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Inquiry into the various understandings and teachings concerning voice registers

Walter F. Leedale

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AN INQUIRY INTO THE VARIOUS UNDERSTANDINGS AND TEACHINGS
CONCERNING VOICE REGISTERS

by

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B.M. Montana State University, 1962

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CHAPTER I

THE PROBLEM AND THE PURPOSE OF THE STUDY

It has been the experience of voice students and teachers that the vocal pedagogy is filled with apparent contradictions, misunderstandings, and confused terminology. We know of teachers who insist on "voice placement"; others deny this. Some concentrate on the development of the diaphragm muscles for tonal support; on the other hand many fear this exercise and use "breath coordination." Some refer to the "head voice" and "chest voice," while others refuse to consider any use of such terminology. These are but a few of the many expressions, ideas, terms, and approaches to voice development that are used by many and at the same time denied by others. There is, however, success in voice teaching and learning among good and serious voice teachers and students who seemingly contradict each other in terminology and techniques. The answer to the apparent paradoxes lies in the correct understanding and psychological application of the terminology to the individual. It is universally understood that voice teaching and learning must be for the most part approached through imagery because many of the nerve sensations of the larynx lie below the conscious level thereby requiring an indirect approach and development. This paper will deal with one of the problems of terminology, the voice "register."
II. THE PURPOSE OF THE INQUIRY

William Vennard has stated: "The vocabulary of registration is as confused as the knowledge of its function." This statement aptly illustrates the fact of a great variety of explanations, techniques, and approaches to the problem of the voice register. Many of these different explanations will seemingly contradict and deny each other. The purpose of this paper is to present a general survey of the most authoritative writings on the subject and try to draw some satisfactory conclusions that can be universally accepted and understood concerning voice registers, and be of value to teachers and students of singing.

III. DELIMITATIONS

Although many other aspects of vocal techniques are interrelated rather closely with registration of the voice, this paper will be confined to three specific areas. They will be:

1. The first known historical concepts and teachings concerning voice registers
2. A chronological presentation of the basic authoritative writings on the subject from the nineteenth century to the present
3. A summary and conclusion of the total survey

Not all the writings on this subject have been used for this paper, but the basic and most authoritative have been selected. Other writings that may be found on this subject are based upon and repetitious of the authorities cited in this work.

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CHAPTER II

EARLY USES OF THE TERM: VOICE REGISTER

The first known records of singers and teachers of singing using the concept of 'register' come from the twelfth and thirteenth centuries. John of Garland, (1193 - 1270) stated:

It must be known that the human voice exists in three forms: it is a chest voice, throat voice, or head voice. If it is a chest voice then it is in the low register; it ought to be placed in the lowest part of the piece. If it is a throat voice, it is in the middle position in relation to each, that is to the low and to the high. And just as far down the chest voice is in the low register, so the head voice is high in the upper register.¹

Jerome of Moravia, (1250), also wrote, "-- similar classifications are in vogue today. It is quite usual to speak of low, middle, and high registers, or chest voice, middle voice and head voice."²

From these quotations it can be concluded that in medieval times there existed a recognition of changes in the voice within the compass of a singer's range. These changes were called registers which corresponded to particular parts of the body where the voice would seem to be emanating from or vibrating in more intensity. There is no indication of any particular teaching methods of the development of the voice register, nor any explanation of what actually occurs in the larynx during these changes in the voice. It would seem that the singer would


²Ibid.
recognize the registers naturally and develop them unconsciously in his own practice under the supervision of the choir master or teacher.

Just as vocal registers are generally recognized among the later medieval theorists so in the sixteenth century there exists a substantial number of references to the same subject with the same general ideas, that is, there exists three practical registers, high, middle, and low. Among the Italian singing teachers, Tosi is considered one of the better known authorities of voice theory in this era. He defines the word register as a term taken from the different stops of an organ, and like the medieval theorists divides the voice into three registers.\(^3\) Mancini does not entirely agree with Tosi with regard to registers. According to him the voice ordinarily divides itself into two registers, one called chest register, and the other, head register or falsetto.\(^4\) It is at this time there is found a divergence of opinion regarding the falsetto or head voice. Where Tosi and his followers regard the falsetto a separate division from the head voice, Mancini, Manefredi, Mengozzi and others consider the falsetto and head voice as one and the same.\(^5\) Mancini gives some specific directions for the development of the registers, especially the high register or head voice:

Take for instance a student who has a strong chest voice and head voice out of proportion, weak and feeble. In such a voice the break between the two registers comes between C and D (treble clef) ....... the way to correct it is to have the pupil at once

\(^3\) Ibid., p. 113.
\(^4\) Ibid. 114.
\(^5\) Ibid., pp. 114 ff.
undertake and fix his mind in his daily study, to keep the chest tones back as much as he can to force the voice little by little against the head just where it seems to be most unfriendly to him and thus fix it and develop it with the same strength that the chest tones have naturally developed.\(^6\)

Although most of the Italian singing authorities agreed that there existed only two registers, chest register and head register, some of the German authorities insisted on the three register concept. They maintained that the falsetto was distinct from the head voice. Agricola, one of the German authorities, offers a theory for the difference in the registers:

The chest voice is the strongest, therefore the opening of the windpipe is stronger, harder, and larger; and as the voice proceeds upwards the opening become smaller, softer, \(^7\)

According to Marburg there exists only the chest voice and the artificial falsetto.\(^8\) The theory of Agricola was for all practical purposes maintained solely by him since the practical carrying out of this idea would cause many difficulties in proper voice production.\(^9\)

Petri, Aubigny, Lasser and others offer the following instructions for the blending of registers:

The overlapping tones between the falsetto and chest tones must be practiced slowly over and over again within the range or compass of a fifth until all the tones are strengthened in either voice, and until the change-over is unnoticeable - the change-over should not always occur at the same place, but sometimes higher and sometimes lower.\(^10\)

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\(^6\)Ibid., p. 114.
\(^7\)Ibid., pp. 116-119.
\(^8\)Ibid.
\(^9\)Ibid.
\(^10\)Ibid.
All of the singing authorities at this time agreed that the art of singing ultimately consists in rendering imperceptible to the ear the passing from one register to the other.\textsuperscript{11}

It is well known from the history of music that the sixteenth and seventeenth centuries were outstanding for beautiful singing and artistic tone production. Although the concepts of the vocal register were not scientifically exact, there was not a universal agreement as to how many registers there existed, a variety of teaching methods existed in the development and blending of the registers, nevertheless this period was an era of great artistic accomplishment in the field of singing.

