

# VOCAL TRAINING DURING MALE PUBERTY

## A critical literature review on male voice mutation

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## Declaration

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By submitting this thesis electronically, I declare that the entirety of the work contained therein is my own, original work, that I am the sole author thereof except for the content stated otherwise, that the reproduction and publication thereof by Stellenbosch University will not infringe any third party rights and that I have not previously in its entirety or in part submitted it for obtaining any qualification.

Stellenbosch, April 2019

Xander Kritzinger

## Abstract

VOCAL TRAINING DURING MALE PUBERTY – a critical literature review on male voice mutation.

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In a country where choral music enjoys a rich heritage especially in schools, little focus has been placed on vocal health and the development of young singers. Very few studies have been done in South Africa in this regard. Furthermore, the question of how to deal with pubescent boys experiencing vocal change during this development period in a choral context has enjoyed even less attention. This study endeavoured to answer the above question by asking another question, namely, what happens physiologically during puberty and how do these changes impact the voice of the pubescent boy? In answering, a physiological overview has been presented to provide a better understanding of this process. The intention is to provide conductors and pedagogues with a basic understanding of how to manage the vocal change of pubescent boys. Contrasting literature has been studied to tap into the thoughts of theorists and researchers regarding the pubescent singer and whether these boys should be allowed to sing as opposed to resting their voices. Once it was established that the modern approach is to let the pubescent boy continue singing, the next step was addressed, namely, how vocal pedagogues should deal with the singing adolescent while they (the pedagogues) had no resources at hand. This study provides the conductor working with pubescent boys with solutions in the form of vocal exercises. The study furthermore elaborates on the use and application of exercises for results in breath control, the improvement of healthy phonation (vowel placement), and the successful mixing of problematic register changes. Exercises are presented for the use in choral rehearsal spaces thus providing choral conductors with practical solutions to deal with the pubescent boy and his changing voice that could result in a generation of pubescent boys equipped with tools to cope with vocal change.

## Opsomming

SANGOPLEIDING GEDURENDE MANLIKE PUBERTEIT – ’n kritiese literatuuroorsig oor die mutasie van die seunsstem.

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In ’n land waar koormusiek ’n ryk herkoms geniet, veral in skole, word min op vokale gesondheid en ontwikkeling van jong sangers gelet. Selfs minder aandag word bestee aan studies oor die problematiese veranderende seunstem. Voorts word die vraag oor hoe om binne koorverband te werk met tienerseuns wie se stemme verander, nóg minder aangespreek. Hierdie studie poog daarin om bogenoemde vraag te beantwoord by wyse van die vra van ’n verdere vraag, naamlik, wat gebeur fisiologies gedurende puberteit en hoe beïnvloed sodanige veranderinge die stem van die tienerseun? Ter beantwoording hiervan en ten einde ’n beter begrip daar te stel is ’n fisiologiese oorsig oor die stemverandering van tienerseuns aangebied. Die doel hiervan is om dirigente en pedagoë te voorsien van die basiese kennis oor hoe om stemverandering van tienerseuns te hanteer en te bestuur. Kontrasterende literatuur is bestudeer om die benadering van teoretici en navorsers oor of tienerseuns toegelaat moet word om voort te gaan met sing of om eerder hul stemme te rus, vas te stel. Die studie het vasgestel dat die moderne benadering is om tienerseuns toe te laat om te sing. Die volgende stap was om vas te stel hoe pedagoë die singende tienerseun moet hanteer terwyl hulle (pedagoë) geen hulpbronne tot hul beskikking het om seker te maak hul hanteer die stemverandering korrek nie. Hierdie studie bied oplossings aan die dirigent wat met tienerseuns werk in die vorm van stemoefeninge. Die studie brei verder uit oor die gebruik en toepassing van oefeninge vir asembeheer, verbetering van gesonde fonasie, en die suksesvolle vermenging van problematiese registerveranderinge. Oefeninge word vir gebruik gedurende kooroefeninge aangebied en voorsien koordirigente met praktiese oplossings om met seuns in puberteit en hul veranderende stemme te werk. Op die manier word ’n bydrae gelewer tot ’n generasie van tienerseuns wat toegerus is met die nodige hulpmiddele om hul veranderende stemme te kan hanteer.

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# Chapter One

## INTRODUCTION

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### 1.1 Introduction and background to the study

Many South African boys' schools, such as the Drakensberg Boys' Choir School, the Afrikaans Hoër Seunskool (Pretoria), Paul Roos Gymnasium (Stellenbosch), the St John's College (Johannesburg) and Pretoria Boys' High, to name but a few, have young male voice choirs. Despite this phenomenon of choral music education in South Africa, many choir conductors who deal with young male voices lack expert knowledge on how to approach the specific challenges of working with adolescent voices and how to keep young voices healthy.

According to Killian (1999), boys experience a significant increase in the length and thickness of the larynx during male puberty which can start as early as the ages of eleven or twelve years. She continues to say that, "documented vocal challenges that occur during this transition stage include limitations of range, breathiness of sound, incomplete phonation in sections of the range, inability to control pitches, lack of vocal stamina, and limited control of vocal loudness" (Killian, 1999, p.358). Ashley (2009) believes that the fully developed adult male voice is only experienced in his early twenties and that clues of vocal change are not only found in the voice lowering but also in greater hoarseness, roughness of sound, pitch instability and glottal attack. Van Heerden (2000) is of the opinion that change in the male larynx happens because of the influence of the increase of testosterone during puberty. He continues that the question whether boys going through the vocal mutation phase may receive vocal training or not is frequently asked. Seidner and Wendler (1982) believe that vocal training can only happen when professional singing teachers are entrusted with the task, and that they should do so with the utmost care within short practise sessions. According to them, choral or ensemble singing during male vocal mutation is strongly discouraged because of the kinetic functions of the larynx and auditive control, which is not yet co-ordinated. Cooksey (1977) however, argues that if a young male

sings within the comfortable range during mutation, voice and tone quality will develop naturally, if proper principles of correct vocal production are applied. He continues to say that, “the challenge then becomes one of developing techniques and methodologies to train the voice during each phase of the mutational process” (Cooksey, 1977c, p.5). With these contrasting views, confusion may arise because of the lack of knowledge on the part of the choral conductors working with boys during this phase.

It is thus proposed that an in-depth study be done on the process of voice mutation experienced by boys during puberty, to better understand the preconditions of a healthy and sustainable voice education for this specific age group. This will require a broader understanding of the matter and in order to create this broader understanding, contrasting views will be analysed and discussed.

## **1.2 Exploring existing research literature**

Little research has been done on vocal training during male puberty and most resources published in English tend to refer to four American scholars, namely, McKenzie, Cooksey, Swanson and Cooper.

McKenzie (1956) provides a theoretical background on male voice mutation in his book, *Training the boy's changing voice*. He discusses traditional and modern theories, the evolution of the Alto-Tenor plan, as well as the boy's voice during adolescence, including the comfortable range policy and the passing from the unchanged to the changed voice. Theories on voice testing, tonal possibilities and preserving the Pre-Tenor voice are also discussed. The second part of the book is devoted to the international approach to the changing male voice in a singing context.

In a series of consecutive articles about male voice preservation, Cooksey (1977a, 1977b, 1977c) provides us with a background of existing theories, stretching from ancient Roman and Greek times through to the height of castration during the seventeenth and eighteenth centuries. He mentions the impact of theories of McKenzie, Cooper and Swanson on this field of research and discusses scientific and empirical findings. These findings include voice mutation and physiological changes in the male adolescent, mutational changes related to the organs of phonation during puberty, sequential voice development, range, voice breaks and relationships with changes in the speaking voice, and research pertaining to adolescent voice changes. In his last article, Cooksey (1977c) puts forth an “integrated approach” for the training of boys

continuing to sing during vocal change. Starting off with classifying and analysing the young male singing voice by means of five stages of voice development, the author describes, moreover, favourable voice testing methods in groups and individually. Cooksey (1977b) also explains the basic principles of good tone production and ends off his article by providing exercises for the male voice during its mutational stages. Seidner and Wendler (1982) believe that vocal training can only happen when professional singing teachers are entrusted with the task, and that they do so with the utmost care within short practice sessions. According to them choral singing or ensemble singing during male vocal mutation is strongly discouraged because of the kinetic functions of the larynx and auditive control which are not yet coordinated. Van Heerden (2000) also discourages uncontrolled singing during puberty and describes the various stages of the vocal mutation process experienced by boys going through puberty in the third chapter of his Master's thesis. "Practise sessions must be without extreme volume of sound and done with an awareness of the limited vocal range" (van Heerden, 2000, p.61). He discusses vocal development before adolescence and provides a description of the physiological changes in the larynx during adolescence. Different stages of the mutation process as well as different voice types of the young male voice are also discussed. Regarding the age of boys experiencing vocal mutation, Killian (1999) found that boys' voices may be changing earlier than had been suggested by previous research. By using Cooksey's changing voice stages, 11 and 12-year old boys' voices were categorised and compared with one another. In a 12-month perspective longitudinal study on the relationship between weight, speaking fundamental frequency, and the manifestation of phonational gaps in the mutating male voice by Willis and Kenny (2006), eighteen boys experiencing vocal change were recorded doing three ascending and three descending vocal slides over the extent of their vocal range on the vowel "a". Results were analysed to determine the range of frequencies produced and the frequency characteristics of the phonational gap and were plotted against changes in weight and speaking fundamental frequency as indicators of pubertal development. This was done to test the theory that weight change and speaking fundamental frequency were both related to the appearance of phonational gaps. Mecke (2007) looks at the handling of voice change from the 1700s to modern day from a musicological perspective. She researches the reasons why boys' choir conductors cannot use boys going through voice mutation because of problematic repertoire, choral structures, aesthetics and the quality of the choral sound, psychological and social conditions as well as medical and

pedagogical convictions and competencies. She also asks the question whether the phenomenon of boys ceasing with singing in European Boys' choirs have always been the known practice or whether there were times when, what happened with the changing or growing voice, were not conceptualised at all. Hollien (2012) reviews adolescent voice change in males with a brief historical overview followed by a summary of studies that describes this process in the average boy. He puts forth existing research in the form of models which can be used to establish a reasonable description of physiological details and which serve as basis for future research. Leck (2009) re-examines the term 'voice change'. He continues to let boys sing in their high voices whilst going through vocal change and developing their new lower voices, namely, "a three-octave voice without a break" (Leck, 2009, p.49). He believes that if you allow boys to sing in their high voices and if you continue with descending *glissandos* over the *passaggio* enough, the break disappears. He also believes that, "nearly every male who is allowed to keep singing in his high voice is able to keep that voice" (Leck, 2009, p.49). In a group study led by Fuchs (2005) an empirical study had been done on predicting mutational change in the speaking voices of boys. The group study explains the methods and results in detail with regards to voice protection. In a study about how adolescent male choristers experience the vocal mutation in choral programmes at school, Freer (2016) has found that boys showed an interest in obtaining knowledge about their changing voices, especially in the process of change and vocal techniques that could help them through the time of vocal change. He believes that, "this has been supported by similar studies with an additional finding that boys who are most likely to perceive themselves as unsuccessful singers might be more willing to continue singing when provided with information about the voice change, its process and its effects" (Freer, 2016, p.74). He also mentions his research produced interest amongst them in more individual knowledge and personal skill development which they could apply to singing and choral activity as they desired.

