm then is supported in its rise by a whole host of muscles but this pelvic area and the TA is very important for the duration of the phrase or of the note. At the end of the breath, then that muscle is gradually under more and more contraction and the very important thing then is to release that contraction so that the diaphragm can drop and air is sucked in like into a vacuum into the bottom of the lungs as opposed to people breathing high. So this release, or drop down of the TA is very important in order to take a new breath and to have that breath column sitting in such a way that those muscles are working again to support the diaphragm.

I tell people when they go beyond the passaggio, to the first soprano or tenor F#-A, that they should engage gradually more and more – F# they need to drop the shoulders so the muscles between the shoulder blades are slightly more active and gradually that active feeling goes down the back to the lower back and then by the time you get to the really high note Aflat/A, that in the pelvic floor, the muscles that women use to control the urinary function and men use to control or stop an orgasm, those muscles are then also used in the very high notes. And that is in order to stop people using the stomach muscles and the higher abdomen muscles to push the air in the top part. So it's like you're gradually are going down down in terms of muscular activity. And all that is to maintain a very moderate air pressure through the passaggio into the top top. Basically that's it. Very often heavier voices have a problem in the passaggio because the middle voice is very heavy and rich and mezzos or baritones – they need to be encouraged to sacrifice something – to start slimming the voice before the passaggio allowing the overtones to be present. This is where the shimmer of the vibration of the voice is very important – encouraging those overtones and using a great deal of legato in that. As you prepare the passaggio, all that legato is in order to regulate the breath pressure in relation to the natural vibration of the voice.

2. Could you please respond to this statement?
'Addressing the subject of vibrato with your students can be a valuable way of enhancing the quality of their sound.'

I don't address it directly in terms of correcting it or adding it because people tend to compensate by tensing or squeezing or pushing in order to create a vibrato. Firstly train the air pressure and air flow using voiced consonants. Vowels are much more difficult to regulate and that is months and months of work to create a habit that this continuous column of air keeps flowing and movement sitting on lower support. And then you get onto vowels from that. Working with vowels it's important to look at the modulation of the vowels themselves. A young singer would try to sing what they hear when they speak and miss out intermediate vowels. But if you do a modulation of the vowels "u-o-a", you are using a continuous modulation of the articulation mechanism to arrive at that next vowel. What's interesting is what is between the vowels because there the singer's ear is not controlling in the wrong way. They're actually less aware of having to control because they don't hear it so well. If you get them to make a movement very slowly between the vowels very often it's successful because they're very used to fixing an a or o or "i" in the way they've learnt in an artificial way. The journey between the breath on the legato and the breath is a kind of unknown thing. As Paul Lohmann said in his book about singing errors: singer is a bit like a baby. When it sees things, it's not enough to see the object, it needs to feel it in its mouth. With a young singer it is the same: they think they can hear, but actually their ears are not hearing in the right way. It's better to encourage them to feel their voice the way a baby would feel something like in its mouth. Feel the vibration, the air pressure, feel where a vowel sits and then later when their ears are reeducated to hear that feeling as opposed to always going back to having the wrong feelings, to recreate what they perceive to be the right vowel or the right sound (which is actually a manipulation of sound.) So there is a problem of hearing in inexperienced singers, but they have to use a kinesthetic sense of the air and also a sense of the feeling of the breath and the vibration in the body and the mouth as well as hearing. And learn to hear the invisible things such as the modulations between the vowels, the modulation between the notes and things like that that they don't normally hear.

Usually train " i e a o u" and back, or just lip vowels: "u o a" or just tongue vowels "i e a" or backwards. The round "u i u i u i o a" to find the way around the other side of the vowels. You have two kinds of resonance space: pharyngeal – where raw material, the exciting, is generated – and the articulation space: mid, front vowels, not back. In other words, encourage the phonetics, the articulation of the mid or front vowels but without closing the pharyngeal space. Many singers do one or the other. They either only over open and down the pharyngeal space, pushing down the tongue and have no articulation. Or if they over articulate, they close down the back and it goes in the nose. So you've got to have a kind of bridge between the pharyngeal space and the articulation space and that is very important is the tongue. "i" vowel: tongue is in its highest position, encourage the midblade of the tongue to sit between the top molars so that the root of the tongue comes out of the back and creates more space. Relative to the "i" then you train the e and the a. And what singers often do is squeeze the e and then over open the a so it drops back. Very important to try and tune this. Then you often have tongue and jaw tension problems so you can use the lips and their movements, to make the phonyms for "o" and u, u more at the front so you're not lengthening backwards. Keep midspace open for the open o and u so you never drop the soft palate. That is what young singers can't manage. So, you're looking for a high tongue position and even for the "a" the tongue stays slightly bowed, and encourage not to drop for the open o and u. Manuel Garcia says the tongue should stay lightly arched, bowed even for a, open o and u.

