FOCUS on VOCAL TECHNIQUE

The Tongue as Master of your Singing: Vowel Modification

by Shirlee Emmons

Today it is science and research that provide the rationale behind the insistence upon vowel modification, but the great voice teachers of the past came to the same conclusions solely by means of acute observation and pragmatic experience. In a questionnaire distributed by the authors of the new Prescriptions for Choral Excellence, published by Oxford University Press in January 2006, choral directors cited the following five elements as the most problematic in their directing experience:

1. Inability to sing in tune in the area of register breaks.
2. Adverse effects of consonant production on tuning and tone quality.
3. Inability to sing at a soft dynamic level without losing the fundamental of the pitch.
4. Breathiness in the middle register.
5. Inability to "cover" the tone.

It is evident that these same five factors have everything to do with vocal problems in solo singing as well. Vowel modification will contribute to the solution for each of these problems.

The belief that singers should sing the exact vowel written by the composer is entirely logical. However, to do is not natural to the vocal instrument. A singer whose vocal resonance is even and consistently good from note to note—high or low, soft or loud—is changing the vowels semitone by semitone (whether or not the listener can sense it), and the vocal tract is constantly changing form (whether or not the singer takes note of it.) This cannot be avoided. This is the way the voice works. As Oren Brown, the noted vocal pedagogue reminds us, "Good singers, whether consciously or not, depend on finding an easy adjustment for the pitch. This will be a *modification* [my emphasis]." Moreover, when voice teachers or choral directors ask their singers to, for example, sing [i] (ee) but drop their jaws while doing it, they, too, are modifying the vowel, for an [i] (ee) sung with a very large mouth will be an [ɛ] (eh).

With the aid of vowel modification singers will have fewer intonation problems, better resonance across their ranges, more carrying power, easier production of forte and piano, clearer diction, and, if choral directors could persuade themselves to use the modification suitable to each section in place of that common vowel indicated for all the voices, a much better blend.

Perhaps this sounds too optimistic to be true. Your doubts will be alleviated by understanding that the described results are governed by the extent to which the tongue controls events of the resonator tube (the vocal tract), and the tongue's effect on laryngeal efficiency. For optimal results, the tongue tip should rest at the top of the bottom teeth. This position can be taught by saying, "Hmm!" which maneuver will place the tongue tip correctly. Trying to use other tongue postures in an attempt to achieve more resonance does not allow the proper shapes

for the vocal tract and creates tongue tension.

> Putting the tongue tip at the root of the bottom teeth produces a dull sound. Pulling the tongue tip up and back distorts all the vowels. Pulling the tongue back into the mouth forces the larynx into a very low position, delivering unclear diction and a muddy sound, if a darker one. Pushing the tongue tip against the back teeth makes for harsh and tinny timbre.

Each inhalation is best executed with the tongue tip on the top of the bottom teeth. Using this position is not difficult and the rewards are great.

Artistic performance is vital, vibrant, and exciting. Certainly, it is dependent upon the human spirit, the musical and poetic imagination, and health, but it also hinges upon the physical events of vibration and resonation that are brought about by certain muscular activities related to the vocal instrument. Non-singers' tendency is to forget that the voice is a musical instrument, responsive to the laws of acoustics just as any other instrument is. (They probably forget because the human voice is located inside a human body rather than inhabiting a carved piece of wood or a metal housing.) Artistic limitations will result if the proper muscular activities do not become almost reflexive. Insistence upon singing the vowel written on the page will stultify the natural ability of the singer to find the modification that serves the needs of the music. When the vocal tone is correctly formed by acoustical phonetics, the singer avoids many muscular problems, basically hyperfunction and hypofunction, both of which may result in stiffness of parts of the vocal tract.

Stiffness of the singer's vocal tract can translate into hoarseness, register problems, unacceptable deviations from the pitch, limitations of range, color, and dynamics, poor vibrato, as well as other malfunctions and/or dysfunctions, all of which present the singer, the voice teacher and the choir director with very real problems.

- Singers who are suffering from hoarseness caused by the vocal cord erosion That speech vowels induce will find it difficult to concentrate on the details of their musical and vocal responsibilities.
- Singers who are experiencing register problems find it difficult if not impossible to handle the musical and vocal problems that occur at register breaks.
- Singers who are chided for off-pitch singing that seems unfixable simply by more acute listening often cannot think of anything other than pitch. (Faults in singers' hearing are so seldom the root cause for pitch deviations that musicians are often shocked by the fact.)
- Singers who cannot handle the high notes or the low notes, the loud notes or the soft notes, well enough to please themselves, their teachers or their conductors usually become disheartened at their own lack of technique and, as a consequence, are incapable of attending to the musical and vocal qualities of their singing.
- And so on.