### **1.3 Statement of the research objectives**

The objective of this thesis is to provide choral conductors working with pubescent boys, with a broader understanding and guidance on how to deal with pubescent boys and their vocal health. What happens during male voice mutation? When does it occur? What does research in other countries indicate? Is it possible to continue to sing during this period and if so what kind of vocal training is required during vocal change? These questions arise because of the lack of

knowledge about the healthy vocal development in rehearsal spaces of children's, boys' and youth choirs in the country.

#### **1.4 Research design and methodology**

The methodology of this study is non-empirical research and a literature review. The study aims to provide a better understanding of a very specific field in choral music tuition in schools. By using secondary data, existing sources on male voice mutation, historic and current handling of the topic, vocal health, and physiological mutation of the larynx and the general dealings of pubescent boys singing in choirs, were analysed.

Mouton describes literature reviews as, “studies that provide an overview of scholarship in a certain discipline through an analysis of trends and debates” (Mouton, 2001, p.179) and further refers to non-empirical research that uses secondary data. He continues to describe literature review as an “exercise in inductive reasoning ... in order to come to a proper understanding of a specific domain of scholarship” (Mouton, 2001, p.179). According to Mouton (2001) the limitations of a literature review are the fact that these can only summarise and organise existing scholarship and that it cannot produce new empirical insights.

In this study, resources were divided into four categories to establish a broad overview of male vocal mutation. The first category established a case for little singing during puberty. The second category of resources addressed an analysis of existing empirical data on the physiology of the male voice during puberty. A third category represented a case for the continuation of singing during puberty which was full of contradictions and was debated and analysed accordingly. The last category represented an understanding of general vocal health during vocal training for boys and was also analysed. Being a critical literature review, this study does not aim to present new research but presents current and past research in a comprehensive overview. This study thus creates a proper understanding of the changing boy voice. By incorporating some practical examples for the work with pubescent voices, an attempt is made to understand the theoretical findings of the study from a practical perspective. It is hoped that this adds more relevance to the thesis.

## **1.5 Chapter Layout**

### **Chapter One: Introduction to the study**

This comprises an overview of the background to the study as well as the research problem. It also serves as an introduction to the research design and methods used.

### **Chapter Two: General physiological overview of the mutation process**

The aim of Chapter Two is to give an overview of the physiological mutation process experienced by boys going through puberty. This chapter also includes references to various stages of mutation.

### **Chapter Three: Contemporary views on male vocal mutation**

In this chapter various views regarding healthy singing for boys experiencing puberty is compared and discussed.

### **Chapter Four: Understanding healthy singing for boys**

Chapter Four refers to existing vocal exercises for boys in a choral context that are collated and analysed for use in a South African context. Specific references are made to the use of the mixture of registers, vowel placing, and phonation.

### **Chapter Five: Conclusion**

Chapter Five gives an overview of the project, highlights the main points of discussion, and elaborates the findings of Chapter Four. Chapter Five concludes with recommendations for further study and critically reflects on the shortcomings of this study.

## Chapter Two

### THE PHYSIOLOGICAL MUTATION PROCESS OF THE MALE VOICE

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#### 2.1 Introduction

In order to create a brief overview on the mutating boy voice, the aim of Chapter Two is to present research of the physiological mutation process experienced by boys going through puberty. This is done by analysing some of the leading studies on this matter. The analysis stems from questions such as: What is the role of testosterone in this process? When does it occur and what happens with the larynx during puberty? A historical overview will also be presented with a look at selected research done during the last 35 years. This chapter also includes a discussion on the various stages of mutation.

#### 2.2 Historical and current overview of studies on pubescent voice change in males

The pubescent change of the male voice has a far-reaching effect on choral and individual singers. For teachers, scholars, and artists, this mutation process is not only interesting but also important, since the physiological changes of a boy reaching puberty have a direct impact on his performance as a singer.

According to Hollien (2012) the question often arises as to what happens physiologically when boys experience this phenomenon. In fact, this question has been asked for centuries. Where this question could not be answered Hollien (2012) claims that in the last millennium boys would simply be replaced by other boys or by women, where allowed. In European cultures, where women were not allowed to sing, the problem was resolved either by processes and teaching methods that prolonged the adolescent's ability to sing in the higher registers, or by training tenors to use their falsetto. In extreme cases, attempts were even made to remove the effects of puberty, by castrating child singers.



Hollien (2012) continues that, up until World War I, attempts to understand this process were either non-existent or very crude, mostly due to a lack of time, training, and technology, and because of the neglect in providing useful detail on the matter, generalisations about the mutation process emerged. However, after World War II, a general effort was made to gain insight in vocal mutation and with the advancement of technology and the development of the scientific method, research became more objective and databased.

During this period Pedrey (1945) approached the basic problem, i.e. when voice mutation starts and ends, by observing 1014 boys between the ages of 11 and 16. For this study he compared boys' actual ages to three stages of voice maturity and contrasted these voice measures through three levels of pubic hair growth. Not all of his measures were quantitative; however, it could be used by researchers such as Tanner (1970) who provided an overall understanding of the subject.

Yet, confusion still existed concerning male voice mutation. Various studies were done such as studies comparing boys' ethnic background, the climate of the boys' place of upbringing, and nutrition. It was found that boys of an Afro-American ethnicity originating in the south of the USA experienced voice mutation earlier than Caucasian boys from the north of the country. Similarly, Hollien (2011) studied adolescent voice change in different climates. For this study boys were divided into five groups of 12 to 16-year olds and data were collected on height, weight, and the mean fundamental frequency (an average measurement of the lowest frequency produced by the voice) of 491 boys from four different countries, i.e. Sweden, The Netherlands, Poland, and Spain. The data obtained from subjects from cold, temperate, and warmer climates and the factors studied, were physical size and speaking fundamental frequency. The results correlated with previous studies confirming that there were indeed differences in the mean fundamental frequency that could be related to the respective climate zones. However, the colder climate had an overall lower mean fundamental frequency than the warmer climate, which means that boys in cooler climates mature earlier than boys from warmer climates (Hollien, 2011).

Manwa and Lau (2017) believe that, although sexual differences exist before the onset of puberty, little anatomic differences are present in the vocal apparatus between pre-pubertal boys and girls. In a study on the human perception and recognition of boys' and girls' voices, they specifically looked at acoustic cues for gender distinction in voices before the onset of puberty and found that these differences could be credited to differences in the vocal tract size and

gender-specific articulatory behaviours that tended to enhance the distinction between the sexes. Manwa and Lau (2017) also believe that morphological differences exist in the vocal apparatus among different ethnic groups. They mention a study by Xue et al. (2006) where Chinese males were found to have significantly larger oral and vocal tract volume compared to white American and African American males. Further research into this field could enhance our understanding of ethnic differences in vocal pedagogy.

Pedersen et al. (1985) made an effort to understand the physiology of voice change in puberty by contributing to findings of previous studies on the growth of larynx cartilage, on the finishing of the vocal cords' cover layer, and on the development of the phonetogram area, which displays the dynamic range of the human voice. As these studies did not include any investigation of the hormonal development Pedersen et al. (1985) obtained a better knowledge of the connection between fundamental frequency, phonetograms, age, and secondary sex characteristics together with androgen status. Androgen is a steroid hormone that regulates the development of male characteristics in vertebrates. For the study Pedersen et al. (1985) examined a group of choir boys going through various stages of puberty and adolescence. The findings of the Pedersen et al. (1985) study are indicated in the following table:

	Age, years		
	8.7–12.9	13.0–15.9	16.0–19.5
Serum testosterone, measured in nanomoles per litre, nmol/l	0.54	10.5	18.9
Dihydrotestosterone, nmol/l	0.18	1.21	1.57
Free testosterone, nmol/l	0.007	0.14	0.33
Sexual hormone-binding globulin (SHBG), nmol/l	134	66	45
Delta-4-androstenedione, nmol/l	0.59	1.7	2.5
Dehydroepiandrosterone sulfate, nmol/l	1,400	4,100	5,900
Testicular volume, measured in ml	2.3	13	20
Fundamental frequency, measured in Hertz, Hz	273	184	125
Voice range, semitone	3.7	4.8	5.0
Phonetogram area, measured in cm <sup>2</sup>	19	28	34
Lower biological tone, Hz	158	104	72
Middle biological tone, Hz	435	321	254
Higher biological tone, Hz	1,188	946	837

*Figure 1: Geometric means and ranges of androgen status, testicular function and voice (Pedersen et al., 1985:274)*

From this table we can assume that Fundamental Frequency (F0) was connected to all data and comparison with the phonetogram area proves that F0 was linked to the lower biological tones. However, variations were constant in the voice range during reading, as well as for the adrenal hormone DHEAS. The three variables F0 in lower biological tones in the phonetogram, speech, and the sexual hormone-binding globulin (SHBG) showed the greatest variation in the puberty group. In short, a clear relation between F0 and androgen status was found, while multiple

analyses showed that the levels of SHBG had the highest predictive value, predicting vocal change from child to adult voice in boys (Pedersen et al, 1985).

In 2005 Fuchs et al., identified vocal features of the male changing voice which included “a noise component, jitter, shimmer, mean waveform correlation coefficients, and fundamental frequency” (Fuchs et al., 2005, p.172). They established a significant restriction of vocal function seven to eight months before the onset of voice change. The results of the study were applied by Willis and Kenny (2006) who conducted a 12-month longitudinal study investigating the relationship between phonational gaps in the vocal range of adolescent boys undergoing vocal change and weight gain, as well as changes in speaking fundamental frequency during this period.

