4 RESONANCE BALANCING

THE VOCAL TRACT

Question

What is meant by the vocal tract?

Comment

The vocal tract is the supraglottal resonator system, extending from the internal laryngeal lips (vocal folds) to the external lip bastion. (See figures 4.1 and 4.2.) It is a flexible, nonfixated system that responds to the articulatory demands of speaking and singing. In its response to the vibrating larynx, it influences the timbres of the singing voice.

CHIAROSCURO

Question

You seem to be very fond of the expression "chiaroscuro." I understand what it means in the visual arts. What does it mean when applied to singing?

Comment

Universally used as a voice-pedagogy term, the expression "chiaroscuro" comes from the international school, and is featured in practical exercises from

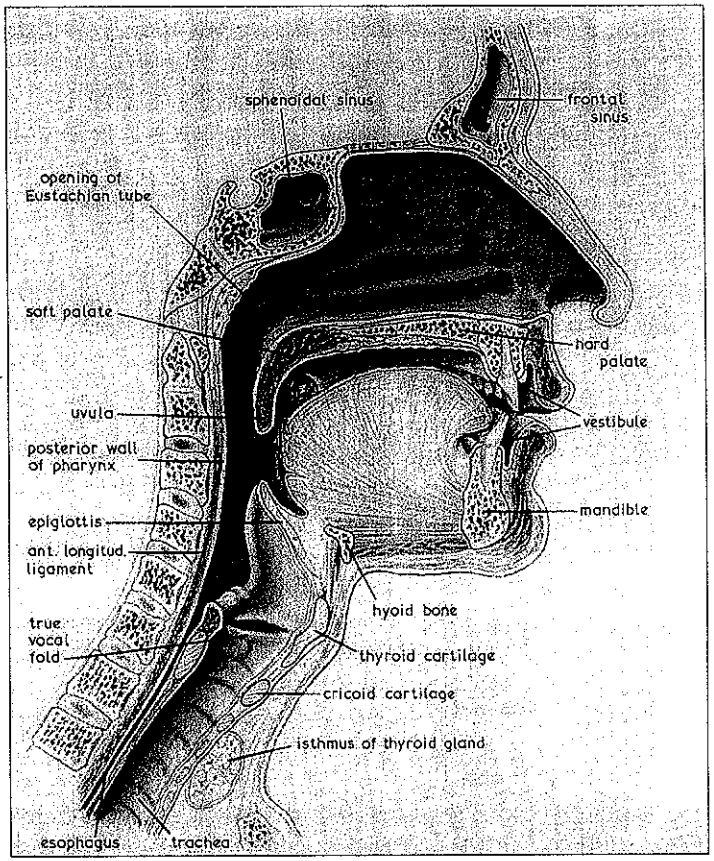

FIGURE 4.1. Midline section of the head and neck, showing structures of the left half. Note (1) the communication of the nose and mouth with the pharynx; (2) the crossing of pathways for air and food; (3) the extensive area of the tongue facing the pharynx, normally invisible from the mouth. (From Meribeth Bunch, *Dynamics of the Singing Voice.* New York: Springer-Verlag, 1982. By permission.)

historic treatises. "Chiaroscuro" means much the same thing in voice timbre as it does in the visual arts: the balancing of bright and dark aspects of color, and degrees of shading. In vocalism, "chiaroscuro" specifically refers to the equilibrium of acoustic strength manifested by an ideal distribution of lower and upper harmonic partials (overtones), clustered in formants.

Modern spectral analysis has verified the chiaroscuro (clear/dark timbre) concept, a balance of forces among the formants that represent acoustic peaks in

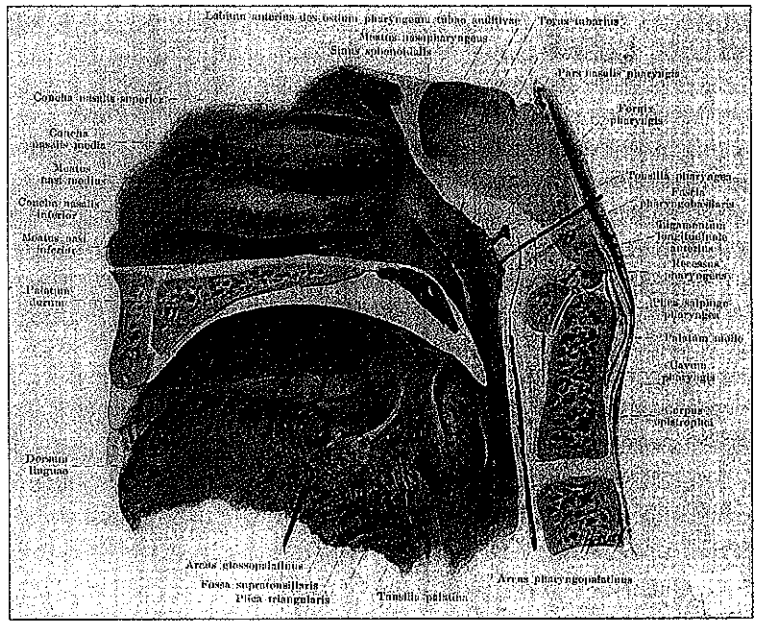

FIGURE 4.2. Sagittal section of the nasal cavity and mouth. (From Werner Spalteholz, *Handatlas der Anatomie des Menschen,* 13th ed., vol. 2. Leipzig: S. Hirzel-Verlag, 1932.)

voiced phonations. These relationships are clearly visible in spectral analysis of the singing voice. Almost every recorded major past or present singing artist displays chiaroscuro. Amateurs and unskilled singers do not.

VOWEL DEFINITION AND THE IPA SYMBOLS

QUESTION

You keep plugging use of the International Phonetic Alphabet symbols for defining vowels in singing. What are its advantages? Doesn't familiarity with the languages suffice? Won't such concentration on each individual sound inhibit expressive singing?

COMMENT

Vowel definition is a chief distinguishing characteristic of modern language communication. Each vowel produces its own vocal-tract shape. Much of voice training consists of ensuring linguistic articulation while maintaining the chiaroscuro tone, and this is attainable only when the shape of the vocal tract corresponds

to the vowel being defined. International phonetic symbols assist in describing these sounds.

No matter the language, clean vowel definition is the result of vocal-tract shapes that correspond to what the larynx is "saying." It is essential to be aware of the consistency of vowel formations from language to language. Most professional singers cannot fluently speak all of the languages encountered in the performance literature, yet they are expected to sing them accurately. The IPA vowel system is a great assist in achieving phonetic exactitude. Learning how to use the International Phonetic Alphabet no more impedes artistry than does learning music symbols for pitch and rhythm. It is an efficient device for achieving subtleties from language to language, and is of special value to the English-language speaker, who must be taught to avoid diphthongization and transition sounds. Appendix II offers model words for vowels in four languages, as well as for semivowels and for the French nasal vowel sounds.

KEEPING UNIFORMITY OF TIMBRE THROUGHOUT THE CHANGING VOWEL SPECTRUM

Question

One of my many (well, about half a dozen!) voice teachers told me that my jaw should remain pretty much in the same dropped position during all vowel changes, and that only the tongue should move for vowel definition. This was to make certain that a uniform quality would remain, regardless of the text being sung. What is your opinion?

Comment

What you describe is a recognizable pedagogic approach that at first blush might appear to be in keeping with uniform resonance balance, regardless of pitch or vowel change. But it has no basis in the phonetic processes of the human voice. Voice timbre is not the product of a more or less fixed resonator system, which is to a large extent characteristic of the flute, the horn, and the trumpet. The filtering process of the supraglottic resonators of the vocal mechanism depends on constant alteration of relationships among vocal-tract spaces. To hold the jaw or mouth in a single shape while attempting to define vowels is contrary to normal, uncontrived vocal-tract response to laryngeally generated tone. It is in direct conflict with the adage of the historic international school, *Le parole sempre sulle labbra* (the words always upon the lips). If the mandible is retained in one low position, all vowel sounds share a common quality of distortion. The changing postures of

the lips, the tongue, the jaw, the fascia of the zygomatic region, the velum, and the larynx determine flexible articulation. No one of these contributors, including jaw and tongue, can be held in a set position without inducing strain and distorted voice quality.