All these maladies have the same result: in the end they will produce a faltering and more or less inept performance. High on the list of appropriate remedies for performance problems is vowel

modification.

There is no disputing the fact that modification of vowels inspires much controversy. However, the conviction that modification of vowels is unnecessary does betray a certain ignorance. It is true that singers can sing any note on any vowel, limited only by the physical boundaries of their range, but some vowel forms will have constructive interaction with the vocal cords (aid and amplify their air pressures), and other vowel forms will have a diminishing acoustical interaction (distort and diminish the cords' air pressures). A bad tone fights with itself; that is, two vibrators interact badly with each other. For example, in stringed instruments the conflict is between a string and the resonator; in the organ the conflict is between the reed and pipe. In the voice, the conflict is between the vocal cords and the vocal tract. [1]

Needed is an extended method of bringing sung pitch and the resonance of vowels into their best relationship, or, bringing the frequencies of the vocal cords and the vocal tract into concord with the various pitches and vowels. Voice pedagogue Berton Coffin, together with acoustician Pierre Delattre, worked out the practical details of a system that allowed singers to choose the vowel that would give a compatible frequency with the pitch. This system of vowel modification is found on the Vowel Chart that is included with their book, *Overtones of Bel Canto*.

Those opposed or indifferent to modification include many choral directors and some voice teachers. Pressed for the reasons behind their objections, voice teachers generally cite the seeming mechanistic quality of the method; choral directors cite lack of blend and unclear diction.. Often, in an effort to promote the elusive "blend," choral directors subscribe to reducing the sound of their singers to the resonance level of the least resonant voice in the group. To encourage clarity of diction they often embrace a theory of using only "pure" vowels, by which they may mean speech vowels.

By avoiding vowel modification as a part of their technical training, voice teachers have ignored a means of producing in their singers a more resonant, carrying tone and a more efficient way of achieving it, not to mention more control over dynamics, and more ease in upper range singing. As for choral singing, holding all choral voices back to the *piano* level of the least vibrant voice in the group not only produces a less beautiful tone but is actively unfair to and dangerous for the larger, more resonant voices in the group. Dale Moore, noted pedagogue, has this to say: "I would rather have a soprano of potentially operatic caliber serving as part of a cheerleading squad than have her singing in a group where the tonal ideal for a soprano is the sound of a tired English choirboy."[2] Paul Kiesgen, celebrated teacher of voice and vocal pedagogy, echoes Moore: "Loud singing with inadequate vocal technique can be harmful....Poorly produced soft singing, however, can be equally harmful....For most voice students, soft singing is the last skill mastered and one of the most difficult to acquire."[3] The result of improperly produced soft singing is often perilously close to "pushing," a term usually applied to loud singing.

The following true story illustrates the power of using the constructive interaction of modifications that "beef up" the singers' formant, which was done here by means of mechanical

help. The very same result can be achieved by the singer's use of correct vowel modification.

> As undergraduates in the music department of a western university were preparing to perform in their yearly opera production, former fears about audibility and clear diction were stirred up. The complaints were the usual ones: the young voices were no match for the orchestra and the text was completely unintelligible. Using the new sound system to boost the singers' voices led only to amplified "booms."
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> Then one of the resident voice teachers recalled voice scientist Johan Sundberg's words about audibility and how to enhance it. If all that is heard from the singer over the orchestra is the singers' formant range from 2000 to 4000 Hz., why not use the new sophisticated sound system to boost only that range of frequencies? Immediately, the voices could be heard and beautifully. If boosting the singers' formant frequency made such a difference in the balance, why not add another boost to the consonant/diction spectrum, which lies between 7000 and 8000 Hz.? Again the result was miraculous. Especially advantageous was the fact that boosting only the relevant frequencies took away the listeners' annoyance at the obvious tonal interference produced by the usual amplification.[4]

Turning our attention to the practice of singing only "pure" vowels, voice teachers must recognize that, acoustically speaking, speech vowels are not necessarily "pure." In addition, speech vowels vary considerably depending upon regional accents. The results are, therefore, less than uniform and less than "pure." Furthermore, those who really understand the vowel issue, acousticians, consider a pure vowel to be the one that delivers ease, beauty, and resonance on that particular pitch. "Vowel purity is the optimum acoustical response for a given vowel."[5] "...the requirements for singing far exceed the demands of speech. Singing is not simply sustained speech spun out over wide-range pitch fluctuations, except in the most simplistic and technically limited vocal styles."[6]

> Whereas spoken vowel values vary according to languages and dialects, in singing they cannot depart from the coincidence of a vowel pitch and a harmonic of the sung pitch. This is an absolute of singing. This is one of the reasons why a person can sing a foreign language without an accent but cannot speak it without an accent.[7]

Acousticians, if not singers, teachers, or directors, understand that both vowels and sung tone have pitch. The pitch of the vowel being sung must be harmonic with the sung pitch, or there wil be a weakening and/or distuning of the vocal cord vibrations. Because even singers themselves must often be persuaded of the advantages that accrue when adopting acoustical vowels, a comparison of acoustical and speech vowels follows:

Acoustical Vowels

Acoustical vowels, wherein the harmonic of the pitch coincides with the pitch of the vowel, produce amplification of resonance and a physiological feeling of well being.