The study of Willis and Kenny (2006) identified “key characteristics and the chronological progression of the changing voice to resolve inconsistencies in the literature at hand on the timing and extent of the appearance of phonational gaps” (Willis and Kenny, 2006, p. 463). They found consistent patterns with the first appearance likely to be in the lower vocal range, which was followed by a phonational gap in the higher vocal range and later settling in the middle of the range. These findings correlate with the studies done by Fuchs et al. (2005).

The development of midrange gaps verifies the findings of Harries et al. (1997), i.e. that midrange phonational gaps occurred later in puberty. This study found that some boys experienced an extended phonational gap over most of the falsetto range frequencies. In addition, Willis and Kenny (2006) found that “minimum glide frequency decreased significantly over the time of the study, and the appearance of phonational gaps increased significantly” (Willis and Kenny, 2006, p. 468). No noteworthy changes in maximum F0 or range were observed. According to them, all boys in their study in the weight range of 42.7–44.9 kg had either low (around 202Hz (G#)) or high-range (641–688 Hz (e5–f5)) gaps, whereas boys heavier than 54.8kg had gaps averaging 301–429hz (D#4–G#4). Willis and Kenny (2006) conclude their study with the argument that the detection of these phonational gaps and the confines they place on vocal function are important in the pedagogy of vocal training for male adolescents.

Finally, mention must be made of John Cooksey, one of the most important contributors to this field of research. Although Cooksey’s ideas on the phonational gaps were proven not to be accurate through the 2006 study of Willis and Kenny, Hollien (2011) believes that the post-war

period of research saw Cooksey at the peak of insight into the process of voice mutation, and up until today Cooksey's voice classification system (1997) is indeed still being used as the basis of classification of pubescent male singers. This is evident in studies done by Harries et al. (1997), where Tanner's stages of puberty were compared to Cooksey's classifications of pubertal voice change, and where it was found that both these classification methods correlate with each other.

## **2.3 Overview of the physiological mutation process**

With the historical overview at hand, various approaches to and stages of puberty have been identified by different scholars and the study of phonetical and physiological vocal changes sheds light on the reasons why the male voice mutates and when this happens. The aim of this overview is to highlight the different approaches to the mutation process during male puberty.

### **2.3.1 Male puberty**

“Pubescence, which literally means ‘to grow hairy,’ is defined as that stage of life at which sexual maturity is reached” (Hollien et al., 1994, p.2646). Generally referred to as male puberty, this stage goes hand in hand with many changes, such as changes of the voice. Cooksey (1977b) believes that voice change experienced by boys is related to a psycho-physiological change experienced during their teenage years, which is then referred to as puberty. Marshall and Tanner (1970) identified five stages of puberty that boys go through, namely: Stage one, or the pre-adolescent stage, where genitalia are evenly proportioned with no pubic hair. Stage two, where the enlargement of the scrotum and testes takes place characterised by sparse growth of pubic hair. Stage three is when the penis enlarges and pubic hair spreads sparsely and becomes darker, coarser, and more curled. Stage four is where the penis further enlarges in length and breadth with the development of the glans. Further enlargement of the scrotum and testes is also experienced with pubic hair becoming adult in type but not as spread out as in the final stage of puberty. Stage five, the last or adult stage, is where genitalia reach the final size and shape and pubic hair covers the whole pubic area.

Voice change happens within these stages but to establish when this happens, the changes should be studied within a timeframe. Evans et al. (2008) believe that abrupt vocal change can be observed during the third and fourth stages. According to Hollien (1994), adolescent growth for

boys can start from the age of 12 and can last for several years. For Cooksey (1977b) puberty differs from individual to individual but seems to occur between the ages of 11 and 20.

Many physiological changes take place during this period and include sexual development, growth in height, weight gain, general body growth, and the mutation of the voice. Manwa and Lau (2017) confirm that the elevated level of testosterone during male puberty results in the lengthening and thickening of the male's vocal folds. This induces growth of laryngeal structures that causes a lowering of the average and range of the fundamental frequency. Manwa and Lau (2017) continue that, after puberty, the male larynx outgrows the female larynx by approximately 40%. The longer vocal tract and secondary descent of the male larynx would give rise to lower formant frequencies and less formant dispersion. Referring to Weiss (1950), Cooksey says that "the speaking voice changes faster than the singing voice and the initial onset of its change precede that of the singing voice" (Cooksey, 1977b, p.7). He continues that the average duration of speaking voice mutation is up to 13 months and for the singing voice between one and two years.

Given the fact that male voice mutation is directly linked to puberty, Cooksey (1977b) believes that during puberty shifts in the hormone balance take place in the organs of phonation. The changes begin gradually at age 12 to 13 and reach a climax at 14 to taper off at 15. He provides room for individual variance with cases of boys experiencing the mutation as early as 11 and those that come to the end of it at 16, resulting in a time-frame of 1½ to 2½ years during which male voice mutation occurs. White and White (2001) argue that the onset of puberty takes place between 9½ and 14 years including the "physiological changes that occur in the organs, muscles, cartilage and bones support the phonatory process" (White and White, 2001, 41).

### **2.3.2 Phonational and physiological vocal change**

The human voice is comprised of two autonomous acoustic components, namely fundamental frequency and formant or resonant frequencies. Fundamental frequency is determined by the vibration of the vocal folds and regulates perceived pitch during vocalisation. Evans et al., (2007) believe that "resonant frequencies are determined by the size and shape of the vocal tract" (Evans et al., 2008, p.786). Before puberty, small differences are noted between boys and girls. During

puberty, however, fundamental frequency that is produced in the male larynx permanently lowers (Evans et al., 2008).

White and White (2001) provide us with an overview of the physiology of the male voice change. They explain that the body grows and matures, and that muscles and cartilage of the larynx change in position, size, strength, and texture. They believe that the singing voice changes in range, power, and tone during puberty. According to them, the larynx sits high in the neck at birth and that it descends to the level of the seventh cervical vertebra during the first five years of life. They also believe that after the first five years a child's vocal folds do not change significantly until puberty. It remains approximately six to eight millimetres in length for males and females. With regards to the physiological change experienced by boys during puberty, they explain that the epiglottis grows, flattens, and ascends, and is manifested in the lengthening of the neck.

Various physical changes can contribute to voice mutation (Weiss, 1950). A change, such as the rapid increase of the length and circumference of the chest, increases breath capacity. Weiss (1950) believes that the neck increases in length and width which causes a descent of the larynx. This in turn creates a greater length and width of the pharyngeal tube to enlarge this part of the resonatory system. The oro-pharynx also enlarges during this time and is connected to the changes of the pharyngeal tube which produces changes in vocal timbre and that is linked to changes in voice classification. Weiss (1950) believes that because of testosterone the larynx enlarges and though it does not double in size, the male vocal chords increase by approximately one cm.

Fuchs et al. (2005) confirm that vocal change goes hand in hand with a reduced vocal efficiency because of speedy growth of the larynx and vocal folds, due to the excretion of testosterone and growth hormones. According to them, vocal folds in boys would lengthen up to 10 mm and F0 drops by more or less an octave. White and White (2001) argue that "the larynx grows at different rates and in different directions according to gender" (White and White, 2001, p.42). According to Evans et al. (2008) one of the most striking developmental changes that take place during puberty is the enlargement of the thyroid cartilage. This is confirmed by White and White (2001) who state that the male larynx grows mainly in the anterior-posterior direction which leads to the angular projection of the thyroid cartilage. White and White further believe that the males' vocal folds lengthen by four to eight millimetres during this time. Evans et al., (2008) are

of the opinion that male vocal folds increase by 63% during puberty in comparison to an increase of 34% of female vocal folds. Weiss (1950) concludes that the increase of all these organs constitutes a lowering of the vocal range by approximately an octave for males. He also states that young male voices have more vocal power or volume and intensity because of an enlarged breathing capacity and resonance. For most boys the vocal mutation begins at 12–13 years and reaches a climax between 13 and 14 years. It then slows in intensity between 15 and 17 or 18. The newly changed voice usually appears between 14 and 15 but settles and develops for one or two years afterward (Cooksey, 1997).

## **2.4 Stages of mutation**

Research by Sataloff and Spiegel (1989) provides a new perspective on how the singing voice can change during puberty. According to them, the singing voice may change in one of four ways: the first possibility is that the voice drops to a full register in the bass range at a fast rate that leaves the boy with little use of the head register. The second possibility is where the voice gradually lowers while retaining much of the head register. A third possibility is where the voice keeps much of the treble or boy soprano voice with the ability to sing several pitches in the bass register, but with an incapability of singing in the middle register. The fourth and last possibility is where the voice retains the young boy soprano quality and is capable of singing comfortably in the middle register with an ability to descend into the low range with ease and without register breaks.

However, many researchers prefer to divide stages of pubertal voice change into three time periods: Pre-mutation, a period of mutation or vocal instability, and post-mutation. According to Fuchs et al. (2005) phoniatric research can help us predict when vocal change occurs. Symptoms of mutation should also be distinguishable from other phenomena like inflammation of the vocal apparatus. They continue that the time remaining before the onset of mutation should also be predictable; it can be indicated by a fundamental frequency of 226.2 HZ and that elements of timbre, like a jitter and a shimmer in the sound, are to be found about six months before the start of the actual mutation. After this cut-off point, “jitter and shimmer show a sharp rise whereas noise component, mean waveform correlation coefficient and fundamental frequency decrease” (Fuchs et al., 2005, p.173).



In a study done by Harries et al. (1997), Tanner's five stages of puberty classification were compared to Cooksey's six stages of pubertal voice development. The Harries study indicates that maximum vocal change occurs between Tanner's stages 3 and 4 and not towards the beginning of puberty as has been implied. However, according to acoustic parameters and Cooksey's classification, vocal change takes place earlier in puberty and before the main 'voice-break' or major vocal change (Harries et al., 1997).

### 2.4.1 Cooksey's Stages of mutation

According to Cooksey (1977a) voice mutation occurs in three main stages. He presents stage I as the beginning of mutation, stage II as the high point of the mutation and the stage III as the end of mutation. In later studies Cooksey (1997) offers a 6-stage classification of boys' voice change. This classification is based on the fact that voice maturation stages follow each other in predictable patterns.