Because of the increase in energy demanded, the larynx naturally adopts a slightly lower level for singing than for speech, a position achieved with every complete breath renewal. The hung-jaw maneuver unites excessive laryngeal depression with the yawn, causing a drastically depressed larynx. A contrasting technique, promoted here, is based on a verifiable acoustic rule: There is no one ideal position of the mouth or jaw for speaking or singing; the vowel, the tessitura, and the intensity determine shapes of the vocal tract.

When singing within the speech-inflection range, *si canta come si parla* (one sings as one speaks). *Chi pronuncia bene canta bene* (who enunciates well sings well). Some teachers, with late nineteenth-century and early twentieth-century Germanic/Nordic orientations, continue to favor the low, immobile jaw, but are increasingly a minority in both Europe and North America. (See Elevating and Lowering the Larynx.)

VOCE APERTA AND *VOCE CHIUSA*

Question

Please address the distinctions between *voce aperta* and *voce chiusa.*

Comment

Respective literal meanings are "open voice" (*voce aperta*) and "closed voice" (*voce chiusa*). *Voce aperta* is also termed *voce bianca* or *voix blanche* (white voice), because its "open sound" strikes the listening ear as colorless and white. Choosing the "open" side of the vowel produces a distorted vowel targeting. For example, /e/ becomes /ɛ/ or /æ/, /ɑ/ becomes /a/, and /o/ becomes /ɔ/. In contrast, *voce chiusa* selects vowel formations that migrate toward front-vowel resonances, and avoids open, dull, or spread sound. Resulting timbre has been subjectively described as pursuing the "high side" rather than the "open side" of the vowel.

Voce aperta is always a pejorative term. *Voce chiusa* is favorable, being closely allied with *copertura* (cover) and *aggiustamento* (adjustment or modification) skills. *Aggiustamento* makes possible the carrying of chiaroscuro timbre throughout all ranges of the voice. Subtle adjustments of *copertura* and *aggiustamento,* which together produce *voce chiusa,* account for much of the technical registration work of the elite singer.

THE ROLE OF SENSATION IN SINGING

Question

Can a singer depend on sensation to ensure that correct resonance is present?

Comment

A singer has three ways to self-monitor his/her singing: (1) How does it sound? (2) How does it feel? and (3) How does it look? Identifying and selecting a basic concept of sound from among numerous possibilities provides a permanent and dependable tone-nucleus model. When a clear image of balanced resonance has been established, the sensation it produces becomes a reliable model. Because the psyche of each singer is a distinct entity, singing sensation is uniquely individual. It cannot be imposed on any singer, but must evolve as an individual, proprioceptive matter. Attempting to transfer a teacher's sensations to the student almost always results in technical complications.

Learning to recognize the new sensations experienced during well-balanced singing leads to replacement of previous perceptions. The singer may earlier have erroneously trusted responses induced in violation of freely produced tone. Eliminating those perceptions requires the substitution of one kinesthetic remembrance pathway for another. At first the singer may say "But I feel a lot less is going on!" or "But I'm not *doing* anything!" Letting go of superimposed controls changes how singing feels. (Once again, recall the dictum of Giovanni Battista Lamperti: "Controlled singing feels uncontrolled.")

Although we do not hear our voices as others hear them, we are fully capable of differentiating among sounds. The voice is the body; it is not hidden from observation. How do differences in voice production sound, look, and feel? Juxtapose examples of the old and the new sounds. (Feedback from mirror and video recording makes awareness much more possible.) Sensation associated with the chiaroscuro tonal balance is identifiable, repeatable, and above all, freedom-inducing. Taken together with companion perceptual parameters—hearing and seeing—feeling the ideal tone becomes a reliable monitor.

SYMPATHETIC VIBRATION

Question

What do you mean by sympathetic vibration? Does it differ from vocal resonance? If so, how? How do you teach it?

Comment

Resonance, the result of an acoustic alliance between vibrating bodies at an identical fundamental pitch, can be either sympathetic or forced. The sounds of singing are the result of sympathetic resonance. Bony structures of the head can be set into sympathetic vibration, but not into actual resonance; they do not contribute to the complex tone the listener hears. Nonetheless, the sensations they produce are realistic to the singer, becoming reliable indicators of resonance balance. Sympathetic vibration (as opposed to resonance per se) can be illustrated by firmly grasping the music rack of the pianoforte while playing a low note, pedal down. The hand registers sympathetic vibrations on the woody surface, but the music rack itself can be removed and placed on the floor without perceivable difference in the quality of the instrument's sound. Many traditional pedagogic notions on "placement" stem from attempts to induce sensations in the head. Unfortunately, most placement attempts are unrealizable, because tone cannot be placed. Sinuses, cheeks, foreheads, occipital bones, and other structures do not contribute to the actual resonance of the voice, nor does resonator filtering of laryngeal tone include areas of the skull. It is restricted to the vocal tract, conjoined with the nasal cavities only for nasal phonemes. Bone, like wood, is a remarkable conveyor of sympathetic vibration.

One of the ways the sounds of singing can be monitored by the performer is through experiencing sympathetic vibration. (See The Role of Sensation in Singing, and Internal and External Listening.) When the spectral balance is complete, a singer is aware of sensations in bony structures of the head that are quite different from those of imbalanced phonation. Once an association with ideal sound has been established, these proprioceptive sensations become dependable indicators of tonal balance.

Invention of physiology and acoustics is not tenable in respectable pedagogy. Maribeth Bunch, in *Dynamics of the Singing Voice* (1982, Springer-Verlag), quotes research and pedagogic sources, including Negus, Russell, Vennard, Blanton, and Bigg. All prove that the sinuses of the skull "play little or no part in the vocal resonance that is actually perceived by an audience" (p. 97). Herself a singer, Bunch wisely appends that, because of one's own proprioceptive responses, "many teachers are thus misled into giving the various sinus cavities of the head undue credit for resonance." This does not preclude the fact that singers often feel sympathetic vibratory responses in one or more areas of the body. On the other hand,

there are fine singers who are unaware of such sensation. The registering of sympathetic vibration is highly individual and can be experienced only personally. It should not be imposed on another person.

EAR-CUPPING AS AN ACOUSTIC DEVICE

QUESTION

Why do some singers cup a hand behind the ear? Is there an acoustic reason?

COMMENT

A hand placed behind or above an ear produces a false impression of the true nature of the spectral balance. Both males and females hear themselves better when cupping the ear (many of the guilty are males), but the sound continues to lack acoustic strength in the very region of the spectrum the singer wrongly surmises is being reinforced.

A simple experiment may help to explain. Energetically speak a phrase without cupping the ears; repeat the phrase while cupping them. You will notice that even in dynamic speech, brilliance and intensity seem to increase when the ears are cupped. Singers who feel the necessity to cup the ear generally suffer from dull production. They instinctively feel the need for brightening the sound and for reducing weightiness. Sometimes, when the habit of ear-cupping is questioned, the singer reports that the voice sounds bigger, louder, better, and that singing feels easier when an ear is cupped. Curving a hand behind the ear increases perception of acoustic strength in the upper portion of the spectrum—that is, in the area of the singer's formant, around 3K (3000 Hz) for the male, with a similar awareness occurring for the female at 4K (4000 Hz). (See figure 4.3.) The singer gets an impression that the sound is brighter, louder, and more resonant than what actually is heard by the listener.

A similar effect can be achieved by singing into the corner of an uncarpeted room in close contact with bare walls, or in a shower enclosure, especially if the walls and the floor are metal or tiled. Acoustic return to the ear is heightened, especially with regard to overtones that lodge in the upper regions of the spectrum. (This is why singing in the shower encourages the hobbyist performer.)