It can be concluded that the problem of the voice register posed no great problem in the development of singing. This leads to the belief or theory that whatever changes take place in the vocal mechanism in regards to register are natural and for the most part lie below the conscious level since the approach to this was by imagery rather than a conscious muscular effort. Today the same terminology exists and many singing teachers still use the idea of "chest" voice or "head" voice, but the idea of the voice actually emanating from these areas is discredited for the most part.

The medieval and sixteenth century ideas of the vocal register can be summarized by stating that there exists change in the voice within a singer's range, these changes are called 'registers', the sound emanation for the different registers \textit{seems} to be concentrated in one part of the

\textsuperscript{11}Ibid., p. 121
body more than the other for each respective register, and careful
training will develop and blend these registers for artistry in
singing.
CHAPTER III

HISTORIC VIEWS OF IDEAS AND TEACHINGS

From the period of the "Bel Canto" era to the sixteenth century there apparently was no new concept or new pedagogical methods concerning the registers of the voice. There is no available authoritative literature on this subject for almost two centuries. Obviously the methods and ideas presented in the last chapter were adequate and sufficient for the successful voice student and teacher because there was no lack of great singers who performed the music of these centuries with great skill. This could not have been done without a successful understanding and application of the ideas on the voice register.

In the late nineteenth century Manuel Garcia\(^1\) experimented with a comparatively crude laryngoscope. This instrument was a combination of mirrors and light to enable an observer to view the vocal mechanism of a singer during phonation. The results of this experimentation by Garcia did little to change the previous concepts of the voice register, but did however, give a clearer idea of what was physically happening within the vocal mechanism during a register "change." These observations of Garcia were a starting point for further investigation and discovery concerning the physical operations of the vocal mechanism with regard to the voice registers.

Garcia's observations present the three-register concept, the chest register, the medium register and the head register. He goes on to state that the names are scientifically incorrect but are accepted as names for these three portions of the voice. From the observations through his laryngoscope Garcia also presents the following descriptive definitions of a voice register:

When preparing to emit a sound, the two sides of the glottis, which are separated for breathing, shut the passage, and if the sound be a deep chest note they become slightly tense. The whole length and breadth of the lips are engaged in the vibrations. As the sounds arise in the register the tension of the lips increases, and the thickness diminishes. Meanwhile the contact of the inner surfaces of the arytenoids will progress and extend to the end of the vocal processes, thereby shortening the vibratory length of the lips. The medium or falsetto is the result of similar actions except that the lips come into contact not through their depth, but merely at their edges. In both registers the glottis has its length diminished from the back by the arytenoids, which advance their contact until their adhesion is complete. As soon as this takes place the falsetto ceases, and the glottis, consisting of the vocal cords alone, produce the head register. The resistance opposed to the air by the large surfaces generates the chest register and the feebler opposition presented by the edges produces the falsetto.

The physical processes just described are remarkable in so far as their basic operations have never been scientifically contradicted, but rather have been confirmed in recent scientific investigations. The process of the upper edges of the vocal folds producing the falsetto and the arytenoid muscles advancing the contact until the "legitimate" voice sounds as described in the above quotation is the procedure practiced by voice teachers and singers when they advocate going from

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2Ibid., p. 7.
3Ibid., p. 8.
the falsetto to the "head" voice and back to the falsetto again to develop this head voice.

About the same time that Garcia presented his observations on the vocal registers Herman L. F. Helmholtz, M.D., contributed some ideas on this subject. In his treatise, On the Sensations of Tone, Helmholtz states that the vocal chords can be tensed in two ways, the stretching of the bands longitudinally and voluntarily stretching the muscular fibres within them. He states that the "chest" voice is caused by the fact of soft inelastic tissue, underlying the chord, weighs them down somewhat, while the head voice is probably produced by drawing aside the mucous coat below the chords thus rendering the edge of the chords sharper and the weight of the vibrating part less.\(^5\)

Helmholtz refers to the writings of Lennox Brown and Emil Hehnke for further explanations of voice registers. In their book, Browne and Hehnke present a theory of five registers. They also used a laryngoscope and came to the following conclusions of the five register concept:\(^6\)

The mechanism of the five registers is as follows:
1. **Lower Thick.** The hindmost points of the arytenoid cartilages close together, an elliptical slit between the vocal ligaments which vibrate through their whole length, breadth, and thickness fully, loosely and visibly.
2. **Upper Thick.** The elliptical chink disappears and becomes linear. The epiglottis rises; the vocal ligaments are stretched.
3. **Lower Thin.** The epiglottis is more raised so as to show the cushion below it, the whole larynx and the insertions of the vocal ligaments in the thyroid cartilage. The vocal ligaments are made thinner and transparent as shown by illustration from below. Male voices cease here.

\(^5\)Herman L. F. Helmholtz, M.D. On the Sensations of Tone as a Physiological Basis for the Theory of Music, (London: Longmans Green and Co., 1885) p. 100

\(^6\)Ibid., pp. 100-101.
4. **Upper Thin.** An elliptical slit again forms between the vocal ligaments. When this is used by men it gives the "Falsetto" arising from the "Upper Thin" being carried below its true place.

5. **Small.** The back part of the glottis contracts for at least two-thirds of its length, the vocal ligaments being pressed together so tightly that scarcely any trace of a slit remains and no vibrations are visible. The last two registers were made from drawings of a laryngoscopic examination of a lady.

It seems that there was a great deal of laryngoscopic observations and attempted applications of ideas found from these observations after the experiments of Helmholtz and Garcia. The result of these many ideas was confusion and contradiction among voice authorities. In 1922 David C. Taylor published a book entitled *The Psychology of Singing.* This work refers to the confusions and contradictions with regard to the voice registers in the third chapter entitled "Registers and Laryngeal Action." In this chapter Taylor states that the difficulty with laryngoscope observation is the fact that no two observers report the same thing exactly, and not only have all the previous investigations failed to define exactly what the correct laryngeal action is, but even if this were determined it would still be necessary to find a direct means for the student of singing to have a command over the correct laryngeal action.\(^7\)

Taylor also reports some of the conflicting views of singing teachers. Some teachers profess to ignore the subject of registers entirely, they maintain that when properly trained from the beginning the compass of the voice is one homogeneous whole without breaks or changes. At the time of Taylor’s report the general belief of vocal authorities was overwhelmingly against the denial of registers by the few teachers

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of singing who ignored the subject. The majority of voice teachers maintained that the situation of the voice being one homogeneous whole throughout the compass of range is the ideal to be attained through proper attention being paid to the registers. This latter opinion was to be the prevalent one at the present time.