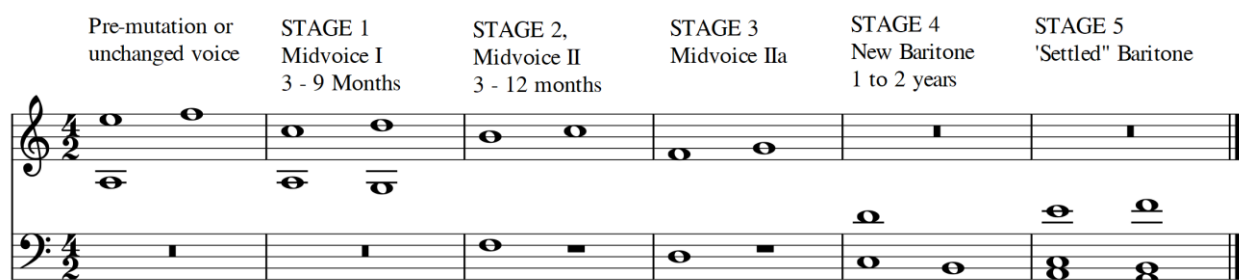


Figure 2: Cooksey's stages of mutation (Cooksey, 1997:722).

- Firstly, the pre-mutational phase, or the unchanged stage that correlates to Tanner's first stage or pre-adolescent stage. For this stage Cooksey (1997) measured an average range starting from G3 to approximately E5.
- The starting point of vocal mutation is described as mid-voice I and is Cooksey's first stage of voice change (Cooksey, 1997). This stage correlates with Tanner's second stage of puberty. Although it is difficult to detect the onset of mutation, the first stage of voice mutation is triggered by hormone secretions and occurs at different times varying from individual to individual. The timbre of the upper register changes slightly with the range

limit descending and an increase in breathiness. It is clear that top notes are still reachable but become more difficult, while bottom notes start to descend.

- The third and fourth stages are called mid-voice II and mid-voice IIa, which correlate with Tanner's third stage of puberty. During these stages the vocal change and mutation are most noticeable and happen over a combined time-length of approximately 14 months. During this time register definitions in terms of falsetto and chest voice also become clearer and the speaking voice becomes considerably huskier and lower in pitch (Cooksey, 1997). During these phases, Cooksey warns that, "the singing voice needs careful training and becomes harder to manage because of coordination problems related to external and internal growth of the laryngeal muscles. Furthermore, if not cultivated properly, the quality of the sound is often described as harsh, breathy and weak" (Cooksey, 1977b, p.3-4).
- The fourth stage of mutation is called the New Baritone stage or Post-mutational Period and evolves in the lower half of the vocal range. This phase relates to Tanner's fourth stage of puberty. The modal or chest-register starts taking on its adult characteristics in quality of tone, although not fully established yet. Resonance capabilities in the lower register have not yet fully developed, thus the voice remains light in timbre. It can come across as huskier than the mid-voice II tone while the passaggio region extends from middle C to possibly E4 or F4. Vocal agility is limited and recently changed voices may have difficulty in negotiating fast moving interval laps of more than a 4<sup>th</sup> or 5<sup>th</sup>. The New Baritone stage has a range spanning from approximately Bb3 or C3 to D4 (Cooksey, 1997).
- The last stage of Cooksey's voice classification is called the settling baritone and is in direct correlation to Tanner's last stage of puberty. In this phase the speaking voice begins to take on the adult sound while the singing voice increases in body and resonance. With some boys/young adults this is the stage during which the vocal range increases in the top register. Characteristics of the adult sound emerge and vocal agility, resonance, and power increase (Cooksey, 1997).

Total pitch range, tessitura, voice quality, register development, and average fundamental frequency can be used to define and identify maturational stages and voice classification. Cooksey (1997) believes that pubertal stages of sexual development are parallel to the stages of

voice mutation supported by Harries et al. (1997). Voice mutation takes place at various rates through predictable stages, affecting singing capability differently in each stage. More stability and less individual variation in the lower registers and lower range limits are evident throughout the various stages of vocal change (Cooksey, 1997).

Willis and Kenny (2006) do, however, confirm Cooksey's (1997) description of the sudden drop in frequency and development of phonational gaps, including pitches, as easy vocal range and sometimes as tessitura. They also agree with Cooksey concerning the development of his so-called Blank spot or midrange phonational gap being the phenomenon characterising the New Voice or New Baritone stage in the region of 262-349 Hz (C4–F4). Willis and Kenny (2006) further acknowledge that this stage is associated with rapidly lowering speaking fundamental frequency and rapid weight gain. However, Willis and Kenny (2006) found that these gaps are substantially larger than proposed by Cooksey as tessitura and that his claim that “phonational gaps in other parts of the vocal range are the result of inadequate breath management, has not been proven” (Willis and Kenny, 2006, p462). They also disagree with Cooksey's recommended practice to work from the falsetto to modal voice, stating that it is not suitable for boys with restricted or no falsetto range.

## **2.5 Conclusion**

In this chapter a short historical overview of studies done on pubescent voice change in males was presented and discussed. Existing research has been analysed and it was proven that the release of testosterone plays a prominent role in the process of vocal change. The concept of Androgen status and testicular function with a connection to voice change forms the basis of a better understanding regarding this physical change. This creates an environment for conductors to be constantly aware of the rapid changes taking place in the boys they are working with.

Other studies comparing ethnic background and climate with vocal mutation were also presented which open further fields of research. The outcome of these studies does not correlate with one another. Research in the field of genetics rather than climate should be considered with regards to timing differences in vocal mutation with different nationalities. Such studies could be beneficial for diverse societies like South Africa. Other findings established a broad general period of vocal change with individual variations. Within this broad period, stages of voice mutation can be

identified. With this broader understanding the following chapter will elaborate on the contrasting views on male vocal mutation in choral practise. These views and practices will be analysed and discussed to establish a broader view on international choral practice with regards to working with changing boy voices.

## Chapter Three

### CONTRASTING PEDAGOGICAL VIEWS ON MALE VOCAL MUTATION

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#### 3.1 Introduction

Dealing with the boy's voice change has been a vital discussion among choral conductors, vocal pedagogues and voice specialists. The different views of these specialists who had been working with boys, had done research, and had thorough experience about healthy singing for boys will be compared and discussed in this chapter. Effort will also be made to answer two questions in this field of study. Firstly, should boys sing during puberty, and secondly, if found that they should continue to sing, how should their voices be treated?

To answer these questions, the specific theories of pedagogues and theorists such as Garcia, McKenzie, Cooksey, Cooper, and Swanson are focussed on. In addition, and to provide a broader sphere of viewpoints, more contemporary views based on case studies are also referred to.

#### 3.2 Contradicting views on whether boys should sing during puberty

For the last two centuries the question of whether boys should continue to sing during puberty has led to roughly two spheres of thought. These are that boys going through puberty should not sing, and that boys should continue singing under certain circumstances.

##### 3.2.1 Arguments against boys singing during puberty

According to Weiss (1950), the idea that boys should rest their voices during the vocal change experienced with puberty was first proposed in the latter part of the 19th century. This proposal was confirmed by Manuel Garcia, the creator of the idea that no further voice training should be done during puberty. He also established the theory of the traditional voice-break in his treatise on the art of singing (1857). According to Fisher (2009), Garcia believed, during the time of vocal change, it was necessary to let nature take its course as boys in puberty are not capable of taking care of their vocal apparatus. Garcia (1857) believed that boys could only continue

singing after their voices had dropped by an octave and that their vocal mechanisms could be seriously damaged during this phase of fragile voice change. Garcia's opinion is confirmed by Behnke and Browne (1885) who contended that they could provide evidence that exercising the voice during voice change was detrimental and potentially dangerous. Although they were leaning towards Garcia's theory, they also acknowledged that not all boys experience a break in the voice and that those who are 'breakless' may continue to sing. Nearly a century later, East German voice specialists Seidner and Wendler (1982) are of the opinion that auditive control and new kinetic functions of the larynx as well as the singing apparatus as a whole are not yet fully synchronised during the voice mutation phase, and that this is the reason why pubescent boys cannot sing properly during puberty.

Seidner and Wendler's breakthrough theory influenced choirmasters throughout Europe, especially in the English cathedral choir tradition. Fisher (2009) confirms this by stating that "many voice teachers and choral directors throughout Europe adopted Garcia's practice of resting the voice during the mutation, as shown by the management of various boys' choirs throughout Europe" (Fisher, 2009, p.38). The Vienna Boys' Choir serves as example. Fisher (2009) also quotes Eastman who believed that pubescent boys often destroyed their voices through using them too often and in the wrong manner, and that the question whether boys should continue to sing or not, should be answered by doctors and throat specialists. Eastman concluded that the most difficult voices to train after voice mutation were those of men who had been solo choir boys. This is further confirmed by Fisher (2009) quoting Gehrkens:

The older plan of training boys' voices, as inherited from the English school of choirmasters, was to keep the boy singing soprano as long as possible and then letting the voice 'break'. Often it broke all to pieces and never recovered, and in any case, there was usually a period when the boy could scarcely sing because he had suddenly acquired a voice that he could not manage at all. After this he began all over again, learning to sing tenor, baritone or bass as the range and quality of his voice dictated; or not singing for the rest of his life – as frequently happened. The more modern plan is to encourage the boy to sing second soprano when his high tones begin to be less clear or less easily produced, and especially as lower tones develop; and, similarly, to sing alto as the voice goes down

still farther, this being-tenor, which has a very small range midway between alto and tenor. (Gehrkins, 1936, p.72-73)

### **3.2.2 Arguments in favour of boys singing during puberty**

Fisher (2009) presents a counterargument at the hand of Sir Morell Mackenzie, a noted English laryngologist of the late 1800s, who believed that vocal change was gradual and that the voice should be exercised and developed under careful supervision. Fisher also refers to Cyril Winn, British Inspector of Music in schools in the 1920s, who argued that boys' voices do not break, which was strongly opposed by Eastman. In addition, Cooksey (1993) states that in the 1940s William Norman Mellalieu reported results of his seven-year study of the adolescent changing voice. He found that the voice should be exercised during puberty and that ways of managing this process could be implemented. Likewise, Duncan McKenzie (1956), a Scottish professor in choral pedagogy, believed that to deal with the difficulty of voice change, two aspects must be understood, namely that a boy's voice never breaks but rather that the vocal chords lengthen at varying ages causing the voice to change, and that singing is a similar process as speaking, with singing being a sustained form of speaking. McKenzie believed that the muscles used in speaking are also used in singing and that they should thus not be strained during vocal change. Fisher (2009) presents McKenzie as one of the most prominent English music educators on the topic of singing during male vocal change and reckons that McKenzie's book "Training the Boy's Changing Voice", was the first practical guide ever to be used for the training of adolescent boy voices.