Tongue root coming away from the back is important to allow space for the larynx to tilt and tilting allows the larynx to stretch and that thins the vocal folds and allows the singers into the passaggio. So this tongue root being pushed down is a disaster for the passaggio. Which is why the right phonetic articulation is important. Tenors like to vocalise on "i" over passaggio, sopranos or high tenors prefer "a, u or open o". Important to get the root of the tongue away from the larynx so that the larynx can suspend and stay, it doesn't have to be pulled up by the tongue. If somebody's very tense, through years of squeezing and pushing – it can be that they have a high larynx which will need a bit of exercise or physiotherapy to allow the larynx to ride a bit lower without pushing even when the tongue is high. It's like stretching the tongue away and allowing the larynx to just hover.

3. Does singing with a straight-tone or very minimal vibrato harm the voice? If so, how?

As you prepare the passaggio, [the use of] all legato is in order to regulate the breath pressure in relation to the natural vibration of the voice. The problem is there are a lot of misunderstandings about vibrato. Some think it's something to be eliminated in which case you're stopping the natural movement of the vocal folds and very often to that you're actually stopping the air flow or squeezing and using the larynx as a sort of valve. And this valving tendency has to be bypassed. Those singers who tend to squeeze and eliminate vibrato also tend to squeeze and push with a tight larynx. To get round that I would use the voiced consonants like "vvv" and "fff" in order to regulate air pressure I'd use the rolled "r" as it creates a very good amount of air pressure, regulates the air pressure with ease above the larynx and then takes them from those voiced consonants into vowels and to try to do that smoothly without massively increasing the air pressure once you come into a vowel. Otherwise the vowel goes "splat" and the voice spreads or people then squeeze the larynx in order to produce focus in the vowel which isn't focus because there's too much air pressure.

Without that vibration – if you squeeze and sort of stiffen the vocal folds, you haven't got a hope in hell of getting into the passaggio and going beyond it. It's like squeeze and push until you break. So I would say eliminating vibrato totally is a rather dangerous thing because it can create vocal habits or muscular habits which will then interfere with getting in to the top register.

4. How should a singer approach early Baroque or Renaissance solo music in terms of their vibrato?

No difference in vocal approach. Problem is the other way around. There are all sorts of problems that creep in very late in the singing history – late 19th, early 20th centuries, a big increase in the air pressure. Loss of the school of agility. Singing teaching is more about sustaining long tones. Where the voice is considered another element of an orchestral texture which is far more powerful than anything before. Also where perhaps the dramatic declamation as opposed to melismatic singing takes over. That creeps in very late as an emphasis in the singing, but basically if you go from Monteverdi all the way up to the early 19th century the basic vocal production as opposed to musical style is not that different. Monteverdi had declamation and eloquent melismatic coloratura – both aspects of rhetoric – these two styles there right up to the early 19th century. But this focus on agility is thrown out of the window and what you get is slowly evolving phrases, slow sustained powerful legato and dramatic declamation. You miss the fast moving melismatic style which meant that the voice had to be trained to work on moderate air pressure, because without moderate air

pressure, you can't sing coloratura. So coloratura was a useful training method. If you look at singers who start with agility and fast moving exercises and not only slow sustained exercises. You're to train both movement in singing (so you don't get stuck especially in the high voice) and then you also have to teach legato in slower phrases. If you only teach slow sustained singing, it's very difficult for a young singer to literally sustain that.

Early Music should not be cut off or separate singing technique. In Early Music you have the evolution 1600-late 18th c. of bel canto in its purest sense: elegant articulation of singing with words and the elegant use of melisma. Seeds are there right from the beginning of the solo revolution. Although the music forms evolve and change, the singing technique is not different. Some start their singing from the late Romantic period and they miss out on some things that are very important, not just musically but you learn certain skills by singing Handel and Bach right up to Schubert and Mozart: phrasing and rhetoric in the music, freedom. If you start with Wolf and Mahler etc, it's like asking an apprentice to take on a huge task without any real skills. But if you've learnt the classical skills of legato, phrasing on the breath and releasing, phrasing off ends of phrases, starting properly. Once you have this you can use it in the Romantic music and push it to its limits but you never let go of it. Even Wagner wanted the Italian singing style. It's more a 20th c. problem, working backwards.