The more ringing and vibrant we wish the voice to be, the more we should use the harmonic values of acoustical vowels.

Acoustical vowels give the voice more size and more carrying power (important to unamplified singing).
Singing with the best relationship of vibrator (larynx) and resonator (mouth) is therapeutic to the throat, the ears of the audience, and the length of the air supply.
Almost always, the use of acoustical vowels in singing produces tones that are in the center of the pitch.
Singers who use harmonic sounds (modified vowels) sing for a long time.
The use of acoustical vowels aids, rather than detracts from the diction.

SPEECH VOWELS

Singers who insist on singing absolute language values that conflict with the written pitches experience as a result discomfort, an out-of-tune tone lacking in beauty, and a serious diminution of the air supply.
The more we approximate the sounds of speech vowels, the more nonharmonic our voices will be.
Speech vowels give the voice a reduction of carrying power (a fact no longer germane to musical theater singers because of the insistence on amplification).
When the most resonant vowel on one particular sung note is found, it is invariably different from the one used in speech patterns.
The use of speech vowels often gives rise to inexact pitches, flat or sharp, that are not controllable, even by a singer's attentive ear.
Singers who utilize many nonharmonic sounds (speech vowels) do not sing as long, because this practice is physically unhealthy over time.
Contrary to common belief, adherence to speech vowels does not promote clear diction, because of the tonal interference produced by incompatible vowels and pitches.

It is, in short, advantageous to sing with good interaction, where the vocal cords and the vocal tract augment—not fight—each other. Furthermore, this interaction releases the singer's spirit and energies for that supra-human effort called artistic performance.

The same acousticians hired to correct the deficiencies of a concert hall's acoustics tell us these facts. When vowels are correctly modified, three advantageous things happen: the singer experiences more comfort; the tone is more beautiful; the air supply lasts longer. When the vowel is incompatible with the sung pitch the opposite happens: the singer experiences anything from slight discomfort all the way to actual pain; the tone is anywhere from slightly less beautiful all the way to actually ugly; the air supply is diminished radically because it takes more air to sustain an inappropriate vowel.

The research done on perceptibility tells us that, when each voice reaches the pitches of its high passaggio, the human ear can no longer tell the difference between that voice singing one front vowel or another, one back vowel or another. So why sing a vowel that is incompatible with the sung pitch (and more difficult to execute) if the listener cannot even tell that you are singing it?

Science Answers the Question: Why Modify Vowels?

Why must vowels be modified, especially for louder, higher, softer, or lower notes (which doesn't leave much)? Voice pedagogue Oren Brown answers: "It is impossible to maintain one vowel position at all pitches. Vowel modification must be mastered to facilitate a smooth transition from low to high and soft to loud....As a basic rule, the louder or higher, softer or lower a vowel is sung, the more it will migrate..."[8] Although modification is necessary for all voice types, the problem affects sopranos and tenors especially; e.g., in order to reconcile with higher frequencies and intensities of higher and louder tones, a large resonating cavity is needed. A strained larynx will result when this is not provided.

When concerned with intelligible diction as it relates to modification, consider seriously this basic truth: high notes and very dynamically intense notes are usually musical events, not text events, musically effective, not text effective. Experienced composers of vocal music, knowing this, almost always write the text for such a climactic moment twice—first, on lower, easier to execute pitches, then during the climax, on high pitches where the emphasis is on vocal skill rather than diction skills. Insisting on making a text event out of passages with high or loud notes will produce an uncontrolled and unattractive tone. Generally speaking moreover, what the listener wants to hear at those moments is beauty and/or impressive sound.

Difficulties in the upper range of the soprano and tenor voices come about, especially in amateurs and young singers, because the gradual thinning and elongation of the vocal folds increases with ascending pitches. Coping with this issue demands great vocal skills and extra energy in the breath. In the soprano voice, for example, there comes a certain point in the rising pitches when the cricothyroid muscle activity reaches its structural limit. At this point the damping that produces the flageolet (whistle) voice can help the stress on the cricothyroid muscle, because damping allows only the ends of the vocal folds to vibrate with the necessary rapidity. Correct modifications will allow this to happen.