McKenzie (1956) believed that perceptions in Great Britain were starting to change during the 1950s. Especially in secondary schools more support was given from choral leaders for Mellalieu's views. This gave way to wider acceptance of the idea that boys should sing through adolescence, and that voice change followed a gradual predictable pattern. After observing the American choral system, McKenzie introduced the alto-tenor plan, his new theory of developing and training the male adolescent voice during puberty. This concept suggests that a high soprano becomes a low soprano, then an alto, later an alto-tenor and that he eventually ends up as a tenor. According to Leck (2009) McKenzie described this alto-tenor range as one with a soprano quality

but lowered into the tenor range. Cooksey (1993) is of the opinion that this new approach created certain specifications for recognising stages of voice transformation and created an opportunity to put forth new vocal techniques for the training of adolescent boys during the most active phases of change. Leck (2009) adds that experience has shown that boys who stop singing during the vocal mutation phase may actually lose the ability to manage their vocal chords later in life.

While British vocal pedagogues and scholars debated traditional and modern theories on vocal change, not much evidence exists that there were similar discussions in the United States, even though American music educators were aware of the debate (Fisher, 2009). However, Fisher continues that there were music authors like Howard and Johnson around the turn of the 20<sup>th</sup> century, who promoted traditional theories of voice resting to avoid injury. Fisher also quotes Gehrkens who mentioned a modern approach whereby boys were encouraged to sing second soprano as soon as their high tones were less clear and more difficult to produce. Gehrkens even mentioned the so-called alto-tenor plan, with a small range between alto and tenor, before McKenzie produced this idea in 1956.

### **3.3 Contradicting theories on the training of the changing boy voice**

With the success of McKenzie's (1956) writings and theories in the United States, a new calibre of theorists and vocal pedagogues emerged; changing the way the mutating boy voice was treated in middle-school choir programmes in America. Fisher (2009) presents three of these theorists: John M. Cooksey, Frederick J. Swanson, and Irvin Cooper, who, in the light of McKenzie's theories, laid the foundation of thought and practice that is still in use in American choral programmes today.

#### **3.3.1 Fallacies of the changing boy voice**

Dr Irvin Cooper (1950), a British professor of music education at Florida State University, believed that the so-called problem of working with adolescent voices is “due to a pedagogical misunderstanding of junior high school vocal resources coupled with a distinct negative philosophy towards the teaching of singing in these grades” (Cooper, 1950, p.20). Cooper found that choral programmes in America in the 1950s had the singing of girl groups in capable hands, but the moment co-ed classes or boy classes, where the boys' voices were passing through the



changing phase were tried, conditions were non-satisfactory. The result was usually that boys were given instruments to play rather than singing.

Cooper (1950) is quoted as saying, “The changing voice was treated almost as a sickness and the unfortunate owners were often labelled ‘non-singers’” (Cooper, 1950, p.20). He continued to argue that these boys had no problem singing, as they would sing popular songs of the day, after school, automatically choosing a key that fit their voices. Cooper (1950) suggested the problem should not be attributed to the boys, but rather to the teacher who is unacquainted with wavering vocal features of adolescent boys. He believed there to be some traditional fallacies that hindered the development of the adolescent male voice, such as that the boy's voice breaks during puberty and from that point should be treated as if the voice was sick. Secondly, that the misnamed break is found by boys singing an octave lower than the rest. Thirdly, that “when the break has ‘healed’ the boy should only sing quietly at an octave below the girls' melody” (Cooper, 1950, p.20). The fourth fallacy Cooper mentions is that alto, soprano, and baritone ranges of junior high students are the same as those of senior high students, and that “any music published for S.A.B. is suitable for junior high singers” (Cooper, 1950, p.20). Finally, it is believed that any normal range unison song could be sung by mixed classes with boys singing in the lower octave.

In an effort to address the fallacies of the changing boy voice, Cooper (1950) stated that “the first indications that a boy's voice is changing are: (a) that the quality of his lower tones becomes richer and thicker, (b) that his lower range has extended downward considerably, and (c) that he is unable to comfortably sing the higher tones” (Cooper, 1950, p.21). He believed that “this new range extends from F below middle C upwards an octave plus a fifth” (Cooper, 1950, p.21). He also realised that the problem is rather to identify every boy singing in the group and in this range in order to integrate their voices with other known vocal types. Cooper (1950) was of the opinion that if the boy's voice was “kept within its own new range there would be no break in the voice” (Cooper, 1950, p.21). However, if forced outside this range, even by a tone, a break will be affected. He believed that by requiring every boy in this age to sing songs in unison and at an octave below the soprano, every boy would be “forced into a premature baritone causing a scarcity in tenors in high school and in adult choirs” (Cooper, 1950, p.21). He continues that, “following the voice-changing period the subsequent progress towards the boy's vocal maturity would either be to that of a tenor or a light baritone that rests between B flat (second line bass

staff) and F, an octave plus a fifth above” (Cooper, 1950, p.21). Cooper (1950) argues that these ranges are rarely understood thoroughly, because “tradition insists that top F is too high for the average baritone” (Cooper, 1950, p.21). He believed that if you gather all these various ranges and find a collective range for unison singing, it would “result from B flat upwards a ninth, and that this interval of a ninth covers the perimeter for junior high unison singing” (Cooper, 1950, p.21). Cooper (1950) further found that this factor might explain the bad singing practice in junior high assembly singing. He concludes that hymns, patriotic songs, folk songs, etc., sung during these assemblies must all be brought within this limited range.

### **3.3.2 Referring to the changing voice as *cambiata* and not “alto-tenor”**

Cooper (1950) did not use McKenzie’s (1956) term, alto-tenor; he preferred using the term *cambiata*, so referring to the boy's changing voice. The word *cambiata* originates from the Italian word “cambiare”, which means changing. He argued that the alto-tenor had become coupled with a vocal range, “extending from F below middle C upwards an interval of a sixth or seventh, whereas, the *cambiata* extends upwards to octave middle C” (Cooper, 1950, p.21). He agreed that the upper fifth of this range frequently holds some soprano quality, but that it was still part of the voice and was available for use. Cooper (1950) offered a solution by stating that “teachers working with these voices should have the ability to identify each boy's voice according to quality and range, classifying it accurately as soprano, *cambiata*, or baritone, and to organise the boys into part groups, to integrate these groups with girls' voices, and to select singing material within the vocal ranges of these different parts” (Cooper, 1950, p.21). He also implied that teachers created their own problems by attempting to force pubescent skills into an adult pattern by using music fit for adults. Cooper (1950) concluded that “if a *cambiata* has future adult tenor potential, the *cambiata* interlude will hold him there, whereas, careless or thoughtless handling of the changing voice will prematurely force the voice into a baritone or bass” (Cooper, 1950, p.21). In all, Cooper (1950) recommended that teachers should select the appropriate repertoire based on the male students in the class and to place boys in voice parts best suited for their voice ranges. According to Fisher (2009) Cooper also arranged several pieces that contained a ‘*cambiata*’ part in the score and influenced other theorists like Don Collins.

### 3.3.3 Swanson's approach of individuality

Another theorist that influenced the American approach to male voice mutation was Frederick Swanson, former conductor of the Moline Illinois Boys' Choir, who became one of the first music educational scholars to scientifically study the male voice change (Fisher, 2009). According to Fisher (2009), Swanson found that the physiological stages of sexual development were the best predictors of vocal mutation. However, Swanson used methods of data collecting that caused some controversy because he personally inspected boys' pubic regions. Fisher continues that, although controversial, these methods brought much awareness to particular aspects in the field of the male voice.

Swanson (1961) was also of the opinion that male voices could not be classified as easily as the Cooper and McKenzie model suggested. He also disagreed with the notion that the changing male voice process was gradual. He believed that some boys make the transition quickly and very radically and that good teachers should thus change techniques and materials rapidly too. With this thought in mind, Swanson shed new light on the existence of basses in the middle-school choir and so contradicted Cooper and McKenzie who believed that basses at that age are rare, once again. Swanson (1961) believed that, "basses who can sing to a low G' are quite common in the junior high school and that these 'new' basses frequently find middle C or even B and A quite uncomfortable and must strain to produce them" (Swanson, 1961, p.64). While using case studies, Swanson (1961) found 12-year-old boys who easily sang in the lowest reaches of the bass clef. In the 13 to 14-year-old boys Swanson found from 30 to 40 of the low basses out of every 100 boys that enrolled in general music classes. He believed that young voices should sing in ranges that suit them better. This meant that, as they made this abrupt change into the new tessitura, they required care and mindful handling. He continued that there should be bass parts for 30 to 40 percent of grade eight or nine boys that range from A' to G and that all materials used for these voices should be in the lower part of the bass clef. Swanson concluded that "eventually a true bass-baritone quality will emerge, that ranges will begin to extend, control will be regained, and that these boys will be ready for mixed choral singing again" (Swanson, 1961, p.65).

When it comes to young tenors, Swanson (1961) asked whether young adolescent voices could be classified as tenors. He believed that it was possible and that there could indeed be tenors in grades eight and nine. He added that these boys physically developed rather early and that they found it quite comfortable to sing in range D to E. Swanson established that the boys displayed the typical ‘break’ at about F, and that the lowest notes, D and E, tend to thin out and lose resonance. Swanson (1961) said, “These boys maintain this singing range, adding only a few tones during several school years, indicating that this is not a transition period but a final “settling” of the voice into its approximate adult range” (Swanson, 1961, p.64). He found that these young tenors shifted with ease into the falsetto with a slight ‘break’ rather than the more shattered break commonly found with lower adolescent voices and believed that, “There seemed to be a close integration of the full and the falsetto tones, whereas some of the deeper voices develop areas between falsetto and full voice where no sounds can be produced at all” (Swanson, 1961, p.64). Swanson (1961) experimented with the head-voice of the young tenors by carrying it down across the break where a tone quality emerged that was unusual in quality and colour. Although this phenomenon of good tenors happens, Swanson (1961) believed it to be rare and promoted special care for these voices.