If a singer is accustomed to hearing sound rebound from the walls of an enclosed concert hall, singing on an outdoor stage that lacks an acoustic shell becomes difficult. Both the shell and the cupped ear enhance acoustic return. In immense halls like auditoriums and stadiums (horrible places, acoustically), where slight amplification of sound is in general use, if the amplification equipment fails, the return of sound to its producer is unfavorably reduced. Hoping to "project" better, the performer may disadvantageously alter vocal production in hope of achieving better feedback.

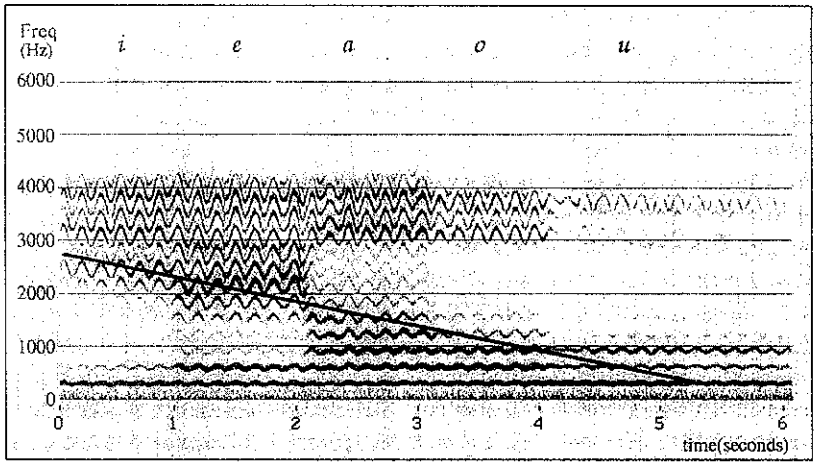

FIGURE 4.3. Spectrogram of a twenty-two-year-old lyric soprano singing an /i–e–a–o–u/ sequence on $E\flat_4$. Time is represented by the lower horizontal axis of the graph; the left-hand axis represents frequency in Hz. The first formant appears at the bottom of the graph. The diagonal line beginning at the left in the middle of the graph (diagonal vowel sequential) shows stepwise descent of the second formant, which together with the first formant is largely responsible for vowel definition. The third formant occupies the upper regions of the graph, with strong acoustic response registered between 3000 and 4000 Hz. Pitch excursion of the vibrato is indicated by the wavy lines of the harmonic partials. (From Vocal Arts Center, Oberlin Conservatory.)

Can ear-cupping ever be a useful device? If, during ear-cupping, the singer is able to sort out factors that contribute to differences in tonal shadings, it might be. Mostly, ear-cupping serves as a traitorous friend. The teacher should take pedagogic advantage of the situation when a student habitually places a hand behind the ear, cups the hand around it, or makes a complete hand shell over the ear. Offer some comment such as "You sense the need for more upper partials in the sound, but what you do with your hand doesn't yield the results you want. Fortunately, there are some specific ways by which you *can* add acoustic strength to that part of your spectrum, increasing resonance, intensity and carrying power, and permitting ease of production." An explanation of the chiaroscuro (light/dark tone that balances depth and brilliance), and how to achieve it, should follow.

Exercises that increase the strength of the third, fourth, and fifth formants need to be routined. Nasal continuants that increase awareness of energy levels in the upper region of the spectrum can be separately drilled, then used as pilot consonants for subsequent vowels. Because the lateral (front) vowel series is stronger in upper partials than is the rounded (back) vowel series, lateral-to-rounded vowel progressions may prove helpful. Despite vowel change, the goal is to ensure uniform acoustic balance between the lower and the upper portions of the spectrum. (See figure 4.3.)

It goes without saying that the proper phonetic postures which permit intelligible vowel tracking must pertain. Zygomatic-arch elevation (achieved naturally through a pleasant expression) will dramatically strengthen overtones of the upper region of the spectrum by slightly altering the shape of the buccopharyngeal resonator tract. These learnable adjustments assist in achieving desirable tonal balance. In all cases, sessions dealing with important differences in timbre should be recorded, preferably by video camera, so that changes can later be recalled through both audio and visual records. If proper acoustic balance has been achieved, the singer will note how cupping the ear gives an impression of excessive tonal brightness. Optimum resonance balance is now understood, and the need to readjust tone perception by a false acoustic aid will be forsaken. The ear-cupping habit will be broken.

In any event, a singer cannot use false acoustic-enhancing maneuvers in public. Were a performer to put a hand behind an ear while singing a love duet, it would seem to the audience that the singer was either suffering a hearing loss or searching for ways to protect ears from a colleague's excessively high decibel level. Even in singing the final climactic unison High C in act 1 of *La bohème* (offstage and unseen), through ear-cupping Rodolfo will not be increasing his dynamic level beyond that of Mimì. If she follows suit, each may think he or she is achieving greater brilliance or higher decibels than is the actual case, or that they dislike one another's sound. They may also be contributing to their mutual tonal detriment. Ear-cupping is evidence that the singer's own musicianly ear is aware of resonance imbalances. When those imbalances are corrected, ear-cupping will be happily discarded.

FORMANT INFORMATION. WHY?

Question

Why should a voice teacher need to learn about formants or ever speak of them to a student? I haven't the slightest interest. What student or teacher even thinks in terms of formants during the course of a lesson? There are plenty of practical ways to address an overly dull sound or an overly bright sound without having to resort to scientific terminology that is probably confusing or off-putting to a student. I find this to be completely unnecessary!

Comment

Of course there are plenty of ways to attempt explanations of desirable chiaroscuro balance in the singing voice. Many are illusory descriptions applied to measurable acoustic events. In some traditional quarters cut off from current pedagogic thought, there remains a prevalent assumption that singers are incapable of understanding the components of voice production. The teacher's job then becomes a mystical search to describe those functions. What are the "practical ways" the questioner raises? "Frontal placement," "billowing, rosy clouds," "bubbling fountains," "the mask," "up-and-over," "projection," "head voice," or other imprecise terminology? Any student with enough intelligence to learn to read music and to be admitted to a school of music or a conservatory, and who has sufficient discipline can very quickly understand what the term "formant" means.

A formant is an area of acoustic strength that results from the cumulative distribution of upper partials (also known as harmonics or overtones). A formant results from the acoustic multiple of the fundamental pitch that originates at the level of the larynx, in response to shapes of the resonator tract, thereby producing regions of prominent acoustic energy distribution. (See figure 4.3.) Surely, anyone engaged in the teaching of singing can understand these concepts as readily as freshman students, who have no problem understanding the principle. Dodging specific information should be abandoned. Information will enhance, not detract from, one's ability as a teacher or singer.

MAINTAINING THE MALE 3K (3000 HZ) FACTOR IN BACK VOWELS

Question

In keeping acoustic strength in the 3K area (singer's formant) in all parts of the scale as the male sings the back vowels, are you modifying the vocal tract, adding more breath energy, or doing something else?

Comment

In the elite, trained singing voice, during progression from lateral to rounded vowels, the vowel-defining areas of the spectra (chiefly, first and second formants) alter, but the singer's formant, composed of the third, fourth, and fifth formants, remains. In speech, the back vowels demonstrate a loss of acoustic energy in this 3K region, as is apparent in a spoken sequence of front to back vowels. (See figure 4.3.) No matter what the vowel or the tessitura, the singer's formant ought to be present. To achieve this, the shape of the buccopharyngeal resonator (mouth/pharynx) must match what is "said" by the larynx. In order to retain linguistic clarity, each vowel requires proper tracking on the part of the filtering resonator tube (pharynx and mouth). With male singers, the acoustic strength of the 3000 Hz (3K) region can be lost, particularly in upper range, through excessive modification of the back vowels formed by mouth shapes inappropriate to vowel tracking. What is popularly termed "ring," "ping," or "focus" is lost.