One of the physical actions concerned with registration is the position of the larynx. This fact has not been referred to before in this survey because none of the authorities up to this time have discussed the relationship between the larynx and the voice register. This relationship had been considered and various positions of the larynx had been advocated in vocal pedagogy because Taylor reports four different and contradictory opinions concerning the position of the larynx for singing as advocated by representative voice teachers at the time of Taylor's report. These opinions are:

1. The larynx should be held low in the throat for all tones.
2. The larynx should be held in a fixed position high in the throat.
3. The larynx should be high for low tones, and should descend as the pitch rises.
4. The larynx should be in a low position for the lowest for each register, and should rise as the pitch rises; when the highest note of the register is reached, the larynx should at once descend for the lowest note of the next register.

These four opinions give an indication of some of the confusion existing in vocal pedagogy at the time. Following the publication of

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8 Ibid., p. 39.
9 Ibid., p. 49.
Taylor came the first real opposition to the doctrine of the registers. This opposition was not a result of Taylor's work, but a result of the existing confusion in voice teaching at the time. This opposition was presented by Herbert Witherspoon, who states that each tone of the voice has chest, mouth and head resonance; and these resonances change their ratio to each other for each tone. "If we accept this view, and I cannot see how we can accept anything else, we eliminate an ancient bugbear for all time - the really absurd doctrine of the registers."11

Witherspoon goes on to explain his position by stating that there is only one register but three distinct qualities of the singing voice; chest, mouth and head. If one refers to a vocal adjustment as a register, then Witherspoon says that each interval of a semi-tone would constitute a new register.12 He declares that it is far simpler to deny the existence of registers because the term register originated in the recognition of the three predominate qualities caused by the three principle resonators.13 Later in his treatise on singing Witherspoon describes a physical and psychological adjustment required for singers in ascending to the upper part of their range. He calls this adjustment the "Lift of the Breath." This constitutes an extra surge of energy at the first note above the speaking range of the voice in order to coordinate action of the vocal organs for the higher pitches. This is

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11 Ibid., p. 23.
12 Ibid., p. 23.
13 Ibid.
the real beginning of the "head voice" and shows an increase of head resonance. This "lift" insures head resonance and makes unnecessary the so called "covering."

There is no mention of laryngeal action, thinning or thickening of the vocal bands, or thyroid and arytenoid muscles. It may be adduced that the reason for the lack of physiological explanations for the productions of vocal sounds is the fact that Witherspoon's approach to vocal pedagogy is based mainly on phonetics, and in his experience the use of the term register and physiological considerations hampered the progress of his particular students and perhaps his own singing technique. It is known that Witherspoon was a very successful singer and an excellent teacher of voice.

The use of different terminology and approaches to vocal technique by different teachers and singers had always been and is at present a common occurrence necessitated by the difference of personalities and backgrounds of the individuals. Witherspoon's approach to the three main resonances, chest, mouth and head, the same as the 'Bel Canto' concepts as reported in chapter two of this paper. Witherspoon's "Lift of the Breath" idea is a term describing what previous singers and teachers referred to as "tonal support" or extra surge of energy. It may be therefore concluded that Witherspoon has not essentially deviated from the concepts of the voice register, but has rejected the terminology of "register" and refrains from a physiological approach to the vocal adjustments in singing. Many teachers of singing prefer this approach

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14 Ibid., p. 90.
for the reasons that the student of singing, at least in the early stages of voice development, may concentrate on the physiological aspects to the extent of sub-consciously using some throat muscles extraneous to the proper functions of the singing process and thus hamper their development. Therefore the apparent contradiction of Witherspoon to previous authorities concerning the voice register may be reduced to possible solutions. First, there exists a difference of terminology; other authorities may use the term "register," while Witherspoon uses "resonances"; but both sides probably refer to the same thing. Secondly, there exists a difference of methodology in singing pedagogy; but this, as has been pointed out, is necessary for different individuals and the end result is the same. From the fact that Witherspoon himself was a singer of excellent technique and quality, and a successful teacher of singing, it is clearly shown that the differences shown are not a real impediment to the singer or teacher of singing if the terminology and pedagogical approaches are clearly understood.

Fifteen years later a work of Robert Curry entitled The Mechanism of the Human Voice, presented a more detailed explanation of the voice register than any previous work had demonstrated. In the section devoted exclusively to the topic of the register there is presented a combination of a physiological explanation with a relationship to physical sound vibrations. Curry states that the term 'register' is used loosely in singing to describe either certain ranges of sung tones or different audible qualities. He then gives his own definition of a voice register;

Transitions or stages in the act of singing over the compass at which the singer is compelled to make a physiological change in the larynx vibration mode in order to proceed higher in the compass.\(^{16}\)

From the purely physical aspect Curry states that the pitch range in speech comes in the so-called 'chest' register, or the lower range of the singing voice of an individual, and extends about eighty to one hundred and sixty cycles for men and about two hundred and twenty cycles to three hundred cycles for women. Some sopranos may extend from two hundred to one thousand and twenty-four cycles. The mechanism of the larynx is unable to cover this wide range with the same mode of vibration throughout and so the singer is required to use different actions of the larynx for the different parts of his compass.\(^ {17}\)

The detailed description of each of the voice registers according to Curry are as follows:

For the low pitch range the vocal cords are approximated and tensed lengthwise as well as internally. ---By tilting down the anterior body of the thyroid the level of the cords is lowered slightly in the neck so that while open or in rest position they are tilted slightly upwards in towards the anterior attachment, in phonation they assume a position some three millimeters lower and are horizontal or even tilted slightly downwards toward the thyroid attachment.\(^ {18}\)

The next higher register which occurs at about six hundred and fifty cycles involves a definite change in muscle action. In the trained voice the change from the first to the second mode is performed gradually over the transition so that no obvious change of quality occurs. The normal change of muscle action at this stage results in the gradual elevation of the larynx cartilages and the separational pull on the end attachments of the vocal cord. Any such

\(^{16}\) Ibid., p. 5.