### **3.3.4 Cooksey’s views**

According to Fisher (2009) Cooksey served as professor in music education at the University of Utah and produced various publications aimed at studying the male voice change. His research includes several longitudinal studies and he is known for developing a five-stage plan for the changing male voice that was discussed in Chapter Two. According to Fisher (2009) Cooksey assumed that the changing male voice was predictable and thus established criteria for classifying the mutating male voice. Cooksey (1977c) first offered vocal technique advice to the choral community working with these voices in three articles named “development of a contemporary, eclectic theory for the training and cultivation of the junior high school male voice”. On the whole Cooksey’s contribution influenced many American voice change theorists and resulted in more music being composed and arranged for changing voices.

### **3.3.5 Leck's theory**

The works of McKenzie, Cooper, Swanson, and Cooksey were recently analysed by an American theorist and choral conductor, namely Henry Leck (2009). Leck (2009) found that many of the theorists' voice classifications did not fit the students they were working with. "If we approach the voice from the top down and actively work to maintain the upper singing range, these classifications are insufficient because they do not take the falsetto into account" (Leck, 2009, p.51). Leck continues to say that these theories excluded the high voice and encouraged the idea that once the voice breaks, the high voice disappears. For him the solution was that the boys had to continue singing in their high voices just to continue to move down across their breaks into their new voices. "Experience shows that boys' voices expand while changing if they continue to sing in their high voice and vocalize from the top down across the break while developing their lower range" (Leck, 2009, p.52). He found that if boys sang from their high voices to the low ranges consistently and continued using their high voices while developing their new voices, the breaks would eventually disappear. Leck (2009) is of the opinion that this would result in a three-octave voice without a break. He concludes that "a bass range is not the range of a man's voice but only the lower register thereof and that nearly every male who is allowed to continue singing in his high voice would be able to retain that voice" (Leck, 2009, p.52). Although many boys are hesitant to use the high voice, for Leck (2009) it forms the foundation of vocal production for the boys' changing voice.

### **3.3.6 The approaches of Freer and Cooksey**

Freer (2010) in turn, points out that McKenzie, Cooper, Swanson, and Cooksey's classification charts suggest that the voice of the adolescent boy lowers gradually without retaining the ability to produce high notes, whether through falsetto or other productions, but states that all of them referred to the use of the upper voice or falsetto in their writings. Referring directly to McKenzie, Freer (2010) says that McKenzie was an advocate for having boys sing in their new voices at the expense of the higher register although still accessible, and quotes McKenzie as saying that, "the voice classification within a group with changing voices should not be considered final for any given period because each voice changes at its own rate" (Freer, 2010, p.31). According to Freer (2010), McKenzie criticised Cooper saying that he was not clear about how vocal quality of the upper register in his cambiata and baritone ranges should sound.

Freer also mentions Collins (1982) who studied Cooper's Cambiata concept who first believed that the head area of the young male voice would become his falsetto. This would only be used on extremely high literature and special effects. However, according to Freer (2010), Collins mentioned that it was important to use the falsetto when higher pitches created tension in the voice. Collins then started advocating the incorporation of the falsetto, thus agreeing with the views of Leck in later writings.

In discussing Cooksey, it is Freer's (2010) opinion that Cooksey never included falsetto ranges in his classification and stages of vocal development charts. He did however find the midpoint of the change process to be indicated by the emergence of falsetto pitches. Freer continues to say that Cooksey's original charts, also used by Leck (2009), were outdated. He states that "Cooksey's research drew upon a broad cross section of boys, including boys that had little or no singing experience" (Freer, 2010, p.29), as well as boys who experienced phonational problems during their voice change. Referring to Leck's (2009) article, Freer believes that Leck created a false impression that Cooksey ignored the use of the higher or head register all together. Leck is proven wrong when looking at Cooksey's latest research where he emphasizes the use of the falsetto in boys who have access to it. Cooksey also expresses concern about teachers who encourage boys to sing in the head voice at the expense of the new lower voice. Cooksey (1997) actually said that, when a boy who only sings in his falsetto tries to sing in his new voice that boy will not possess enough coordination of his larynx. He continues that the majority of boys can learn to sing in the head voice easily if physically efficient vocal coordination is used. Therefore, Cooksey (1997) does differentiate between the falsetto and the upper register of the voice and believes that it is crucial for boys to learn how to transition smoothly from the falsetto to the upper register of the full voice.

With regards to the sliding down from one register to another, Freer (2010) states that McKenzie as well as Leck promotes the use of a "descending scale through all registers of a boy's voice as a tool for identifying distinct timbral qualities evident in different parts of the range" (Freer, 2010, p.31). He goes further and mentions that McKenzie advocated the beginning of a descending scale a few notes above the point of transition between the falsetto and the chest voice. For McKenzie (1956) the aim was to take the new chest voice as high as possible and not to take the falsetto down as low as possible as advocated by Leck (2009). McKenzie thus wanted to cultivate

the falsetto in order to develop the higher notes of the baritone range. Cooper (1950) suggested that nearly each activity should be used by means of glissando from the lower register to the higher. He continues that if this approach had been successful, it must be reversed with a glissando slide from the higher to the lower registers.

Swanson (1961) on the other hand suggests that the five-note descending scale should by all means start in the high soprano register and gradually drop down over the *passaggio* so that the treble to the bass voice can be smoothed out. Like Leck, Swanson (1961) believes that in many cases a boy can move from his boy-voice to the deeper register while keeping sufficient control over three octaves. He also believes that, “if singing downward is done consistently and properly, it is likely that their voices will never ‘break’ nor develop problematic areas of silence or phonational gaps around middle C” (Swanson, 1961, p.65). He confirms that eventually the boy voice becomes the falsetto which in turn strengthens and extends the new lower tones.

### **3.4 Conclusion**

In this chapter, two questions were raised, namely, should boys sing during puberty, and secondly, if found that they should continue to sing, how should their voices be treated?

The decision to let boys continue to sing or not during their voice-changing times is still being debated by conductors and voice teachers. However, based on the research presented in this chapter it could be argued that boys should indeed continue to sing during puberty but that allowing them to sing should be approached in the most careful manner. This is supported by the notion that a boy’s voice never breaks but rather that the vocal chords lengthen at varying ages causing the voice to change. Adding to this idea is the fact that boys continue to speak during puberty and that singing is merely a sustained and elongated form of speaking. Although the muscles used in speaking and singing during puberty should not be overstrained in this period, boys should continue strengthening these muscles in both activities.

Just as the theorists had varying views, boys develop in varying ways and experience their voice changes differently. Some will experience a sudden lowering in pitch and others will experience a gradual lowering without noticing a drastic change. Whichever way, the ideal is that these boys should be accommodated within their singing environment so as to enable them to develop their

own voices and sound. It is thus largely a matter of treating each voice as unique and approaching the use thereof individually.

Regarding the debate on how boys should use the falsetto, it is important to notice that, although their voices change, most boys are still able to use the falsetto but with a new timbre. The use of the falsetto in training and the question on how to carefully guide these voices through this process is discussed in the Chapter Four.



## Chapter Four

### UNDERSTANDING HEALTHY SINGING FOR BOYS

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#### 4.1 Introduction

In previous chapters international research and theories regarding the changing boy voice were studied and it was concluded that most boys experience the phenomenon of voice change in different ways, and that according to the majority of scholars, most boys can, and should, continue to sing during this process.

With a firm belief that the adolescent boy should continue singing but under supervision, the question arises as to what that supervision should look like. Therefore this chapter will collate and analyse existing vocal exercises for boys in a choral context. Because of the nature of a literature review these exercises have been selected with the focus on healthy vocalisation based on previous research. Not all of these exercises have been tested on adolescent boys going through the various stages of mutation. They do, however, represent exercises that significantly contribute to the education of healthy singing. By incorporating these practical examples and adapting them for the work with pubescent voices, an attempt is made to understand the theoretical findings of the study from a practical perspective. It is hoped that this adds more relevance to the thesis.

The examples start with exercises for the general improvement of breath control as a basis of proper vocalisation, followed by exercises for the improvement of healthy phonation (vowel placement) and for the successful blending of the old higher boy voice with the new lower voice. In each case exercises are presented for the use in choral rehearsal spaces which should present choral conductors with practical solutions to deal with these young changing boy voices who continue to sing.

## 4.2 Breathing exercises as the basis for all sound production

A good posture is of utmost importance for all aspects of singing, mostly because a good posture allows for good breath control, which in turn forms the foundation for sound production. Thus, when working with adolescent boys, it is important to create a culture where maintaining a good posture is essential. According to Jones (2017) there are seven points of good posture to ensure breath control and healthy singing. These are:

- A tall spine, allowing for the natural ‘S’ shape.
- Released hips and knees with a slight bend at the hip sockets and knees.
- Suspended rib cage specifically attending to the suspended back rib cage.
- A rounded chest without an overly pulled-up chest.
- Sitting bones that are aligned above the heels.
- Ears that are aligned over the shoulder area.
- Released and relaxed shoulders to ensure a suspended back rib cage.

Jones continues that there are three critical stages of healthy singing; namely, free inhalation, controlled breath management throughout a musical phrase, and body release at the end of a phrase. Put more simply, “We need to know how to breathe, engage sound, and release, without a tight or tense body” (Jones, 2017, p.29).

### **Breathing exercise 1: Hissing breath while sitting in a chair**

The following exercise helps to balance the outflow of breath and to regulate the speed thereof. The aim of the exercise is to train the lower abdominal function, while sustaining a tall spine. This exercise is good for young inexperienced singers and will lead to a better understanding and awareness of these bodily functions:

- Sit in a chair that is the right height with your knees bent at a 90-degree angle and your feet placed slightly apart but flat on the ground.
- Elongate your posture from the hip sockets to the top of your head to stretch your back-rib cage lengthwise.

- Slowly breathe in through your nostrils while lightly biting on your tongue; breathe like this until it feels as if your lower back expands, creating a sensation that you are breathing between your hip sockets.
- Still inhaling through your nostrils while lightly biting on your tongue, you should lean forward from your hip sockets. Your body will feel anchored to the chair through your “sit bones” while your back-rib cage must expand gently without thrusting too open. This exercise should be done repeatedly.
- Once you experience the air in your lower back, you must make strong hissing sounds returning to a tall posture. The lower abdominal muscles do not pull inward or push down and out but rather stretch slightly forward, wide and upward. You should pay special attention to what is happening physically around the lower back and waist areas. You will probably experience a feeling of resistance especially in the area of the waist. (Jones, 2017)

### **Breathing exercise 2: Strong consonants while sitting in a chair**

The following exercise is designed to activate the young singer’s abdominal muscles that are required to support breathing and vocal agility.