In tracking vowels for singing, even while producing vocal-tract shapes that accord with a particular vowel, the ear must hold to a tonal concept that calls for the subtle balancing of the harmonic integers (overtones) of the fundamental. Especially in the *secondo passaggio* region, this may require adjustment of a back vowel toward a front vowel or, conversely, of a front vowel toward a back or neutral vowel, but in either situation, an increase in breath energy is necessary. Discovering the balance that retains the singer's formant at all times is a primary pedagogic aim. The result is the *voce completa* (complete voice) of the chiaroscuro ideal. Although the mouth undergoes a rounding process (*aggiustamento*) in back-vowel formations, increased buccal opening and rounding ought not to be so great as to lose the inherent acoustic strength of each vowel. Vowel integrity must remain, despite modification, in all regions of the scale.

Proper vowel modification requires that while the mouth opens more for the rounded vowels, the zygomatic muscles do not drop from their slightly raised posture. Preference given to the mouth as a resonator (as in back, or rounded, vowels) increases the acoustic strength of lower harmonic partials. Preference given the pharynx as a resonator (as in front, or lateral, vowels) encourages greater acoustic strength in the higher formants that contribute to the 3000 Hz factor in the male voice, and to the related 4000 Hz phenomenon in the female. A pleasant facial expression—a slight elevation of the zygomatic muscles—will retain the acoustic benefits of the lateral vowel series; lowering the jaw augments the first and second formants so necessary to the definition of rounded, or back, vowels. These elements must be kept in balance as the scale ascends and as the vowel is modified. *Aggiustamento* (articulatory adjustment) includes analogous increases in breath energy.

It is often helpful to preface a rounded vowel with a lateral one (as simple as momentarily replacing "Ah!" by the syllable "Yah!") with its initial /i/ sound. Or insert any vowel from the front vowel series as a pilot device for the introduction of a back vowel, then return to the vowel's initial formation. Pilot consonants serve the same purpose. (See Using Pilot Consonants for Adjusting the Resonator Tract.)

Sound, sensation, and physical appearance that accompany these modifications become indelibly imprinted on the subconscious of a skilled singer. Above all, the musicianly ear must hold to an established concept of balanced tone. The ear conceives balanced tone; what the ear conceives, the body delivers.

MAINTAINING THE FIRST FORMANT (THE *OSCURO* FACTOR) IN FEMALE HIGH RANGE

Question

What can help sopranos and mezzo-sopranos in upper range to preserve the depth of sound you have called the first formant, so that timbre is not shrill or thin?

Comment

The historic concept of the chiaroscuro tone can be verified by modern real-time spectral analysis. In untrained singers, the highest notes of the female voice often show distortion (a preponderance of upper partials), whereas in premier female artists the *oscuro* (dark) aspect of the chiaroscuro (dark/light) tone never diminishes. In fact, among prominent female artists, when they are singing in upper range, the first formant and the fundamental are often enhanced and exhibit increased acoustic energy in the lower portion of the spectrum. Why should this be the case? In ascending pitch, the trained singer's jaw drops just enough to avoid the conjoining of high pitch and lateral vowel. She must not hang the jaw in static position. Rather, as the jaw lowers, the singer should keep the elevation of the zygomatic fascia, which is accomplished by a pleasant facial expression.

Assume that at relatively high pitch levels, young Mary sequentially calls out the names of good friends: "Jean, Jim, Jane, Jen, Jan, John, Joan, June!" As she calls each name, her mouth changes shape to accommodate the sequence of shifting vowels, some lateral and some rounded. She would not willingly confuse the identities of friends by holding to one immobile buccopharyngeal posture; she automatically adjusts her mouth and vocal tract to permit vowel intelligibility. (John should not answer when she is looking for Jane.) Holding the mouth in an unmodified lateral position while singing in upper range will forfeit the first formant, produce an overly bright, thin tone, and destroy diction. Conversely, too large a buccal opening will produce disequilibrium among overtones.

In some less than efficient voice pedagogies, vowel differentiation and phonetic phenomena have unfortunately become dissociated. It is disturbing to read published pedagogic literature that advocates drastic jaw-dropping as a means to increase the first formant. Vowel integrity can be successfully maintained in upper range at the same time that the first formant—that is, the "velvet," the "richness" of the voice—is strengthened.

Rule: If, as the mouth opens naturally with rising pitch and amplitude, the integrity of the vowel is retained, the first formant will grow in strength and there will be no loss of upper harmonic partials ("ring," "ping"). Resonance balance will pertain throughout the scale.

FALLING BACK ON THE VOWEL /ɑ/

Question

Why do so many singers complain that the vowel /ɑ/, as in "ah," falls back?

Comment

In normal speech, during a progression from front to back vowels, the perception of the pitch center lowers, as is apparent in the spoken vowel pattern

/i–e–ɑ–o–u/. Unless a conscious attempt is made to enforce constancy of pitch level, a downward acoustic curve occurs. A spectrum will display a loss of upper harmonic partials. Migration of acoustic strength in the second formant has been termed the diagonal vowel sequence. The vowel-defining second formant, which together with the first formant largely identifies the vowel, demonstrates a downward stepwise progression, indicated by the descending diagonal line of figure 4.3.

In most phonetic systems the vowel /ɑ/ is considered the first of the back vowel series (in some others, the first of the neutral vowel series); the loss of upper partials becomes particularly apparent when /ɑ/ follows a front vowel, such as /i/ or /e/. Says the singer, "My Ah falls back." Many of the exercises in systematic-technique systems are aimed at maintaining presence of the singer's formant, regardless of vowel sequencing. When the singer learns to retain the third, fourth, and fifth formants, regardless of progressing from lateral to rounded vowels, no vowel will "fall back." How is this favorable condition accomplished? By keeping a sufficient level of upper harmonic overtones in /ɑ/, the first vowel of the back-vowel series to be carried over into the subsequent rounded vowels. (See Keeping Uniformity of Timbre throughout the Changing Vowel Spectrum; and Maintaining the Male 3K (3000Hz Factor in Back Vowels.) Patterns that make use of lateral (front) pilot vowels before the vowel /ɑ/ are particularly useful.

DEALING WITH THE VOWEL /u/

Question

How can one brighten an /u/ vowel that often is too dark? It always seems to fall out of the resonance.

Comment

This is a common concern for singers and teachers. As one proceeds from front to back vowels, the spectra undergo significant changes. In the perception of many singers, the first vowel to "fall back" is /ɑ/ because it is the primary vowel of the back-vowel series. (See Falling Back on the Vowel /ɑ/.) Subsequent vowels of the back-vowel series, such as /ɔ/ /o/ /ʊ/ /u/, heighten that impression. During normal speech and in unskillful singing, back-vowel production typically brings a loss of upper partials. For that reason, the most egregious culprit in upper resonance energy reduction is the final member of the back-vowel series, the vowel /u/. In speech, it tends to sound darker or duller than do front vowels, and lower in pitch than even neighboring back vowels.

Any tendency to pucker the mouth into a small, rounded opening for the production of /u/ removes overtone activity. The upper lip should not be pulled downward, covering the upper teeth, because the zygomatic muscles would then be lowered toward the grimacing posture. (Persimmon-eating, with its effects on the lips, is not advantageous.) This gesture alters both internal and external shapes of the resonators.

Several simple devices are useful in correcting the problem of "falling back" on /u/. The English syllable "you," with its /i/ and /u/ components, can be treated as a diphthong. Because the most lateral vowel /i/ is naturally strong in upper partials, it serves admirably as a quickly occurring pilot phoneme to the back vowel /u/. Practice "You–you–you–you–You" in a quickly descending 5–4–3–2–1 pattern. Sing the pattern again on the single syllable of "you," retaining appropriate mouth and lip postures. Then discard the introductory yodh (y) and sing only the vowel /u/, retaining the same configuration of lips and facial muscles.