Science has established that the core of the *vowel*, which itself is achieved by the size of the jaw opening, the shape of the lips, and the position of the tongue, is also the core of the *pitch* when that vowel is sung rather than spoken. "Each vowel has a quality which is unique to that particular vowel, a quality which names the vowel or makes it what it is. The vowel core, then, is the identifying quality. It is also an acoustical phenomenon; i.e., when the vowel is identified precisely...the resonance chambers of the vocal instrument are immediately re-shaped so that one hears optimum amplification of the basic sound; one has greater volume and potential for dynamic variation, and one has improved intonation and greater ease of production."[9]

Often teachers and choir directors believe it simpler to instruct their singers to use one mouth and tongue shape for all vowels. Regarding such a method, Richard Miller states: "...pernicious is the technique of distorting all the vowels throughout the range by assuming some one ideal mouth and pharynx posture through which all vowels must then be produced."[10] This is not productive as a method.

One more fact as noted by Berton Coffin: when the vowels have achieved their best

position, breath-coordination problems diminish. According to today's voice scientists, freedom of function in one part of the vocal instrument induces freedom in others,.

In the last forty years there have been many vocal researchers working on the issue of formant frequencies. Johan Sundberg is especially skilled at presenting this complicated subject in layman's terms, of which the following is a précis:

> The vocal tract resonator has different requirements for the sounds that try to pass through it, depending upon the frequency of that sound. Certain frequencies pass through the resonator easily and, as a consequence, are given a high amplitude....In the vocal tract these resonances are called formants. **They and they alone determine vowel quality and donate personal timbre to the voice**. Vowel color is determined by the two lowest formants; timbre is determined by the third, fourth, and fifth formants. **Tuning the formant frequencies is done by changing the shape of the vocal tract: the jaw, the tongue, the lip opening, the larynx, and the side walls of the pharynx**. Adult females have shorter vocal tracts than adult males. Therefore their formant frequencies are 15% higher on average than those of the adult male.
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> - Adjusting the shape of the vocal tract is the most common method for tuning the formant frequencies.
> - The first formant is responsive to the jaw opening.
> - The second formant responds to the tongue shape.
> - The third formant is responsive to the position of the tip of the tongue and to the size of the cavity between the lower teeth and the tongue.
> - The fourth and fifth formants are more difficult to control by these means.

The writings of Berton Coffin do not comprise a theory or a method, but present a body of knowledge with explanations of how to do the vowel modifications. Musical notation and phonetics have been substituted for frequencies whenever possible. As such, they show the practical way to a consistently productive way of singing that profits from the research. Coffin also reminds us that an unknowledgeable diction teacher can undo a great deal by ignoring the laws of vibration and resonance. On the other hand, a knowledgeable teacher can accomplish a great deal by obeying the laws of harmonic pronunciation. Inflexible language treatment tends to impair the musicality, expressiveness, and survival of voices. Speech recognition, which all teachers and singers desire, "is dependent upon the changing shapes of the filtering resonator tracts above the larynx....Attempting to exercise direct laryngeal controls causes the articulatory mechanism to malfunction."[11]

Thus, the crux of the matter is this: modifications persuade the resonator (vowel) to work efficiently, and, vice versa, when the resonator (vowel) adjusts so as to amplify the sung pitch, the vowels are, in that instant, automatically modified. This explains why singers experience vocal unease and difficulty when asked to sing speech vowels in the more perilous parts of their ranges. If vowel positions are kept in a fixed state rather than modified, the voice will run into and out of resonance points, resulting in a sound that is out of tune, harsh, unfocused, and unsteady in vibrato. Furthermore, it is a truism that critics and audience members are more likely to point out bad sound than they are to mention slight modifications of language values.

ENDNOTES

1. Berton Coffin and Pierre Delattre. *Sounds of Singing*, 2nd ed. Metuchen, NJ: Scarecrow Press, 1987, p. 45.

2. Dale Moore. "A Plea for Dialogue," *The NATS Journal*, Jan/Feb 1990.

3. Paul Kiesgen. "Warning! Soft Singing May Be Harmful to Your Health," *The Choral Journal*, August 1997, p. 29.

4. Ingo Titze. "Boosting the Singer's Formant in a Concert Hall," *The NATS Journal*, Sept/Oct 1993, p. 39.

5. Virginia Morrow. "The Significance of Recognition of the Vowel Core in the Teaching of Singing and in Vocal Rehabilitation," *The NATS Journal*, Jan/Feb 1988, p. 24.

6. Richard Miller. "How Singing is Not Like Speaking," *The NATS Journal*, May/June 1992, p. 20.

7. Coffin and Delattre, p. 4.

8. Oren Brown. *Discover Your Voice*. San Diego: Singular Publishing Group, Inc., 1996, p. 109.

9. Virginia Morrow, p. 24

10. Richard Miller. "Thinking Phonetically," *The NATS Journal*, Nov/Dec 1989.

11. Ibid.