\(^{17}\) Ibid., p. 66.

\(^{18}\) Ibid., p. 66.
action of elevation of the larynx is sometimes condemned as faulty action, but it must be remembered that it forms part of the natural act of swallowing in which the larynx is elevated much higher than ever in singing.19

The third mode of vibration is known as the falsetto in the male voice or head register in the female voice. To ordinary laryngoscopic observation the vocal cords in falsetto appear open all the time, but this is due to the optical effect of the relative periods of closure and opening of the vocal cords. The vocal cords are thinned out more.20

These descriptions of three registers by Curry are essentially the same as those presented by Garcia and Helmholtz, but seem to be at least implicitly denied by Witherspoon. The second register mentioned above by Curry is referred to as the "Covered" voice. In this second mode of vibration Curry mentions the gradual elevation of the larynx as being condemned as faulty action in singing by some authorities. He goes on to defend his position by stating that larynx elevation is part of the natural act of swallowing. This idea runs contrary to a rather overwhelming majority of opinion among voice teachers that the act of singing requires the open throat opposite to any act of swallowing. However, as will be seen later, many singers and voice teachers permit a slight elevation of the larynx in the higher ranges; but the ideal is the lowered larynx for the entire compass of the singing range.

In Curry's presentation there is given no procedures or directions for the singer or teacher of singing to bring about the register changes and proper muscular adjustments that he mentions. It is implied in his writing as in the previous mentioned authorities that these changes

19 Ibid., p. 68.
20 Ibid., pp. 72 - 74.
are automatic when the act of singing throughout the range of the singer is properly executed. There still remains the problem of precisely what constitutes the correct technical procedure proper singing so that the voice registers will function naturally and the transitions from one register to another will be accomplished smoothly without interfering with the quality of tone. There had been some general indications of pedagogical procedures regarding this problem during the Bel Canto era. The writing of Curry, however, gives an indication as to what direction the pedagogical procedures will be aimed in order to facilitate the proper register adjustments. This indication is the fact of the lowered larynx; it has been previously shown what confusion existed at the time of Taylor's publication of the Psychology of Singing concerning the position of the larynx for correct singing, but this confusion was probably one of the causes of Witherspoon's denial of 'registers' and there is no indication of any universal teaching of the necessity of the lowered larynx from that time until after Curry's work concerning the mechanisms of vocal registers.

In 1945 two books were published dealing with the science of vocal art. The first book by Douglas Stanley entitled Your Voice, deals with the applied science of vocal art in both singing and speaking. The second work by John C. Wilcox is entitled The Living Voice. This second book is a revised edition in which the author clarifies a quotation taken from Stanley's work concerning the voice register.

Douglas Stanley defined registration as the arrangement coordination of the muscles of the larynx which stretch the vocal cords and
hold them against the pressure of the breath. The author goes on to state that there are two sets of muscles which stretch the vocal cords and therefore there are only two registers. He calls these registers the lower register and the falsetto register. It is this definition and naming of the registers that Wilcox quoted in his first edition and clarified in the second edition of his work.

Stanley claims that the lower register is the operation of the crico-thyroid and thyro-artenoid muscles and the falsetto register is the operation of the posterior and lateral crico-arytenoid muscles. He also states that the falsetto register is responsible in a large measure for the range, quality, and soft effects of the voice, while the lower register gives strength, power and health to the vocal apparatus. This author also presents a new term of the vocabulary of registration.

This term that Stanley refers to is "Mixed Registration." He states that this occurs when both the falsetto and lower register are undeveloped and the establishment of pitch is a function of the thyro-artenoid muscles. This means the action of shortening the vocal cords. According to Stanley this complete 'mixed registration' is the worst of all technical faults in singing.

Some unusual specific instructions on the development of voice registers are given in this work. These instructions consist in external

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manipulation of the larynx by a competent and skilled voice teacher. The first of these consists in the proper manipulation of a tongue instrument.\(^{25}\) This instrument is a rod with a flat rectangular surface at the end and is used by the teacher to push the tip of the tongue backwards to some extent while the student is sounding a tone. The author claims that this manipulation causes the lower back muscles of the tongue to assist in opening of the pharynx and thus give the vocal muscles more freedom in their operation and thus cause the two sets of muscles for the two registers to operate and develop more efficiently.

Another external manipulation advocated by Stanley is an actual larynx manipulation. This consists in the teacher placing his thumbs on the front of the student's larynx and the index fingers forcing the opening between the cricoid and hyoid cartilages while the student sings a tone. This procedure is supposed to assist the arytenoid muscles in their operation of producing the adjustments of the vocal cords for the higher register.\(^{26}\)

Finally there are given instructions for manipulating the lower jaw in developing the lower register primarily. This consists in holding the lower jaw down at the point past the slight shift or 'lock' which occurs when a person opens his mouth almost to its capacity, and then singing a series of tones scale-wise.\(^{27}\)

\(^{25}\)Ibid., pp. 65 - 75.
\(^{26}\)Ibid., pp. 82 - 84.
\(^{27}\)Ibid., pp. 97 - 100.
These external manipulations are held in almost abhorrence by many voice teachers, but Douglas Stanley insists that a skilled teacher who has a good knowledge of the anatomy of the vocal mechanism can judiciously perform these manipulations with success in cases where the student is unable to adjust the mechanism with his own internal muscles at the beginning stages of voice training. From previous laryngoscopic observations it had been implicitly understood that the proper opening of the throat was necessary for muscles controlling the vocal cord adjustments to function properly for any register change. It is also known that the tongue and jaw muscles have a direct influence upon the opening or closing of the pharynx. From these facts it can be concluded that some external manipulation of the tongue and jaw can help in the opening of the pharynx provided that the one doing the manipulating has sufficient knowledge and skill in this operation. Eventually, however, the singer must be able to adjust the jaw, tongue, and space between the cricoid and hyoid cartilages automatically when he begins to speak or sing properly. The majority of voice teachers prefer to approach this through imagery or thought process and sound so that there will be no reliance upon an external force to open the throat, but that this opening will be automatic with the concept of a tone.