Second world war was such a break in opinions. Recordings before the WWII, recording aesthetics were very different. Like Schwarzkopf – in her later recordings she uses a learned technique: more velvet and round, for singing into a microphone as opposed to a gramophone bell. Earlier recordings of her are different – sang with full theatrical voice. Singing had to have a certain focus and upper frequencies disturb the microphone and close up it sounds edgy. Surface of the voice, sanitised, not true. Singers tend to imitate sound, then manipulate their sound to match.

5. What would your approach be to teaching a singer with a piece of music that involves quarter-tones?

I think a quarter tone is actually quite a big interval, if you allow the voice to have a very natural vibration. In other words, it only becomes a problem of intonation when the vibrato is such that the oscillation of the vibrato is wider than the natural vibration of the voice. For example, if you take a composer like Domenico Marzoli, 1640-1660, the Roman composer, he writes in his music quarter tones slides for enharmonic modulation, this because he's trying to reinvent in Baroque music the equivalent of the Greek enharmonic genus. So, as opposed to just a diatonic chromatic scale, he's looking for enharmonic tuning. He describes it as a slide through a quarter tone so that you would get an enharmonic tuning from G# to Aflat. My own experience of singing this music and also teaching it, is it's very difficult to do that slide of quarter-tone pitches unless there's a real sense of legato- and legato is really singing on the air allowing there to be a continuum. No need to slender or focus the voice more than it already is. Any time you're squeezing or closing is going to make pitch much more difficult to control because you're radically changing the air pressure and you'll end up with a tone that's either flat or sharp. Whereas if you stay open throated and have the air sitting properly, supported by those lower abdominals, then you're going to have very moderate air pressure continued producing a slide on a naturally vibrating vocal tone. The equivalent of an instrument is 4ter comma meantone tuning like in Monteverdi where the third is absolutely pure. The oscillation of the third is very peaceful in quality, it's not busy or fizzy. A third on a piano in equal – has a very restless vibration, with extra beats, disturbed way. The natural

vibration of the voice if you let it sit on the air pressure, is more like that, very peaceful and regular vibration that you hear in the pure thirds in mean-tone.

6. Singers in traditional a cappella choirs are expected to blend in order to create a homogeneous sound. Blending often requires adjusting the colour of an individual's voice to match the others. What is your advice to students who want to sing in such choirs?

Students without choir experience often have faulty rhythm and other musical things. Then others who have sung in choir all their lives but they've limited the spectrum of overtones of their voice in order to blend, limited their colours – these are difficult to teach if they carry on singing in choirs because they've got to relearn how to hear their voices alone. They've got their skills and can use them to sing in solo ensembles. Those without the musical training experience I recommend to sing in ensembles, madrigals, cantatas to work on harmonic structure, to tune intervals better. Remedial ear training. Probably not in a big choir where they have to hold back, especially with big voices. It's easier for a light voice to blend in a choir.

7. Where did you gain your scientific knowledge and experience as a singing teacher?

Accumulation of things. 30 years opera singer, natural singer, never stopped from age of 7. Basic technique from music college, learned by performing and singing, coaches, teachers and language coaches. I had to start thinking harder when started giving master classes. Then individual teaching, [in PLACES]. Had to articulate more consciously my natural side of singing plus learned technique, then I went to specific physiological method teachers. I wanted to learn how they perceived the vocal mechanism. One doesn't necessarily need to learn singing physiology as a separate thing to one's instinctive learning or wisdom, but it's useful for support and for correction. The aspect of moderate air pressure, for example is something a young singer can get away with, only becomes an issue when you get to your forties and the natural flexibility of the muscles is less, then you've get less room for error so you have to start to be more consciously consistent. You can't hit and miss. Things like that I had to very consciously be far more disciplined as I was getting older, mid forties and doing more teaching. It was a double journey: one being far more exact for myself and then also learning how a voice consultant, vocal therapist works with dysfunctional voices etc. Learned a lot about the in between moments and very fine-tuning of suggestiveness needed – makes a difference between making an artificial tense sound and allowing the voice to have its natural movement and freedom. Strongly believe in and recommend that students have an experience of. They teach a basic vocal hygiene in the legato and articulation which is based on fact not on some merely suggestive teaching. Young singers often get into trouble by singing too much suddenly on limited technique and sometimes they have a vocal crisis. The crisis can be from emotional things, psychological blocks, they reach their limits and this translates as a physical thing. Otherwise they have a physical trauma which can affect their singing, especially under pressure. In these cases they should go to an ENT specialist, like for cramp or swelling or illness. Vocal therapy is useful to correct the remedial issues which singing teacher doesn't have the time to focus on.