- Sit up in a chair and pivot slightly forward from the hip sockets and inhale or exhale, whilst paying attention to the motion of the lower back and back ribs.
- Inhale through your nostrils while lightly biting on your tongue. This is done to avoid “breathing” with your throat muscles. Utter the following sounds, “ka ka ka” or “ka ke ki ko ku,” using strength at the consonant K. You will experience a reaction in the lower body as the muscles required to support your breathing will be activated (Jones, 2017).

### **Breathing exercise 3: Hissing breath lying on the back**

This exercise highlights the role of the lower back while engaging sound. It also connects the breath to the onset of natural sound production by using tongue trills. By using tongue trills tension is released and the lower body support is enhanced. Tongue trills also loosen the tongue root that can create vocal problems if tight and stiff.

- Lie on your back in a comfortable position. Bend your knees to protect your lower back.

- Inhale and exhale gently and slowly through your nostrils while lightly biting on your tongue. This should be done several times until you feel your lower back expanding gently.
- While inhaling deeply and slowly, make strong hissing sounds keeping your teeth clamped. Press your lower back slightly into the floor. By repeating this exercise, you will feel the muscles in your lower back stretch.
- Using a lip trill, sing a 5-tone scale down. At this stage it is important that, while singing, you should feel your lower back pressing gently into the floor and your back-rib cage moving.
- Continue this exercise by going up in semitones. As you sing higher and higher you must press your lower back more and more into the floor as you must have more breath pressure to sing at higher pitches.
- Make sure that your neck and shoulders are relaxed while you are pressing your lower back into the floor (Jones, 2017).

#### **Breathing exercise 4: Finding core support**

With this exercise the body learns how to support sound from the deepest muscles, by making the phonation function more controlled and efficient. It also helps the young singer to inhale less air while breathing in. For the body to memorise the sensations, each step of the exercise should be repeated as many times as possible.

- Sit down in a firm and supportive chair, inhale and exhale several times and make sure that your ribs are flexible and can move freely.
- Exhale about 70% of your breath and then make a sudden and strong hissing sound. You should feel the contraction of the deepest muscles in the core of your body. These are your true support muscles.
- Stand up, make sure that your hips and knees are not locked, that your rib cage is suspended with an open back, and that your chest is open without being pulled upward.
- After slowly inhaling through your nostrils exhale about 70% of your breath before you start making a strong hissing sound (Jones, 2017).

### **Breathing exercise 5: Engaging the lower back ribs**

The following exercise is designed to teach engagement of the lower-back ribs while releasing the neck.

- Lie on your back with your knees bent.
- Breathe slowly through your nostrils. Do this several times and notice how your lower back feels. As you inhale, you should feel how your hip sockets widen and how the lower curve of your back moves a little more towards the floor. You should experience a feeling that the lower body becomes more open with each slow breath that you take.
- Take six to eight sniffing breaths through your nose and notice how it feels as if your breath goes deeper into your body.
- After inhaling with sniffing breaths, exhale while sustaining a hissing sound. When you do this you should experience that the lower back presses downwards towards the floor as the lower abdominal muscles resist in an upward and wide direction (Jones, 2017).

### **Breathing exercise 6: Panting with a tall rib cage**

The purpose of this exercise is to isolate the free movement of the diaphragm from large movements of the ribs, offering an opportunity for the body to stay tall and open.

- Stand with one foot in front of the other; place your hands on the slightly suspended rib cage while taking a small breath.
- Start panting, while feeling a motion in your lower abdominal muscles near the pelvic area. The rib cage should move only minimally.
- Start hissing while you pivot from your hip sockets as you lean slowly forward onto the front of your feet. This will assist in regulating the motion of your breathing (Jones, 2017).

## **4.3. Exercises that improve healthy phonation**

Phonation is the process through which a tone is produced; it is the way air glides over the vocal folds resulting in sound. Reid (1965) refers to this process, by which tone is initiated, as the vocal

attack. “When the vocal organs adjust swiftly and accurately, and with reasonable spontaneity, the attack may be said to be good” (Reid, 1965, p.96).

Jones (2017) believes that the perfect attack creates an immediate access to healthy, resonant tone. He continues to say that compressed sub-glottal breath allows vocal folds to vibrate on a so-called “pillow of breath” rather than with a large expulsion of air and that this “pillow” allows the acoustical space in the throat to stay open resulting in good vocal resonance. According to Jones (2017), balance sub-glottal breath control results in compressed sub-glottal breath that in turn lowers the laryngeal position. He states that when the correct concept of proper cord closure is applied, young singers can sing more freely for longer periods without experiencing vocal fatigue.

Garcia (1840) refers to phonation as the stroke of the glottis where the vocal chords gently close directly after inhalation, allowing a healthy compression of breath. The singer then employs the body connection to move the perfect amount of air through the vocal folds. Jones (2017) believes that body/breath coordination encourages the perfect small breath stream needed for healthy phonation. He continues to say that for this coordination to work, lower body engagement is the primary source of regulating the sub-glottal air pressure.

The following exercises guide the conductor through basic elements of phonation that can be applied in the choral context. With the vocal exercises the conductor should be aware of the fact that all boys will not be able to do the same exercises at the same pitches. Consider using a set of notes that suit each voice group: one set does not fit all.

If adhering to Cooksey’s (1997) stages of changes, the following suggestions for range adjustments according to the ranges of boys one works with can be used. For the unchanged voices one can start on the C above middle C and continue going up to E. Try not to go too low at this stage because one still wants to keep the high register healthy and free.

For young baritones start at the A below middle C and continue going slightly up to the D above middle C. For young tenors start at middle C and go up to the F above middle C. For young basses, start at the A below middle C and continue going down.

### Phonation exercise 1

Make several strong hissing sounds and note the slight expansion of your body when the sound begins. You should use this slight expansion as it assists in creating the perfect closure of the vocal folds (Jones, 2017).

### Phonation exercise 2

Place a fingertip at the base of your larynx and speak the vowels *a*, *e*, *i*, *o*, *u* while slowly breathing in through your nose before each vowel. This exercise will create an awareness of breath flow and gentle vocal attack (Jones, 2017).

### Phonation exercise 3

Unhinge the jaw slightly and speak the words “*every orange*” while noticing a slight glottal closure at the beginning of each word. The unhinging of the jaw should allow you to feel the cords come together to create a firmness of the vowels at the glottis.

Add a 5-tone scale using these words and focus on the importance of a low and slow relaxed breath through your nostrils while lightly biting on the tongue (Jones, 2017).



Figure 3: Phonation Exercise 3: Sound production through low and slow relaxed breath (Jones, 2017, p.95)

### Phonation exercise 4

Speak the sound “uh-oh,” as though one has made a mistake. The attack of the “uh” will feel as if the vocal folds at the glottal closure are flipping together and then the “oh” will be sustained on the perfect stream of air.

Speak the “uh” again but suspend the sound for a moment, and then sing a descending 5-tone scale on the “oh”, using enough and healthy breath-flow.

Remind yourself that phonation is determined by your breathing and breath-flow (Jones, 2017).



Figure 4: Phonation Exercise 4: Sound production through the use of healthy breath-flow (Jones, 2017, p.95)

### Phonation exercise 5

Speak the e-vowel repeatedly at the glottis.

Alternate e and a, keeping the same closure of the folds.

Sing a 5-tone scale using the two contrasting vowels (Jones, 2017).



Figure 5: Phonation Exercise 5: Sound production through alternate vowel formation (Jones, 2017, p.95)

## 4.4 Exercises that improve vowel placement

Reid (1965) believes that the beauty of tone is dependent upon the purity of the vowel. According to Jones (2017) a resonant sound can only come from an open throat space which is a major factor in the developing of overtones and that in turn creates the ring factor in the vocal sound. He continues that since volume is enhanced through the expansion of the acoustical space, there is little need for the singer to use a pushing action. To create this expanded acoustical space with an optimal resonance, vowel placement can be used. If the young changing boy voice can learn to use this space from the beginning of the expanding voice process until his voice is fully developed, he will be able to produce a much freer and healthier sound.

As the inhalation process provides the key to opening the pharyngeal space, an open throat feeling will be achieved. Jones (2017) believes that the full ring factor of vowel placement is



enhanced by free, open laryngeal muscles and a released tongue. He further stresses the importance of a small controlled breath-stream to enhance this space.

According to Jones (2017) bad vowel placement or distortion are frequently caused by a retracted tongue position, or a narrow tongue-root. This may be the result of too much breath pressure in tonal production and a too high larynx position. A stiff tongue usually leads to a registration imbalance and dysphonia which locks the breath flow. To easily correct the tongue position Jones (2017) suggests employing the “ng” tongue position. This is the position from where all Italian vowels are birthed. The idea is not to lock the tongue but rather to relax the tongue and this is achieved by using “ng” before phonating vowels.

### Vowel placement exercise 1: The “ng” concept

Inhale slowly through the nostrils while lightly biting on your tongue.

Sustain a note on “ng” and then move toward an open Italian vowel; “a, e, i, o, u”.

While moving toward the vowel, imagine that your soft palate is elevated high and wide away from the tongue root.

Continue like this while maintaining an open-throat feeling and a relaxed tongue. Do not place the sound in the throat.