Another aid is to preface the /i/ and the /u/ with the nasal continuant /n/, as in the word "knew" (/n–i–u/). (Avoid mispronouncing "knew" as "gnu" (/nu/), the large antelope loping across the South African terrain.) This conglomerate syllable combines a nasal continuant with the front vowel /i/, the two phonemes working together as lead-ins to the back vowel /u/. Singing a series of the word "knew" on a descending intervallic pattern is often remarkably helpful in locating a balanced /u/. Finally, the phrase "I knew you" combines front-vowel and consonant phonemes that influence the final /u/ to modify its baneful ways. The phrase should be sung on a single pitch, taken as far upward as comfortable, then on a 5–3–1 pattern in easy range. Because these pilot phonemes incite greater acoustic activity in the region of the singer's formant, they help keep the subsequent /u/ from falling out of the resonance.

USING THE *GOOD* VOWEL /ʊ/

Question

A number of times you used the open /ʊ/ vowel around the upper female *passaggio,* and even more frequently at the *secondo passaggio* of the male, with baritones around $E\flat_4$ or E_4, heavier tenor voices at about $F\sharp_4$ and G_4, and sopranos around $F\sharp_5$ and G_5. You also went a tone or two above those changing points, still using /ʊ/. Since /ʊ/ tends to reduce upper partials, isn't there a danger of darkening the pitches of that region too much, causing the early heavy cover you speak against?

Comment

What vowels should be chosen to help gain smooth transition through upper-middle to upper range is dependent on the singer in question. As noted elsewhere, if the vowel is excessively modified (too covered), it is wise to make an approach from a neighboring lateral vowel that will heighten acoustic strength in the

upper areas of the spectrum. In the master-class situations cited, several singers retained unmodified vowels (too open) that did not sufficiently alter the excessive brilliance that comes from conjoining a front vowel with mounting pitch. Resorting to the open /ʊ/ as a practice device is then a wise choice. It is radical enough to turn *voce aperta* timbre into *voce chiusa* quality without being so extreme as the use of /u/, a related close vowel. (See Dealing with the Vowel /u/.)

In cases where transition from the *zona di passaggio* to higher pitches produces a timbre too strong in upper harmonics for acceptance by the sophisticated ear, use the positive word "good." The open /ʊ/ of this common word not only strengthens the lower harmonics of the spectrum, but has positive psychological connotations as well. Before using /ʊ/ on a 1–3–5–3–1 motif in the passage zone and above, have the student speak the phrase "Look at the good book," observing lip and jaw shapes in a hand mirror. Then the same rounding of the lips, no more and no less, pertains when singing the word "good." Finally, one goes directly from the vowel /ʊ/ to a neighboring vowel, listening for good resonance balances among them. There must be an equalized match of timbre throughout the changing vowel spectrum: lateral vowels should not stick out as brighter; rounded vowels must not sound darker. Recall again that lateral mouth postures uniformly raise all formants, while buccal rounding lowers them.

USING PHONETIC /œ/ AND /ø/ MIXTURES AS TRANSITION VOWELS

Question

In two cases where male singers seemed to have "woofy" timbres on back vowels, you suggested prefacing those vowels with what you called mixed vowels. Much improvement was made. I'd like to know more about the nature of mixed vowels: what they are, and how you make use of them.

Comment

The phoneme /œ/, as in the French words *coeur* and *fleur,* and the German *Köpfe* and *möchte,* combines front- and back-vowel phonetic aspects: the tongue is in the /ɛ/ position, and the mouth and jaw in the position of /ɔ/. As a result, some of the acoustic strength from both the back- and the front-vowel series is incorporated within this mixed vowel. The front (lateral) vowels, it will be recalled, tend to heighten acoustic strength in the upper regions of the spectrum, paralleling overtones that make up the singer's formant, while the back (rounded) vowels favor lower harmonic elements.

When a singer has difficulty transitioning from vowels of the lateral series to those of the rounded series, prefacing the back vowel with the phoneme /œ/ often brings remarkable results. Choose a sustained pitch at the point in the literature where the singer has produced what you describe as "woofy" timbre. Briefly sustain a syllable containing the mixed vowel /œ/ as in *coeur,* then, without pause, follow it with a rounded vowel from the back-vowel series.

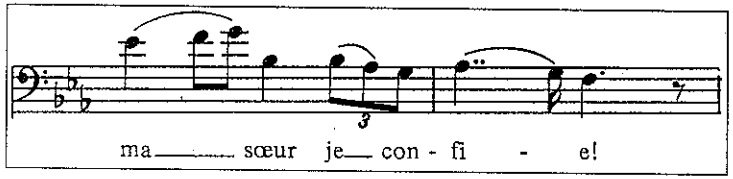

FIGURE 4.4. "ma soeur je confie." (From "Avant de quitter ces lieux," in C. Gounod, *Faust.*)

Consider one of the cases to which you refer. In Valentin's *ma soeur je confie* passage—$E\flat_4$–F_4–G_4—when the singer is moving from $E\flat_4$ through F_4, the syllable *ma* (/ɑ/) heads toward G_4. This fine baritone began to cover excessively. He experienced considerable throat tension, and exhibited the opaque quality you termed "woofy." We asked him first to sing the $E\flat_4$–F_4–G_4 passage entirely on the mixed vowel /œ/. (See figure 4.4.) Then to begin each note of that passage on /œ/, moving immediately to an /ɑ/. Inasmuch as part of the whole high-lying sequence is built on the /œ/ vowel, we asked him to momentarily substitute the word *soeur* for the original text of the entire phase. Subsequently we returned to the $E\flat_4$–F_4–G_4 passage's true text, which he then sang without loss of upper partials, retaining the "ring," the "ping," the "focus" of the singer's formant. Because appropriate modification was reestablished, harmonic balances were improved and throat tension was eliminated.

Another mixed vowel, the /ø/, is formed by keeping the tongue in the position of /e/ while mouth and jaw assume an /o/ position. This vowel is found in the model words *bleu* (French) and *schön* (German). The mixed vowel /ø/ can be used to achieve results similar to those of the more open mixed /œ/, particularly when the subsequent vowel is either an open /ʊ/ or a close /u/. In so doing, the singer takes advantage of acoustic properties of both front- and back-vowel formations.

USING /æ/ AS A PEDAGOGIC ASSIST IN RESONANCE BALANCING

Question

When inducing a lighthearted moment, you had one singer with little resonance in his middle and upper range speak the crazy-sounding phrase "That bad cat has mad black rats" (I wrote it down!), in order to help find the /ɑ/ vowel you wanted. You used it as a prefacing sound for moving into high-tessitura back vowels that had a dull quality. It certainly brought results. Tell more about its use.

COMMENT

With the vowel /ɑ/, which in most phonetic systems is described as the first of the back-vowel series, the mouth assumes its most open vowel-defining position. In the remainder of the back vowel series /ɔ/–/o/–/ʊ/–u/, the lips are incrementally rounded. Singers often complain that in an /i- e ɑ o u/ sequence, the back vowels "fall back." (See Falling Back on the Vowel /ɑ/.) The vowel /æ/ in "cat," while a member of the front vowel series, is a near neighbor of the vowel /ɑ/. In enunciating "That-fat-bad-cat-has-mad-black-rats," the mouth, jaw, and tongue positions on the vowel /æ/ are not far removed from those of the vowel /ɑ/. In moving from the front vowel /æ/ to the back vowel /ɑ/, there is but slight alteration in the body of the tongue, and relatively little change occurs in the shape of the lips and the position of the jaw. Since the phrase is whimsical, in fact quite ridiculous, it invariably induces an ironic smile, ensuring that the zygomatic fascia and the jaw have not been lowered excessively. Then use /æ/ as a pilot vowel to back vowels in order to adjust the resonance balance.