Also sheer nitty gritty of dealing with conservatoire students – learn from the difficult students "my laboratory". Let go of clear tensions.

Interview with Teacher Y

Preliminary survey:

1. Do you think continuous vibrato in the singing tone is the ideal sound for Classical singers?
   Debatable
2. Do you believe that vibrato is a natural result of a well-supported and well-placed voice?
   Yes
3. Do you believe the absence of vibrato is a sign of tension or strain in the voice?
   Yes
4. Do you believe the absence of vibrato is due to incorrect technique?
   Debatable
5. Can a voice still be well-placed and supported if the vibrato is consciously limited or virtually eliminated?
   No
6. Have you taught singers who sing healthily without a perceptible vibrato?
   Yes
7. Is singing without a perceptible vibrato a way of singing that you would normally encourage with young singers?
   No
8. Would you ever encourage a mixture of straight-tone and vibrato-tone singing within one song for reasons of style or taste?
   No

Conclusion from the preliminary survey: vibrato is a natural occurrence and straight-tone is not. Consciously limiting or repressing the vibrato is bad, but if the vibrato is not very perceptible it doesn't mean there are necessarily faults in the technique. Would never advocate limiting one's natural vibrato.

Interview:

1. How would you describe the method of vocal technique that you teach?

Consciously relaxed: jaw and tongue but formed tongue in order to form vowels. Sing with physical connection. Mix of Italian and German but working with body. Voice rides on breath because that is what gives the voice its colour. Connected sound. Does not teach shallow singing (breathing high) – creates tension. Can take vibrato out with the body. Singing with freedom, letting voice flow freely, not restricting. Any singer should be able to sing bel canto – art form that needs to be practised. Safe way to start, even though it's hard, asking a lot of a young singer, getting line. Bel canto and Baroque is very skilled art form, harder than other things.

2. 'Versatility in all Classical styles should be exercised by all young singers.'
   (a) What is your view on this statement?
   (b) What possible vocal health benefits would there be to versatility across the styles?
   (c) Could such versatility hamper a young singer? If so, how?

Agree. Have to be realistic especially in this country. Cannot make a career singing only one

style. Got to extend yourself and explore your abilities. Young singers will find it hard to be versatile across all the style periods. They are trying to find their voice and making vocal adjustments in different styles is not beneficial at that stage. Find your primal voice, don't try to imitate or manufacture a sound. Before you experiment with all the styles, you need to feel comfortable in your own voice and let the technique settle. As you grow older, the voice changes and you learn more about your vocal abilities. Once you have the basis and you're comfortable with your sound then it's easier for you to expand. Can't do everything at the beginning. But versatility is something to strive towards.

3. Could you please respond to this statement?
   Addressing the subject of vibrato with your students can be a valuable way of enhancing the quality of their sound.'

Steer clear of the technical terms because it can confuse the students. Careful to talk about vibrato. Should be a natural outflow of a healthy voice. If singing with connection and open throat, the vibrato will come. Don't talk too much about vibrato with beginners. Scared that they will make or manufacture a vibrato which may become a wobble or bleat. Keep the voice supported and the vibrato will happen naturally. Adding vibrato – it's not a button. Can say I want more depth in the sound, refer to colours. We sing by mental images – what image are you forming?

4. How would you instruct a student to limit their vibrato or produce a sound without a perceptible vibrato?

Nice mixture of more head voice, good combination of head voice and middle, but mostly head voice, I think. Head tone makes it lighter and you have better control over the vibrato. Too much head tone can sound contrived and be difficult to listen to. Have a sound in your ear, like clarity. (especially in the passagio area.) Go by a sensation or a sound and the cords adjust naturally. Difficult to say "less vibrato" because it constricts. Thinking of a sound, keeping the support. Sub-glottic pressure if it's too much, say sing past the vocal cords, otherwise tight sound.

5. Does singing with a straight-tone or very minimal vibrato harm the voice? If so, how?

Young voices can be naturally straight and fresh. If it's done intentionally, then it can cause tension. Bigger voices trying to blend in a choir can get a lot of tension, sore throats. If you don't know how to do it, you will constrict.