After the publication of Douglas Stanley’s work, John C. Wilcox published a second edition of his work in which he states that owing to the misunderstanding of the word "register" by some readers who understood the word "register" as to be a specified span of vocal range, he will use the terminology of "heavy mechanism" and "light mechanism" instead
of "lower register" and "falsetto." Wilcox also states that he will use the term "register" with reference to the male voice because some readers could not accept the word "falsetto" with reference to the female voice.

Wilcox agrees entirely with the concepts of Douglas Stanley, namely, that there are two sets of muscles used in the function and stretching of the vocal cords. These two sets of muscles, the cricothyroid group and the arytenoid group, manage the two registers of the voice. These two sets of muscles are, however, referred to as the "heavy mechanism," and "light mechanism" respectively.29

The point is made by Wilcox that the two mechanisms bear no fixed relationship to range, but are used for certain qualities of the voice. The heavy mechanism is used for low tones or loud intensity and the light mechanism is for high tones and soft intensity. He further clarified the use of the two sets of muscles by stating that the cricothyroid group act as stretchers of the vocal cords, whereas the arytenoid group act as mere tensors of the vocal cords. It can be surmised, therefore, that the two mechanisms or registers operate for both quality and range; both sets may be in operation at the same time but one is more predominate than the other in a particular quality or pitch.

Wilcox does not comment on the external manipulation processes described by Douglas Stanley, but does emphasize the fact that in the actual singing act there must not be any conscious attempt to manage the


29 Ibid., pp. 9 - 11.
mechanisms or registers. He states that once the process of voice training has been carried to the point where both groups of muscles are equally developed, they will automatically coordinate so that each group will do its respective part in producing tones of varying pitch, intensity, and quality. He goes on to say that it is usually necessary to guide the participation of these respective muscles consciously in exercises designed for the development of the voice. Finally there are given two basic rules for the development of the two mechanisms:

1. The establishment and retention of a deeply opened throat is the all-important problem.

2. ——— so long as the larynx does not rise from the low position that it always takes when the breath is deeply inhaled through a released throat.30

These two writings of Douglas Stanley and John C. Wilcox may be summarized by stating that they are of the opinion that there are only two registers of the voice since there are only two sets of muscles affecting the vocal cords. Douglas Stanley calls these two registers the "Lower Register" and "Falsetto" while Wilcox uses the terms "Heavy Mechanism" and Light Mechanism." Stanley advocates some external manipulation in some cases, and Wilcox seems to prefer to develop these two registers through vocal exercise only.

In the issue of the Anatomical Record for August, 1935, Leon Henri Strong reports his investigations of the vocal cords in action taken from pictures made of the vocal mechanism. His report, as far as the voice registers are concerned, states that the vocal folds vibrate

30Ibid., pp. 9 - 11.
in full length of the glottal edges for low tones, in a varying segment for medium range, and in varying segments well forward on the vocal lips for extremely high tones and falsetto.31

Using this report as a basis for some ideas on the voice register, Kenneth N. Westerman in his publication, The Emergent Voice, restates a form of the three-register theory the following way:

In the chapter on phonation we explained three shifts of pitch mechanism for low range, medium range, and high range tones. If the tone vibrations are over-oralized, these shifts with their attendant muscular actions (attempting to align the muscles for resonation) become very prominent and are called Registers. Because of the seeming location of these oralized tone vibrations (in perception), they have been designated as chest, medium, and head registers. —— Registers disappear exactly in proportion to the balanced flexible coordination of abdominal lift, clear tones, and open nasal port.

The fuller resonation caused by use of the nasopharynx and nose through the open nasal port allows the pitch mechanism of the vocal lips and the raising and lowering of the larynx to perform their adjustments with such ease that the so-called registers cease to exist.32

This concept is quite similar to Witherspoon's approach, although there is not such a vehement denial of registers, and there is established a physiological muscular adjustment for three parts of the singers range. The similarity is apparent in the concept of the "abdominal lift," the emphasis on resonance, and the disappearance of the so-called "registers" in the fully developed voice.

There is also present in this work of Westerman's a kind of synthesis of what has been previously presented in this paper, namely,


the medieval and Bel Canto concepts of three registers - chest, middle, and head, the results of laryngoscopic findings of sets of muscles controlling the vocal mechanism, the necessity of blending the adjustments so that no audible change occurs, and a kind of denial of registers insofar as the word "register" would mean an imperfection or audible shift of the voice not in conformity with ideal singing.

Gerard Mackworth-Young has stated in his writing concerning registers that there is found opposition and some points of contradiction of the authoritative writings previously referred to. In his own words Mackworth-Young defines registers the following way:

The registers are not to be confused with qualities of tone nor with resonatory effects, despite the fact that two of them are named chest and head. Nor is a register a series of notes, though often defined as such. It is in fact a mechanical disposition of the vocal cords.

This definition appears to deny the resonance idea of Witherspoon, the pitch and quality ideas of Curry, Stanley, Wilcox, and Westerman, but agrees with the laryngoscopic conclusions concerning muscular adjustments of the vocal cords. As the chapter on registers progresses, there is presented an explanation of the definition of registers and this explanation is in agreement with the previous authoritative concepts.

Mackworth-Young's writing states that there are three registers, chest, medium, and head. Women singers use all three; but men singers, 

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\(^{34}\)Ibid., Chap., 5, pp. 54 - 64.
apart from male altos, use the chest and medium register only. The author goes on to state, as the other authorities have, that the chest register is the full length and thickness oscillation of the vocal cords and that the medium register consists in a slightly less oscillating length with thinner edges. The falsetto, however, has about the same thickness of vibration; but only with about half of their total length. As far as the use of the term "falsetto" is concerned in this work, the author states that the medium register was formerly called the "falsetto" and what we refer to at present as falsetto is termed "head voice." The confusion of terminology had arisen from the fact that male alto voice is generally called falsetto in this country.35

In the application of these ideas the author reaffirms the idea that the muscular actions by which we vary the registers are, like all the actions of the vocal cords, mechanically unconscious. He states further that unlike the tuning muscles the register muscles cannot be controlled directly or with certainty by the ear.36 From this statement it is clear that the author makes a definite distinction between the muscles governing pitch and the muscles controlling the registers. There is no clarification or explanation of this idea which is in conflict with other authorities stating that the two sets of muscles controlling the registers affect both pitch and quality. The author goes on to state that if the oscillations of the cords are governed by a firm yet flexible breath pressure and a good legato, and if the throat is uncontrolled with

35Ibid., pp. 54-56.
36Ibid.
the tongue lying forward, the cords themselves will tend to adopt the mechanism which requires them to oscillate with the greatest freedom and the least muscular effort. In other words they will automatically select the right register.\textsuperscript{37} This idea excludes any particular type of training or exercise for register development. The basic training of open throat, correct tongue and jaw position seem to be the only requirements for the proper register development.