A related procedure is to alternate /e/ and /ɔ/, as in the spoken phrase "They thought they saw—They thought they saw God." (North American singers produce the word God with an /ɑ/ vowel; the rest of the English-speaking community prefers something close to the British "hot,") as in /ɒ/. Transfer the phrase at once to a pattern on the consecutive intervals of a third, 1–3–2–4–3–5–4–2–1, in moderate range and at easy rhythmic pace. The intent of this vowel sequence is not theologic indoctrination but phonetic differentiation. It is constructed so that both the voiced /ð/ and the unvoiced /θ/ consonants preface the vowels. Consonants /ð/ and /θ/ yield the most forward tongue locations in languages of the Western world. Then drop the consonants and sing an /e–ɔ–e–ɔ–e–ɔ–e/ sequence of vowels on 1–3–2–4–3–5–4–2–1 and 3–1–5–3–8–5–3–5–1 patterns. Introduce alternately a vowel from the lateral series and a vowel from the rounded series. Using an /e/ to /ɔ/ progression, revisit spots in the song or aria literature where the back vowels tend to become muddy.

L'IMPOSTO

QUESTION

Some bel canto writers mention *l'imposto* when discussing the attack of the sound. What exactly does the term mean?

COMMENT

Impostare means to start or to initiate. *L'impostazione della voce* and the related *l'imposto* refer to the manner by which the singing timbre is initiated and perpetuated throughout a phrase. *Imposto* embodies immediate sympathetic resonance sensations resulting from the unity of tonal balance, centered intonation, and vibrancy. (See Sympathetic Vibration.) The term is sometimes too narrowly tied to another traditional voice pedagogy English-language expression: voice placement. (See Forward Placement.) *L'impostazione della voce,* however, does not simply describe resonance balances but encompasses all aspects of the appoggio system. Mastery of the onset assures that airflow and vocal-fold adduction are exact coordinates. By remaining *appoggiato, l'imposto* is assured. (See Appoggio versus Belly Breathing, and Routining the Onset.) Because the expression "place the tone" is encumbered with so many dubious connotations, it might be well to replace it with *l'imposto,* which denotes completeness of resonance balancing.

Current voice research continues to examine prephonatory tuning as practiced by highly trained performers. When breath and resonation are coordinated actions, pitch targeting and exactitude of spectral balance immediately occur. Fine singing depends on an awareness of *l'impostazione della voce.* Untrained singers do not enjoy similar directness in producing the onset, nor do they establish the fine resonance balances effected by *l'impostazione della voce.*

FORWARD PLACEMENT

QUESTION

I've heard many teachers talk about placing the tone forward or in the masque. But a number of respected scientific authors seem opposed to forward placement. Since we have not heard you request any singer to place the tone forward or in the masque, does that mean you are opposed to forward placement? Do you never ask the student to place the tone in the masque?

COMMENT

Much subjective terminology directed to resonance perception is less than utilitarian, because perception of sensation is such a highly individual matter. "Forward placement" is one such term. Sympathetic vibration during singing varies greatly from person to person; to expect everyone to experience the same thing is unwise. (See Sympathetic Vibration.)

It is not possible to literally place tone. Yet sensations for some singers are registered in specific parts of the body, one being the region called the mask, or masque. However, similar mask sensations can be generated by a variety of physical means, some desirable, some not. Certain forms of sympathetic vibration in the mask actually are the product of undesirable timbres. Problems often are exacerbated when a singer is told to place tone. Responses to tone-placement requests frequently generate unwanted by-noises, nasality, pharyngeal distortion, lo-

calized control, and breathy timbre. After a tone that exhibits ideal resonance balance has been identified, it is then appropriate to ask the singer to describe the recognizable differences among the several kinds of sensation experienced, including their location.

Significantly, improved sound often emerges when attempts at forward tone placement are abandoned. The teacher may hear from the student "But now I'm not putting it anywhere!" Yet the resonance balance shows remarkable improvement. The best way to build on a singer's proprioceptive response to sympathetic vibration is to avoid confusing the sensation of tone with its actual source. Many problems that continue to plague even advanced singers stem from previous attempts to put tone in some precise spot or slot. Sound does not work that way.

There are many ways to discover identifiable sensations without inventing either acoustics or physiology. Do not ask any student to place tone forward, back, down, under, up, over, or up and over, because such actions are not possible. Instead, make certain that buccopharyngeal resonator shapes properly match laryngeal configurations. As students systematically work through resonance balancing exercises, they discover their own resonance sensations. If a singer feels the tone is now "forward," excellent! I personally have a great deal of vibratory sensation in the frontal regions of my face, but not as a result of trying to put tone there. The singer will develop his or her own imagery after experiencing the presence of sympathetic vibration that results from efficient resonance balancing.

TENOR AND BARITONE RESONANCES

Question

Because the natural pitch and the range of the voice are higher, does a tenor have to introduce more upper partials into his voice than a baritone does? And does the baritone have to produce stronger low overtones in his voice than the tenor? Do you use different techniques in teaching the two male categories? (I am a female singer and teacher, teaching several good male voices. I am not always certain about where to draw the line on this issue.)

Comment

Comparable registration events occur in males whether they have high or low voices. In male voices, the *primo passaggio* marks the pivotal point between the speech-inflection range and the call range of the speaking voice. For example, the lyric tenor and the lyric baritone have their respective *primo passaggio* events approximately a minor or major third apart, the lyric tenor's occurring at D_4, and the lyric baritone's at B_3. A more dramatic tenor will experience his *primo passaggio* slightly lower than will the lyric tenor. Similar relationships pertain to positions of the *primo passaggio* of the lyric baritone and that of the more dramatic baritone. Tenors should not be admonished to produce brighter sound by increasing the intensity of upper harmonic partials. Nor must the baritone reduce higher overtones in favor of low harmonic partials. The chiaroscuro (light/dark) timbre of the classic international school demands balance among the prominent areas of acoustic strength, the fundamental and the first, third, fourth, and fifth formants. Every vocal instrument has its own individual quality, but all timbres must adhere to the chiaroscuro principle. (See Chiaroscuro.)

Techniques that try to increase the strength of the first formant in the male low voice often suggest that a baritone's larynx be placed in a lower position than that appropriate to a tenor larynx. Bass-baritones and low basses are falsely advised to attempt an even lower laryngeal position. Low male voices that follow that advice get a manufactured pharyngeal edge to the tone, and they tend to develop wobbly vibrato rates. (See Making Space in the Throat?) In that same pedagogic orientation, it is suggested that the tenor, in order to increase upper partials, sing with a higher laryngeal posture (sword-swallowing position) than should the baritone. High male voices then acquire a thin, reedy timbre and a fast vibrato, often coupled with nasality, producing buffoesque sonority. Spectrographic analysis of premier male singers confirms that specific balances among the formants are characteristic of the resonant voice, regardless of category. Top male singing artists avoid noise elements that are nonintegers of the fundamental frequency. Acceptable timbre will display predictable relationships among the first, second, third, fourth, and fifth formants, without by-noises.

The nature of the instrument itself need not be altered to produce advantageous harmonic integration. Desirable tonal balances exist when freedom of breath application, unhampered laryngeal response, and resonator configurations are in accord with each other. Tenors will sound like tenors and baritones like baritones when natural resonance balancing pertains. False manipulation of a voice to augment or diminish these balances does not produce a commendable outcome.

UNA BOCCA RACCOLTA

Question

What do you mean when you advise "raccogliere la bocca?" You also say "sing with una bocca raccolta." You translated them, but I need to hear it again. Are there not some comparable English pedagogic phrases you could use instead of these Italian expressions?