6. How should a singer approach early Baroque or Renaissance solo music in terms of their vibrato?

Think like an instrument. Take the weight out of the sound, keeping voice free, more focused sound. Keep same freedom but take weight out. Become one of the instruments of the ensemble.

7. What would your approach be to teaching a singer with a piece of music that involves quarter-tones?

Have to have a good ear first of all! Some vibratos are more than a semitone! Need an excellent ear. Never had to teach that. Something one can explore. No space for vibrato.

8. Singers in traditional a cappella choirs are expected to blend in order to create a homogeneous sound. Blending often requires adjusting the colour of an individual's voice to match the others. What is your advice to students who want to sing in such choirs?

Don't say that they can't. Depends on the sound that the conductor wants. If they know what they're doing, then happy for the student to sing in the choir. Students coming from choral tradition, don't take away this first love of singing. There are specific choirs – would not suit the students, especially youth choir with a specific sound like a breathy sound – not a good sound to advocate – irritates the cords. Sound ideal is very different to solo singing. Depends on type of repertoire and sound required. We are training soloists not choristers. Sometimes tell people to sing in a choir because they're not singing enough between lessons. Singer needs to sing everyday. Too many conductors don't know what they're talking about vocally. Eliminate excessive disturbing vibrato with support. Sound ideal in some choirs is a tense manufactured vibrato.

Interview with Teacher Z

Preliminary Survey:

1. Do you think continuous vibrato in the singing tone is the ideal sound for Classical singers?
   Yes, if we talk about a soloist and a well trained professional singer
2. Do you believe that vibrato is a natural result of a well-supported and well-placed voice?
   Yes
3. Do you believe the absence of vibrato is a sign of tension or strain in the voice?
   Not necessarily, it depends on the training and the singer's condition
4. Do you believe the absence of vibrato is due to incorrect technique?
   Not necessarily
5. Can a voice still be well-placed and supported if the vibrato is consciously limited or virtually eliminated?
   Yes
6. Have you taught singers who sing healthily without a perceptible vibrato?
   No
7. Is singing without a perceptible vibrato a way of singing that you would normally encourage with young singers?
   Yes, when it is a natural part of the tone
8. Would you ever encourage a mixture of straight-tone and vibrato-tone singing within one song for reasons of style or taste?
   No

Vibrato is a natural thing, but the absence of it doesn't necessarily mean strain. Voice can still be healthy if vibrato is minimised.

Interview:

1. How would you describe the method of vocal technique that you teach?

Don't have a specific term, but it's a mixture of different things. Knowledge from different people, masterclasses and books I've read. Use some aspects from each, stress different aspects from different places. Teaching based on my singing technique. Much knowledge from the bel canto, not from old-fashioned e.g. Tosi's Florid Song. Bel canto was dependent on the easy, slender way of making sound, dependent on coloratura technique, all embellishments etc. I've adopted that from books written about bel canto. I've also benefitted from Garcia – Spanish baritone and teacher. Wrote two books and many articles about singing (1804-1905). Both have been inspirational. Garcia started with old-fashioned bel canto style, but then the Romantic music era, including Mozart, Haydn and most especially Beethoven e.g. Fidelio. Asked for a voice use that the bel canto wasn't able to accomplish. Especially with the tenor voice, the use changed quite a lot. And that started around 1820. Rossini didn't like the full voice up to top C – can be very efficient in big opera house, but unusable in other kinds of music.

Garcia talk about voix sombre and voix clair. Lower and upper voices. Romantic period had deep/darker characters – all get deep, darker voices. All the bad things with vibrato starts. If you listen to old recording e.g. Herman Winkermann – Wagnerian singer. Lived until 1912.

listen to Smetana. He was a heldentenor but didn't sing with a lot of vibrato. Oren Brown – well orientated with a lot of texts on singing – took all traditions and techniques into consideration. Richard Miller and Sataloff – have more or less same ideas – differences in details. But most complete book about singing technique is Discover your voice. Very Influenced by him. Start off with the speaking voice and upper voice: falsetto or flute and try to mix, combine both into a full voice – important for a solo singer, not so important for choral singers especially light voices: choral tenors can sing with a falsetto. Altos sing in chest, sopranos in head predominantly. Opera chorus is well blended.

2. 'Versatility in all Classical styles should be exercised by all young singers.'
   (a) What is your view on this statement?
   (b) What possible vocal health benefits would there be to versatility across the styles?
   (c) Could such versatility hamper a young singer? If so, how?