The author states that when we have acquired control of the registers we continue to check our use of them by indirect sensations rather than by our ears. These sensations are a general relief and feeling of ease when entering a higher register. We also feel enhanced vibrations when singing in the correct register because the vocal cords oscillate with greater freedom and effect than if they are in the wrong register.\textsuperscript{38}

The word "Cover" or "Covered tone" has been rather common in vocal parlance to describe the change into a higher register in the male voice. Mackworth-Young says that this word "Cover" is a metaphorical term that can be misleading because it is not a good description of the change itself.\textsuperscript{39} His description of the change is the only specific instruction given on how to proceed from the lower register to the higher register in the male voice. This instruction is as follows:

\textsuperscript{37}\textit{Ibid.}, pp. 54-64.
\textsuperscript{38}\textit{Ibid.}
\textsuperscript{39}\textit{Ibid.}
The beginner is taught to "cover" by singing the upper notes lightly and quietly with the mouth not very widely open. In these conditions the cords cannot produce the notes at the level of E (treble clef) or higher in the chest register and will resort without much persuasion to the medium register instead. Once this register has been established the singer can open his mouth freely and produce the notes piano or forte with an ease, power and brilliance that would be impossible if they were attempted in the chest register. The metaphor of covering then ceases to be descriptive of the process and becomes instead a mere technical term.40

It is interesting to note a certain apparent idealistic simplicity of direction in the above instruction; a great many voice teachers establish the change by a rather wide open mouth and firm grip on the vocal cords with a mezzo forte tone so that the muscular mechanism controlling this register will definitely be activated, then once the register has been established the intensity of volume can be decreased to piano or pianissimo with the mechanism holding properly. However, many would fear this approach from the fact that a fairly loud tone and firm grip of the vocal cords may automatically cause the student to use an extraneous throat grip. The methods of instruction will therefore vary according to the individual success for both teacher and student. Statistics of the number of teachers who use either approach are not readily available, and many teachers will use both. Therefore, success can be obtained either way depending upon the actual exercise used by the teacher and the understanding of the student.

William Vennard, Chairman of the Voice Department of the School of Music at the University of California in Los Angles, states that registers are caused by breaks in the compass of a singer's range due to the

40 Ibid.
laryngeal function being always static.\textsuperscript{41} He goes on to say that pitch is a very important factor in registration, but the real distinction is in the quality of tone.\textsuperscript{42} This is in direct opposition with Gerard Mackworth-Young's statement that registers are not to be confused with quality of tone.\textsuperscript{43} Vennard says that since the vocabulary of registration is as confused as the knowledge of its function, and that at present there exists some prejudice against the word "register," he will use the terminology proposed by John C. Wilcox, namely, "heavy mechanism" and "light mechanism."\textsuperscript{44} Vennard's description of the two mechanisms are taken from his observations of the Bell Telephone Company's research on the human voice.\textsuperscript{45} The description is as follows:

In heavy registration, either for a low note or loud, the vocal bands resemble the lips of a brass player, and each vibration is complex because of the pressure which is accumulated before it is released and because of the thickness of the "emboucher" through which it passes. Hence the timbre is richer. In light registration for higher or softer notes there is less compression. A comparatively smooth flow of air is divided into comparatively fewer "puffs."\textsuperscript{46}

\textsuperscript{42} Ibid.
\textsuperscript{43} Gerard Mackworth-Young, \textit{op. cit.}, pp. 54 - 64.
\textsuperscript{44} William Vennard, \textit{op. cit.}, p. 35.
\textsuperscript{45} Ibid., pp. 33 - 43.
\textsuperscript{46} Ibid., p. 38.
Concerning the actual adjustment from the heavy mechanism to the light mechanism Vennard refers to Witherspoon's "lift of the breath." This lift of the breath is a change, but not so violent a change as "cracking" but it is a definite shift because the lighter the production the less the intensity for the same amount of breath pressure. Therefore in order to keep the volume from dropping off the singer feels the need for an extra surge of energy.\(^{47}\) Vennard's conclusion concerning the registers is that both heavy and light mechanism should ideally be developed as one voice without any involvement in the discussion of registers.\(^{48}\)

Although the work of Gerard Mackworth-Young is some six years later than Vennard's publication, the sequence of presentation of the ideas of each has been reversed chronologically in this paper for the reason that Vennard's references to the Bell Telephone Company's researches on the human voice and his conclusions from those reports are somewhat more recent in the logical order of this paper.

The latest authoritative writing on the subject of the voice register is an article in the official magazine of the National Association of Teachers of Singing, Inc. The magazine is known as "The Nats Bulletin," in Volume XIX, Number 4, May 1963. Wilhelm Ruth presents two European schools of thought on the voice register and attempts to give an understanding of the apparent contrasts in these two opinions.

\(^{47}\) Ibid., p. 40.

\(^{48}\) Ibid., p. 43.
The first of the two schools of thought as presented by Wilhem Ruth is represented by Professor Doctor Nadoleczny of Munich in his book entitled Untersuchung Über den Kuntesang, published in 1923. He explains the substance of registers as a series of successive matching vocal sounds which the musically trained ear can distinguish from an adjoining series which has in itself matching sounds. These tone series correspond to objective and subjective perceivable places of vibration in the head, throat, and chest. These are caused by the changing position of the larynx in crossing over from one series of tones to another. The registers arise from the fact that each series of tones has its own mechanism for the creation of the sound. A number of tones can be produced in two adjoining registers, but not always with the same loudness.