COMMENT

The questioner refers to my personal preference for historic, traditional expressions now in international use. The vocabulary of musical terms is often expressed in Italian. It seems not amiss to retain that usage for professional singers and teachers of all national backgrounds. *Raccogliere la bocca* literally translates as "to collect the mouth," a rather colorless phrase in English that does not encompass the term's complete significance, which is the avoidance of jaw-wagging or excessive jaw-dropping. The expression is a close relative of *si canta come si parla,* and stands in stark contrast to the techniques of some national schools (and their mid-twentieth-century North American imitators) that espouse lowered-jaw techniques as a means to improve voice resonance. The natural processes of vowel and consonantal definition are inherent components of the historic *raccogliere la bocca* concept. Forsaking flawed jaw activities through the substitution of the *una bocca raccolta* principle restores harmonic balance, especially when singing in the speech-inflection range. (See *Si Canta come Si Parla; Chi Pronuncia Bene Canta Bene;* The Idiot Jaw; and Three Fingers in the Mouth.)

SI CANTA COME SI PARLA; CHI PRONUNCIA BENE CANTA BENE

QUESTION

You use several Italian expressions that seem to base the singing voice on the speaking voice. Can you please define them again?

COMMENT

There are two phrases stemming from eighteenth-century Italian pedagogic tradition which stress that singing and speaking make use of the same mechanical processes. In a nutshell, they present a major principle regarding adjustments of the resonator tract (the buccopharyngeal chamber). *Si canta come si parla* means "one sings the way one speaks." *Chi pronuncia bene canta bene* translates as "who enunciates well, sings well." Their wisdom and beauty lie in their simplicity and directness, circumventing unnatural adjustments of the vocal tract in singing, most specifically in the speech-inflection range. Of course, modifications of this principle occur when a singer goes beyond the speech-inflection range.

THE IDIOT JAW

QUESTION

What do you think of the so-called idiot-jaw position for singing? It has been recommended to me as a way of opening the throat while keeping the same quality throughout all vowels in all ranges.

COMMENT

Idiocy is not normally an ingredient of the singer's psyche. Unless cast as idiots, singers should not choose to look idiotic (!). It is difficult to appear romantic or happy while mimicking idiocy. Opening the mouth by dropping the jaw has no relationship to opening the throat. Indeed, pharyngeal space is reduced. The pharynx can be expanded when the mouth is closed. Holding the jaw in a lowered position produces uniform vowel and timbre distortions. (See *Una Bocca Raccolta,* and Pulling Down on the Jaw.) The pedagogic admonition to hold the buccal cavity in the position of idiocy is in conflict with acoustic phonetics and the physiology of phonation. Doesn't it seem a bit idiotic to purposely violate those principles?

THREE FINGERS IN THE MOUTH

QUESTION

I am an adult who sings in a civic chorus. Our director tells us we should make a perpendicular shield of the three middle fingers of the hand, then place them between our upper and lower teeth. This is to open the throat and increase its space so the tone can come out better. I can't seem to get the hang of it, and it feels very uncomfortable. Any comments?

COMMENT

Your question invites a number of comments, some of which will best remain unexpressed.

Comment must be made concerning how one can or cannot open the throat. The very term "throat" is often indiscriminately used to refer to both the pharynx and the larynx, and is too imprecise to be of pedagogic value. The pharynx extends from the base of the skull to the sixth cervical vertebra, with pharyngeal dimensions determined by the structure of the individual. The pharynx consists of three parts:

1. Nasopharynx, lying above the lower border of the soft palate
2. Oropharynx, located between the soft palate and the upper region of the epiglottis, and opening out into the buccal cavity (the mouth) through the palatoglossal arches (velar region)
3. Laryngopharynx, extending from the top of the epiglottis to the bottom of the cricoid cartilage (the lower border of the voice box).

The posterior larynx projects into the laryngopharynx. (See figure 4.1.) Because the events of singing are more demanding, requiring deeper inhalation, greater energy, and further laryngeal depression, there is a corresponding increase in pharyngeal space. However, given the complex construction of the pharynx, any con-

scious attempt by a singer to open the throat locally, or to produce space within the larynx itself, is a questionable exercise (see figure 4.1).

Inserting the width of three perpendicular fingers between the upper and lower teeth in a mouth of any size, in the hope of opening the throat, will produce extreme jaw lowering but will not be in line with what is known about normal acoustic function. (Considering the size of many mouths, even inserting two joined fingers could be something of a stretch.) The vowel /i/ ("ee"), with its lateral mouth position, induces greater pharyngeal space than does the vowel /ɑ/ ("ah"), at which the mouth assumes its most open position in speech. Forcefully dropping the jaw from the temporomandibular joint does not produce more space in either the pharynx or the larynx; dropping the mandible actually narrows pharyngeal space and forces the submandibular musculature to press downward on the larynx.

Indeed, in uproarious laughter, the mouth cavity and the vocal tract are both enlarged, the fascia of the cheek region (mask) is elevated, the velum is raised, and the pharyngeal wall is expanded. In such a natural event, the jaw lowers considerably. But it does not drop out of its temporomandibular socket, which is what happens when three fingers force the mouth open.

There is no phonatory task in speech (in any language) that requires the extent of jaw lowering perpetrated by the three-finger-insertion method. Similar buccal positioning occurs only during strenuous regurgitation, permitting the bolus (substance about to be rejected by the digestive system) to be expelled from the esophagus. Regurgitation involves a correspondingly unfavorable rearrangement of pharyngeal space, and shuts off the phonatory mechanism. The more one assumes the buccopharyngeal vomiting posture, the more one diminishes the space of the pharynx (the throat).

What lies behind a pedagogic admonition (occasionally still encountered in some voice studios and among a segment of choral conductors) to place the jaw in such a distended posture? Can it really be intended as a basic position for singing? Can some limited use of this maneuver serve therapeutically? As a compensatory device to avoid jaw clenching (a condition far less common among singers than is frequently thought), there might be some momentary benefit in such overcompensation; but the probability of inducing other problems outweighs its usefulness.

The technique is reminiscent of the admonition to place a fist in the mouth in order to find optimum space for the singing voice, which produces similar results. Another detrimental device is the placing of corks at the molars in order to keep the jaw open. None of these have any place in the voice studio, even as temporary measures. They invite distortion and malfunction.

There is the occasional student who lacks jaw flexibility and holds to a tight and narrow mandibular occlusion. Working to relax jaw rigidity is essential. The answer is not to place the jaw in a distended or dropped position, but to use vowel sequences that are in accord with normal tongue and jaw postures. A dependable

pedagogic rubric: "There is no fixated resonator position for speech or song." Have the singer place a hand, palm down, directly beneath the chin while speaking or singing. Note the small extent of jaw motion that ensues. Hanging the jaw in the posture of regurgitation, as with three fingers in the mouth, has no relationship to the changing acoustic events of phonation. (See *Una Bocca Raccolta;* The Idiot Jaw; Relaxing the Tight Jaw; and Pulling Down on the Jaw.)

KNÖDEL

QUESTION

What is a *Knödel?* Is it desirable or undesirable?

COMMENT

Knödel describes a throaty sound, as though a dumpling were caught in the throat. It results from spreading the pharyngeal wall and depressing the base of the tongue. *Knödel* is advocated as a timbre enhancement in some old-fashioned segments of the German school. Among well-informed German teachers it is strenuously avoided, the term being used pejoratively. *Knödel* can be produced with both high and low laryngeal positions. It is not the result of an open throat. (See Submandibular Muscles.)

PULLING DOWN ON THE JAW

QUESTION

I just saw an ad for a choral music camp showing young people pulling forcefully downward on their jaws with their hands while singing. Well?

COMMENT

Pulling down on the jaw to ensure that it drops as far as possible is part of a recognizable voice pedagogy system that advocates reduction or elimination of upper partials that ought to be present during solo singing. This pedagogic orientation makes the assumption that increasing room in the mouth enlarges the throat. Dropping the jaw produces radical changes among relationships of the formants, in both low and high registers, causing a reduction in the harmonics essential to balanced voice timbre. Excessive jaw-dropping upsets natural phonetic processes and uniformly produces dull voice timbre. Vibrancy is measurably reduced, and vocal brilliance is eliminated, regardless of the voice's intrinsic beauty. The aim of the vocally naïve choral conductor is that no individual voice should be permitted to alter ensemble uniformity in regard to tone and vibrancy.