Recommend versatility and variety of Classical styles. Diverse styles at the beginning. Take into account what each asks for – don't suggest Romantic opera for a young singer. Start with Baroque, Classical, songs by Haydn and Mozart, Lieder by Schubert, Brahms etc, not so much Strauss and Wolf – ask for strong expressive – need a good technique to bear that expression. But song in general is good for training for opera. Because they're not asking for too much expression: strength, dynamics, strong expression on high notes – hard for a young voice to achieve. Can start with Mozart e.g. Magic Flute small arias. But not Tamino's or Queen of the Night aria for young singers. That opera has a mixture of many things. Also long lines – very good breath control – hard for young singers – enough air to sing long phrases. Kirsten Flagstad – she has good breathing technique – never sings loudly, just with a good ringing in the tone, resonance – makes enormous resonance. She started close to 40 to sing dramatic roles.

Monteverdi not harmful to the voice. But if you want to develop different repertoire, don't only try Monteverdi. We get better at doing things if you train each style. Have to train specific things in each style. Just don't start with the heavy repertoire. Foundation technique is the same through all the styles. Monteverdi and Rossini quite similar, but Rossini asks for a bigger range. Embellishments and agility very similar. Rossini and Mozart similar flexibility and Bach is also different and difficult in a different way. Things to manage as a singer.

3. Could you please respond to this statement?
   'Addressing the subject of vibrato with your students can be a valuable way of enhancing the quality of their sound.'

I don't talk about vibrato. Only if it's too much. Reasons for too much can be various. In modern music, they have to sing so loud to carry over the orchestra – result is to increase vibrato. It's a kind of protection of the voice. Say don't sing too loud, sing controlled, 60-70%, think more about flow, slenderness, - two main things that keep the vibrato away. Think rich quality. Slenderness is more or less the same as focus. Singing broadly doesn't get a rich voice, but it's the opposite. Never ask for the student to increase their vibrato or add more. Natural vibrato is very nice and it isn't a big extent, small interval. Older singers after having done dramatic roles often have wide extent. Never train the vibrato, it's a part of the tone.

4. Does singing with a straight-tone or very minimal vibrato harm the voice? If so, how?

No. Anything can be harmful, it depends how you do it. If you take into consideration, flow

soft attack and placement of the larynx. Of course you can sing without vibrato, but in lower dynamics, not fortissimo or in high register. This can easily harm the voice because you have to use so much power. Normally results in too heavy subglottic pressure – that can be harmful. But singing and blending in a choir – no problem to sing without vibrato – does no harm. But solo voice – most listeners want to hear the shimmering.

5. How would you instruct a student to limit their vibrato or produce a sound without a perceptible vibrato?

Don't sing too loud is one of the main things.

6. How should a singer approach early Baroque or Renaissance solo music in terms of their vibrato?

To be able to sing these styles, you can't sing too loud. You have to handle the ornaments. Sing slender, focused, not too loud, good direction of breath, flow. Don't hold it or constrict, let it go.

7. Singers in traditional a cappella choirs are expected to blend in order to create a homogeneous sound. Blending often requires adjusting the colour of an individual's voice to match the others. What is your advice to students who want to sing in such choirs?

Main thing in blending is for everyone to do the same thing, have the same approach in the singing. Attack of tone and vowels are the same. Students need to take responsibility - when you take vibrato away, singing with not that rich ringing resonance, you are always taking away something. You cannot be 100% individual. Voices are different, some dark, some light. You can teach them to do the same approach to every phrase, have same ideas about intonation, placement of vowels, blending registers. Good conductors need to have a good idea about vocal technique. Have had a lot of students with choral problems. Can be a combination of a lot of reasons that problems arise. Problems experienced – like girls choirs from 10 – 20 years. During that time, so many things change and many of the singers will continue to sing in the same way, and this will harm the voice, because a young singer needs at least some help to change the voice, they may need to change from soprano to alto etc.

Solo students can sing in a choir if it's a good choir and good conductor with the right knowledge of singing. Sometimes tell students to stop singing in a particular choir because of strange ideas not compatible with their solo singing training. I teach singers (not just soloists) to have a healthy voice use that's the main thing – not to harm it – this has the result that it allows them to sing solo, ensemble. That should be a goal of all teachers to be able to teach students to be versatile. Not good to specialise too early. Flagstad – before her dramatic roles, she had sung about 40 smaller roles, similar to Lilli Lehmann's story.