The second opinion quoted by Wilhem Ruth is that of the New Vienna School formed around Professor Doctor Fröschels before 1938. Doctor Fröschels' pupil, Doctor Weiss, published an article in the "Monatsschrift für Ohrenheilkunde un Larunge-Rhinologie" for the year 1936. This second opinion states that the perfect well-trained art voice and the unspoiled natural singer knows no registers. By nature the voice organ is able to produce a uniform line of sounds in which the change of the different components is made gradually without a break. Pathological influences may disturb this change at some places, and there

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50 Ibid.
51 Ibid.
will be the phenomenon of registers. The physiological manner of phonation makes these phenomena disappear.\footnote{52}

In order to attempt to give an understanding of these two opinions and their apparent contrasts, Wilhelm Ruth reports on a scientific process which makes visible the changes in the vocal mechanism. Instead of laryngoscopic observations, this process consisted of X-ray photographs taken of singer's larynxes during the phonation of various notes in the ascending registers. The subjects for the photographs were in the categories of the untrained singer, various trained singers, and the so-called "unspoiled natural-singer" as referred to by Doctor Weiss.\footnote{53}

The results of these photographs called "tomograms" is as follows:

1. The larynx drops with the rising pitch of tones
2. The larynx drops in the low octave of the tessitura, while it rises in the upper part
3. The larynx rises all the time with rising pitch, but in different degrees.\footnote{54}

From these three different types of larynx movement, Wilhelm Ruth concludes that a strongly rising larynx is found by all singers with unsatisfactory performances or in the early stages of training; the demand on the vocal cords is much stronger when the larynx rises because the arytenoid cartilages tilt backwards and the cords are stretched and strained. In as much as this occurrence does not change through the entire tessitura, and there is no particular change in the sensations of the singer, there is no adjustment or change which could be called a

\footnote{52}Ibid.
\footnote{53}Wilhelm Ruth, \textit{op. cit.}, p. 3.
\footnote{54}Ibid.
The strong demand on the elasticity of the vocal cords does not occur if the larynx drops with increasing high tones. In the case of the dropped larynx all the muscles used for the raising of the larynx are relaxed and the arytenoid cartilages are in a normal position to function properly. The voice is then balanced and sounds pleasing in each tone whether loud or soft. Such a condition shows no different registers in the singer and the "one-register voice" becomes a reality. The little drop of the larynx as a sign of its perfect function has been observed by many important voice pedagogues and throat specialists.\textsuperscript{56}

In the case of the singers whose larynx drops in the low octave and rises in the upper part of the range there exists a situation where the vocal cords are less strained in the lower octave but with the higher tones the vocal cords are again stretched and the singing of top notes becomes difficult. With such singers the vocal cords have to work two different ways because in each of these ways there is a certain "appropriate mechanism" of tone production causing some recognizable regions of vibrations on head, throat, and chest. This would be in accord with Doctor Von Nadoleczny's presentation.\textsuperscript{57}

In the conclusion of the report Wilhelm Ruth states that the ideal and most perfect function of the vocal mechanism can be achieved only if the larynx drops with the rising pitch of tones, and if in this the vocal

\textsuperscript{55} Ibid.
\textsuperscript{56} Wilhelm Ruth, \textit{op. cit.}, p. 4.
\textsuperscript{57} Ibid., p. 5.
cords lie freely together so that there is no change in the width of the glottis.\(^{58}\)

The situation as described by Doctor Von Nadoleczny wherein the sensations of a head resonance and diaphragm support appear in a reduced manner in the change of one register to another are, therefore, not the perfect and utmost attainable functions of the vocal mechanism; but this situation is the most widespread among the better known German singers.\(^{59}\)

This article of Wilhelm Ruth\(^{60}\) is the most recent explanation of a difference of opinion about the existence of registers and the non-existence of registers usually referred to as the "one-register voice." The basis for the explanation is new in so far as the use of the tomographs (X-ray photographs) instead of laryngoscopic observation is the foundation for a report of this nature.

It can be concluded from this explanation that the two sets of muscles governing the vocal cords can ideally function with the lowered larynx, and in this situation no noticeable change occurs when one set is operating more intensely than the other, and when the intensity of activity changes from one set of muscles to the other no noticeable change of quality or resonance is apparent. Therefore no "registers" will be present if this word "register" means an audible change of quality or resonance. On the other hand, a majority of important singers

\(^{58}\) Ibid., p. 5.

\(^{59}\) Wilhelm Ruth, \textit{op. cit.}, p. 5.

\(^{60}\) Ibid.
at least in Germany, have a slight rise of the larynx in the upper
tessitura and there is a slight change noticeable to the trained ear.
This latter situation can and does exist among successful singers, but
is not ideal or the utmost attainable method of perfect voice
production.
CHAPTER IV

SUMMARY AND CONCLUSIONS

From the medieval times to the present there has existed a combination of some agreement and a great deal of diversity of opinion regarding the voice registers. These agreements and disagreements can be categorized in the areas of: (1) the existence and terminology of the phenomena usually referred to as "registers." (2) the number of these in the singing voice, (3) what actually causes these changes, and (4) the application of the ideas of registers in vocal pedagogy.

The existence of registers is an area of universal agreement among vocal authorities; but the terminology becomes diversified. The agreement therefore consists in the admission of some kind of change or adjustment in the vocal mechanism during the singing of pitches above the usual speaking voice range. It has been proven rather conclusively that an adjustment other than the stretching of the vocal cords is necessary for a singer to have a range compass of at least two octaves because it is physically impossible for any human being's crico-thyroid cartilages to stretch longitudinally more than a fraction of a centimeter, and the octaves would require a far greater distance of stretch for the fleshy material out of which the vocal cords are constituted. Laryngoscopic observations and experiments have quite definitely proven the operation of another set of muscles known as "arytenoid" group of muscles which assist the vocal mechanism in both
pitch and quality. The actual naming of this adjustment or series of adjustments is an area of controversy. The word "register" has been used by authorities for centuries, but some reject the term on the grounds that both its denotation and connotation imply something other than the desired effects of proper singing. The objectors' implication is that registers are "breaks" in the voice in the compass of a singer's range, or some kind of malfunction of the vocal mechanism producing a very noticeable and undesirable quality when changing from one register to another. This fact brings out another area of universal agreement from ancient times to the present, namely, the entire compass of the singer's range should be one homogeneous whole without breaks or shifts. The objectors of the "register" idea do admit and advocate some kind of adjustment for the whole compass of a singer's range, and they state that this adjustment is necessary for the homogeneous sound desired for the entire range. Therefore it can be concluded that the problem of disagreement is semantic. The various terms used to describe the inner adjustments of the vocal mechanism, whether these words be "registers," "abdominal lift," covering "head or chest resonance," or any others, can be and have been successfully used in voice development because the successful teacher and student of singing have understood these descriptive terms properly for the necessary changes in the larynx during the singing of the full range. It may be definitely stated that voice "registers," meaning the muscular adjustments of the larynx and vocal cords for different areas of the singer's range, do actually exist. The objection of Witherspoon, stating that therefore every change of pitch can be called a "register," is solved by the explanation that both
the arytenoid and crico-thyroid muscle groups are in operation in the singer's range; but that the crico-thyroid group is more predominate in the lower or heavier part of the voice and the arytenoid group functions more strongly and definitely in the higher or lighter part of the voice. The smooth transition from one to another gives the desired uniformity to the singer's range; but the existence of the two sets of muscles and their changing intensity of operation cannot be denied in the light of all the scientific investigations and observations.