If the tongue position is dropped suddenly the higher overtones are distorted which intensifies register shifts or breaks in the voice and should be avoided with the changing and mutating voice of the adolescent boy. (Jones, 2017)

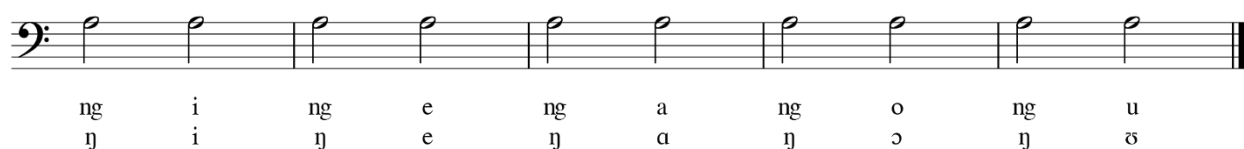


Figure 6: Vowel placement exercise 1: Resonant vowel placing (Jones, 2017, p.60)



### Vowel placement exercise 5: Tongue exercises

Stabilise your jaw in lightly downward and back position. First speak then sing the vowels “e, a, e, a, e, a, e, a, e” in a legato line, switching seamlessly from one vowel to another. Hold your tongue to relax slightly back when adjusting to the “a” vowel while it moves forward automatically for the “e”. While repeating this exercise on different tones, keep thinking that the vocal folds must stay together during the vowel change (Jones, 2017).

a e a e a e a e a e a e a e a e a  
α ε α ε α ε α ε α ε α ε α ε α ε α

Figure 9: Vowel placement exercise 5: Vowel placement through tongue relaxation (Jones, 2017, p.58)

### Vowel placement exercise 6: Vowel alteration

This exercise enhances the different placings of the vowel, “a” while keeping the jaw open and relaxed and the tongue nestled in the front of the mouth (Jones, 2017).

ah aw uh aw ah  
α ɔ Λ ɔ α

Figure 10: Vowel placement exercise 6: Vowel placement with relaxed jaw and tongue (Jones, 2017, p.117)

### Vowel placement exercise 7: Vowel alteration

The goal of this exercise is to keep the resonance balance throughout the changing from a front vowel to a back vowel seamless. It is important to keep the tongue relaxed when changing to the “o” position. (Miller, 1993)

e - - o  
ε - - ɔ

Figure 11: Vowel placement exercise 3: Resonance balancing (Miller, 1993, p.83)

## 4.5 Exercises that improve the mixing of registers

The way we view the definition of vocal registers today was first established by Manuel Garcia who believed that, “By the word register we mean a series of succeeding sounds of equal quality on a scale from low to high, produced by the application of the same mechanical principle, the nature of which differs basically from another series of succeeding sounds of equal quality produced by another mechanical principal” (Garcia, 1840, p.8).

According to Miller (1993) not everyone agrees with Garcia, with some denying the existence of multiple registers and others claiming there to be as many as seven. Miller continues that the aim of good vocal technique is to develop a seamless scale with no evidence of a register shift. However, this is very difficult to achieve when working with young male singers because the vocal apparatus is still developing. Yet, Miller (1993) believes that, although there are predictable pivotal register points for most young changed male singers, there are several variations. He adds that the lower range of the young singer closely parallels that of his new speaking voice. If the young male places the palm of his hand on his sternum while speaking, he will feel a vibration. As he starts speaking into the higher range of his speaking voice that vibratory sensation diminishes—this is the same phenomenon that young singers experience when singing an ascending scale. These notes below the upper limits of comfortable speech inflection are known as the chest voice or *voce di petto* (Miller, 1993).

Research further indicates that the cricothyroid muscle, which is the only tensor muscle of the larynx aiding with phonation, shows increased activity as pitch rises, especially with young untrained voices. Thus, with increases in the ascending pitch, the cricothyroid muscle thins and stretches in the larynx causing the vocal folds to elongate and to diminish their mass. (Miller, 1993)

Miller (1993) believes that each young singer experiences a change in timbre when observing the full scale of his new lower range. These changes in timbre are the result of laryngeal muscles (the cricothyroid muscles) that do not remain in a static position throughout the whole range of the young singer’s voice. In singing ascending scales, muscle activity occurs at pivotal register points traditionally described as “breaks”. This leads to corresponding changes in the resonator system

above and below the larynx that together with laryngeal responses, determine the register phenomena of the singing voice (Miller, 1993).

Miller (1993) continues that when a speaker arrives at the first registration pivotal point he must begin to use the calling voice to produce pitches that lie above his average speech range. One way to achieve these higher sounds is to increase breath energy and dynamic levels. When the young singer speaks in this calling or yelling voice these pitches are roughly situated in an interval of a perfect fourth above the first register demarcation point. This place is called the *primo passaggio* or first passage beyond which a speaker cannot call without experiencing a “break” in the voice or discomfort in the larynx. The pitches of this yelling voice will be different for each boy and will determine the natural range of each boy’s voice (Miller, 1993)

Miller (1993) continues to say that if trained, the young singer can produce pitches above the *secondo passaggio* by using the falsetto (the old voice) or by learning to sing with the full voice in the head being the internationally accepted public performance practice, especially for tenors.

According to Miller (1993) the area between the two passages is known as the *zona di passaggio* or passage zone and the idea is to skilfully negotiate between the two passages if there is to be no “break” when the “head” register becomes predominant. He continues to say that dynamic balancing of the laryngeal muscles and resonator tract enhances gradual registration equalisation which results in a mixed voice timbre. McKenzie (1956) says that when the changed voice first develops, the boy is still able to use his unchanged, or falsetto voice. He agrees with Leck (2009), that some boys can pass from the unchanged to the new voice without these “breaks”. He also found that some boys can sing in the unchanged voice down to a certain note, when there is a “break” in passing into the changed or new voice. McKenzie (1956) further states that every boy experiences a “break-area” regardless of whether the new voice becomes low or high. This “break-area” or *passaggio* is where the lower part of the unchanged range overlaps the upper part of the new voice range.

With this in mind the following exercises present solutions in bridging the two registers:

### Mixing of vocal registers 1: Bridging the *passaggio*

McKenzie (1956) suggests that descending scales be used from the unchanged to the new voice without breaks or vocal glitches to balance the two registers. This will create a balance between the two registers over time and enhance the resonance of the new chest register (McKenzie, 1956).



Figure 12: *Mixing vocal registers 1: Bridging the passaggio* (McKenzie, 1956, p.42)

### Mixing of vocal registers 2: Bridging the *passaggio*

Leck (2009) suggests this exercise which is like that of McKenzie's but that stretches over a greater distance and ascends again to the highest point of the falsetto. He believes that if this exercise is done without tension of the neck, jaw, or chin, most boys will find that, after time, the *passaggi* between the two registers would neither be felt nor heard (Leck, 2009).



Figure 13: *Mixing vocal registers 2: Bridging the passaggio* (Leck, 2009, p.56)

### Mixing of vocal registers 3: Bridging the *passaggio*

Sing the following exercise slowly and softly starting from the unchanged voice gliding as it goes over the *primo passaggio* into the new chest voice while manipulating the bridge. This exercise brings much needed head resonance to the new chest voice and it equalizes the registers. By using tongue trills the stiffness of tongue that can hamper the whole purpose of the exercise, is eliminated. According to McKenzie (1956) most boys will not be able to bridge the registers immediately, however if this exercise is used daily, the two registers will eventually be linked by a seamless ascending scale (McKenzie, 1956).



Figure 14: *Mixing vocal registers 3: Bridging the passaggio* (McKenzie, 1956, p.54)

#### **Mixing of vocal registers 4: Controlling the phonational gaps**

Some boys experience certain notes between the two registers that they cannot sing at all; these are phonational gaps. McKenzie (1956) suggests that in cases like these the boys should continue using their unchanged and changed voices without trying to bridge it. He is of the view that if the previous exercises are used daily and freely without any tension, these phonational gaps will become smaller and disappear in time (McKenzie, 1956).

#### **Mixing of vocal registers 5: Developing the upper range of the young baritone**

According to McKenzie (1956) where the voices of some new basses or baritones started to mature they could not use their old voices or their falsettos for some time. These boys find it difficult to produce tones in the new upper register of their chest voices, or according to Miller (1993) the “passage zone”. McKenzie also mentions that “if a boy has been trained to master the technique of passing through the old voice to the new one, and vice versa, while the voice is developing, he will not have difficulty using his new higher chest register” (McKenzie, 1956, p.56). However, should there be some difficulty McKenzie suggests that “downward vocal exercises be used, but instead of bringing the falsetto down as low as possible, the aim would be to pass into the changed chest voice as high as possible” (McKenzie, 1956, p.56). This will result in young men with newly developed vocal mechanisms that can manoeuvre through the two registers without vocal breaks to the highest point of the chest register. The singers should thus try to manipulate the *passaggio* as high as possible while using relaxed breath flow and without pushing air.



Figure 15: *Mixing vocal registers 1: Developing the upper range of the young baritone* (Miller, 1993, p.86)

## 4.6 Conclusion

With the idea that adolescent boys should continue to sing, practical measures need to be in place for colleagues working with pubescent voices, since healthy singing is an undisputable matter of care and respect towards learners. This chapter cannot answer all questions pertaining to singing but could highlight basic elements that have been tested through research and empirical findings. These basic elements need to be simple and easy, focussing on the mutating kinetic vocal function. With this in mind the most important element of working with these changing voices, is balancing the problematic new registers to the old one. By addressing the basic elements a comprehensive overview was created that answers the main research question of how to treat mutating boy voices who continue to sing. This was done by providing colleagues with a usable and practical set of resources in a choral context.



## Chapter Five

### CONCLUSION

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This study has presented and analysed research to enhance the understanding of the mutating male voice. During this process many problematic areas have been identified that could serve as a starting point for further research. Thus, this study as a whole provided a comprehensive overview of the accessible research in the field of the changing male voice.

The findings showed that existing views on the matter differ considerably. It could, however, be proven that most researchers encourage singing during puberty. Since one can assume that there is a lack of knowledge among choral educators in this field of expertise, the thesis was aiming to contribute to a better understanding of the preconditions for a healthy and sustainable voice education in this specific age group. It is hoped that this might serve as encouragement for music educators dealing with the changing boy's voice.

The wide range of research that was examined and presented created a reliable framework for diverse and balanced arguing. By choosing the means of a literature review, only existing research was critically weighted. Yet, this opened possibilities for possible future research, e.g. an empirical or qualitative study. An interesting starting point might be Manwa and Lau's (2017) assumption that morphological differences exist in the vocal apparatus among different ethnic groups. This hypothesis, if proven right, could help to better understand the preconditions for working with multi-ethnic school choirs, as found in South Africa.

The very complex field of physiological research on testosterone levels and its impact on the changes of fundamental frequency could only be hinted at here, since it entails biological information that is either not accessible or understandable without a profound knowledge of medical sciences. This also opens doors for future cooperation between music educators and medical scholars.

This study did not address individual case studies with regards to the stages of vocal mutation as mentioned by Cooksey (1977b). It became, however, clear that, forty years after the publication of his research, a critical review of his findings needs to take place and is already ongoing. I have outlined that many scholars have started to question Cooksey's approach regarding the different stages of mutation. An opportunity was thus created for more critical discussion about the shortcomings of Cooksey's theory.

During my work on this study, I felt particularly inspired by the scholarly work of researchers that also serve practically as music educators. These examples of profound educational work combined with scholarly analyses, have been the driving force for my own study.

The work on this study has triggered my interest in further research on the topic. I hope that this study has made a contribution to further discussion and examination of this topic.

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