The second area of agreement and disagreement consists in the determination of the number of these changes, adjustments, or "registers." The three-register concept is the most common, but some of the later authorities have insisted on the two-register idea based on the two groups of muscles controlling the pitch and quality. A solution to the disagreements in this area of the numbering of the changes or registers is not as easy to present as is the answer to the problem of the existence of the registers. There are two ways by which the registers are considered to be two, three, five, or any other number. The first way of determining the number is based on a resonance sensation in some way. The lower register has an association with chest resonance, as the voice proceeds higher in the range the sensation seems to be in the mouth area, and the top part of the voice is associated with the concept of head resonance. Therefore those who use this terminology will logically hold for the three-register idea. The terms, "chest," "mouth," and "head" resonances or tones are quite universally used in the history of vocal pedagogy. Although these terms are quite subjective, the idea of these terms is very real and important to a large number of successful singers.
because through this terminology they are able to adjust the mechanisms properly for the correct singing of the entire range.

In the light of the activity of the crico-thyroid and arytenoid muscle groups, the three-register concept can be explained by stating that the crico-thyroid group predominately acting as bringing together the vocal cords with their full thickness would correspond to the chest register; a middle point where the arytenoid and crico-thyroid groups are in approximately the same intensity of operation can correspond to the middle or "mouth resonance" register, and the predominance of the arytenoid group acting may correspond to the "head" register wherein the top edges of the vocal cords are vibrating more intensely. The two-register theory would refer to this middle section as a kind of transition to the higher register.

A more than three-register concept can be explained by referring to the two sets of muscles in greater anatomical detail. The arytenoid and crico-thyroid are groups of muscles governing vocal activity, and if one takes into consideration the predominance of operation of one or two of the particular muscular actions within the main group, then this particularization could be a basis for several registers if one considers any one of these adjustments by the laryngeal muscles to be a register. Therefore it may be concluded that the number of registers in the singing voice is quite subjective and determined by the particular concept of the meaning of the voice register. Another factor that may determine the number of registers for the singer himself will be according to the different sensations and imagery he has in his own mind when the proper adjustments of the vocal cords produce the proper functions throughout the singer's range.
Differences of opinion with regard to the causes of registers in the singing voice falls into two categories. Those who have the concept that a "register" is a "break" in the voice, a sudden change of quality, or some unnatural function of the vocal cords will agree among themselves that registers are caused by malfunctions of the vocal mechanism due to improper vocal development and training. Those who have the more universally accepted concept of registers as adjustments of the vocal mechanism for different parts of the singer's range will simply identify the cause with the definition, namely, registers are caused by the proper adjustments of the vocal mechanism in order to establish a uniform and proper singing tone throughout the compass of the singer's range.

The practical applications of the ideas concerning voice registers will be as varied and different as the personality, environment, associations, and educational background of every voice teacher and student. The reason for this is the fact that the inner muscular activity within the larynx lies below the conscious level and only indirectly through imagery, associations, and habits can the singer adjust the muscular activity of the larynx properly for the correct and pleasing singing technique. The problem is further complicated by the fact that the adjustment procedures in the larynx is not a separate or isolated operation from the proper throat, tongue, and jaw positions in singing. All of the elements, open throat, breath support, resonance, intonation, diction, and registers are in a certain state of balance and coordination in proper singing and at times emphasis on one or the other of these elements is necessary in voice training; but this emphasis cannot be in exclusion of the other elements otherwise there will be a very limited development
if real development of the voice could possibly follow. There can be emphasis but not isolation of the factors of development of the human voice. To neglect attention to any one of these factors would be a form of isolation of that factor and therefore at least a limitation of successful vocal development. Consequently the subject of the registers cannot be ignored but may be approached indirectly. In cases where the subject of the registers in any form has been completely abstained from there is found in that particular singer a range or tessitura limited and confined to such an extent that much of the vocal literature for that particular voice is beyond its capacity. Another danger extant in this state of register ignorance is what Vennard referred to as a "static larynx." This may be translated as a rigid or stiff vocal mechanism limiting the range, power, and beauty of tone.

For the summary and conclusion of the specific application of pedagogical ideas in the development of the registers there can be presented two basic and universal procedures; the opening of the pharynx and the lowered larynx. The opening of the throat has always been a standard and necessary operation for correct singing, but the concept of the lowered larynx as part of the function directly concerned with voice registers has only been somewhat universally accepted in this century. There are problems of detail in pedagogical procedure of lowering the larynx properly, and these specific instructions will be of the variety and difference that has been mentioned previously as being part of the technique peculiar to voice teaching. Whatever imagery or activity works for each individual student to successfully lower the larynx and produce the correct tones in his entire range is to be used
for that particular student, not necessarily all students will have the same approach. Therefore the teacher must be cognizant of a great many approaches and ideas in order to communicate the procedure for each particular student. The voice student must be sufficiently informed of the purpose of the various suggestions and ideas. A mutual understanding between teacher and student of the actual problem of the voice register and the objective physiology of the larynx will be a highly advantageous contributing factor in vocal development of the student.

The final conclusion to this particular survey of the concepts of the voice register can be presented as four general statements. First, the problem of the word "register" is semantic and all the leading voice teachers and singers mean the same thing whether they use the word "register" or any other to indicate necessary adjustments in the larynx in areas of the singer's range. Secondly, the reality of these adjustments cannot logically be denied, and historically have not been denied by the majority of those involved in vocal development. Thirdly, the pedagogical methods concerning the registers will be as varied as individuality will be varied in applying a universal concept to a particular situation of time, place, and circumstances. Finally, it may be said that the singing voice is to be developed as one homogeneous whole throughout the entire compass of the range with proper attention being paid to the registers.
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