Questionable is the notion that the aesthetic aims of a particular choral conductor should take preference over efficient vocal function. Such a mandibular posture induces undesirable tensions in the submandibular region (muscles located below the jaw), inhibits normal velar elevation, and drastically distorts voice timbre. (See Submandibular Muscles.) This outdated, mid-twentieth-century choral technique may achieve the disembodied timbre a particular conductor considers appropriate to the literature he or she selects for performance, but it is destructive, and ought to be discarded. Should students and their teachers respond favorably to the ad? No, not if it represents the kind of instruction the student would receive there. (See *Una Bocca Raccolta;* The Idiot Jaw; and Three Fingers in the Mouth.)

RELAXING THE TIGHT JAW

QUESTION

Can you suggest exercises and vocalises for a student who sings with a tight jaw?

COMMENT

Jaw tension can occur from two opposing errors: (1) clenching the jaw and (2) hanging the jaw. There are standard exercises for reducing either type of jaw tension, based in part on the Froeschels/Brodnitz relaxation method. With lips apart, simulate a circular chewing motion for twenty or thirty seconds. Next, with lips closed, hum a few pitches, at the same time moving the jaw back and forth in a gentle chewing motion. Imagine chewing a large wad of gum on either side of the mouth. Now, still using the lateral jaw movements experienced during chewing, sing a short phrase in comfortable range. (Some momentary diction distortion unavoidably takes place.) Use a mirror to note the looseness of the jaw as it retains its slightly circular motion. Follow this by singing the same phrase without the chewing motions. Then introduce longer sung phrases, alternating chewing motions with normal articulation postures. Notice that the action is more lateral than perpendicular.

Next, move the jaw rapidly back and forth while speaking a single sustained vowel. Wiggle the jaw sidewise for a moment or two, then stop moving it while sustaining the vowel. Do this with various vowels. Sing the passage that had induced a tight jaw, first while simulating small chewing motions, then without them. Use of a hand mirror is vital in bringing awareness of freely functioning jaw mobility. The answer to a tense jaw is not to drop it, or to force it downward, but to allow it to resume its natural phonetic postures. Some teachers who themselves have been taught to hang the jaw assume that a singer who does not do so has a tight jaw. (Of course, during speaking and singing, the jaw is not shifted from one side to another. This exercise is solely a practice maneuver.)

Individual facial construction determines the degree of buccal aperture in speaking and singing. People should not be expected to look alike with regard to the extent of mouth opening. In a singer with small mouth-and-jaw construction, it is easy to falsely assume that the jaw is not sufficiently lowered. A return to speech postures will indicate what the jaw should be doing over a large part of the singing range. In ascending pitch, the mouth opens additionally, but the jaw is not hung. (See Mouth Shapes in High Piano and Forte.)

TMJ AND THE SINGING VOICE

QUESTION

While working on *Chansons de Ronsard* by Milhaud, I suddenly got a bad case of TMJ. Do you think this was caused by singing too long in a high tessitura, or was it because in trying hard to relax my jaw for high notes, I was dropping it too low?

COMMENT

Elimination of jaw and tongue tensions (closely related) are among the most frequent questions posed by singers and teachers. A singer who hears clicking or popping sounds when closing the mouth or dropping the jaw is suffering from TMJ (temporomandibular joint dysfunction, also termed TJS [temporomandibular joint syndrome]). TMJ may have its origin in congenital physical structure. Head, neck, and shoulder injuries may also be responsible. Although there is not complete medical agreement on the contributing factors, poor posture, with lack of head, neck, and torso alignment, is generally conceded to be one of them. It is highly probable that tensions of the tongue and the jaw—the scourge of many singers—are among the chief TMJ conspirators. TMJ can be induced by forcing the mandible to assume positions not meant for continuous phonatory activity.

The jaw can be lowered in more than one way. For example, although the mouth is widely opened in hilarious laughter, the jaw drops but does not unhinge, whereas in a fully distended yawn it does. (See Three Fingers in the Mouth.) A mandible dropped from its socket is not relaxed—it is undergoing distortion. The incidence of TMJ syndrome is markedly higher among singers who perpetually hang the jaw in order to relax it, or in the hope of introducing additional depth or roundness by strengthening the first formant. Many recover when proper phonetic postures are reestablished. It is interesting to note that for the above questioner, the onset of what she considered to be TMJ came after singing relatively high-lying passages for extended periods of time, with a consciously dropped jaw.

Several current writers advocate enhancing the first formant through jaw-dropping. A valuable adage of the historic international school is that one assumes speech postures in the speech-inflection range (*si canta come si parla*). In upper

range, the mouth opens more but the integrity of the vowel, determined by postures of jaw, lips, tongue, velum, and larynx, is maintained. The jaw must be permitted mobility, allowing flexible adjustments for rapid phonemic and pitch variations, not retained in low or distended positions. (See *Si Canta come Si Parla; Una Bocca Raccolta;* The Idiot Jaw; Pulling Down on the Jaw; and Relaxing the Tight Jaw.)

Perhaps the singer needs to make certain that she remains in the noble, axial posture, and that she retains vowel integrity when performing in upper range. If the problem continues, she should, of course, get medical advice.

SUBMANDIBULAR MUSCLES

Question

Should the muscles of the submandibular region always remain soft during singing, or can there be some noticeable outward expansion in that part of the neck? Or is it possible that enlargement in this area is actually a manifestation of tongue tension, to be treated as such?

Comment

This question is directly related to concepts of how one "opens the throat." In some techniques of singing, expanding the submandibular musculature (located immediately below the jaw and above the hyoid bone—an area sometimes referred to as the submandibular or digastric triangle) is mistakenly considered to produce an open throat. In this pedagogic practice, the teacher places the student's fingers on teacher's own neck, just below the jaw and above the larynx, then demonstrates what is assumed to be spreading of the pharyngeal wall. The student tries to emulate similar external movements in the throat. This leads to timbre described in the literature of voice pedagogy as *ingolato, engorgé, Knödel,* or *pharyngeal.* (See *Knödel.*) Such activity does not open the throat; it produces tensions among muscle groups located between the mandible and the hyoid bone, including the mylohyoid, geniohyoid, stylohyoid, hyoglossus, and digastric muscles, and causes strain in the tongue and the muscle systems lodging above the larynx. It places the pharyngeal constrictors in positions unrelated to freedom in singing. (See figure 1.4.) The hyoglossis ascends from the hyoid bone to the sides of the tongue; the "loop muscle"—the digastric—is attached to the hyoid bone, from which the larynx is suspended by the thyrohyoid membrane. Efforts to spread the pharyngeal wall by outward movement of the submandibular musculature do not produce an open throat. It is unnecessary to expand the front or sides of the neck to improve either speech or song. Firmly place the index finger and the thumb on alternate sides of the thyroid cartilage of the larynx while speaking or singing a sequence of vowels, as in /i–e–ɑ–o–u/. There is noticeable, limited movement as the external musculature differentiates the vowels, but there is no sustained outward distension of the throat wall.

A corrective prescription for problems of pharyngeal spreading is to close the lips, to place the tongue apex between the upper and lower teeth, and to gently but rapidly move the jaw back and forth while humming. At the same time, with the fingers check the region below the jaw to see that it remains soft. The same submandibular relaxation should occur equally in speaking and in singing. (See Relaxing the Tight Jaw.)

MOUTH SHAPES IN HIGH PIANO AND FORTE

Question

What should be the shape of the mouth for singing vowels in high, sustained range? Are those shapes different at piano and forte passages?

Comment

Vowel definition must always be recognizable, yet vowel modification remains quintessential to upper-range singing. As pitch ascends, the mouth gradually opens (that is, the mandible lowers). However, integrity of the vowel must be preserved. The primary mouth shape for each vowel survives, but the jaw opens slightly wider as the pitch elevates. Extent of buccal aperture in high range must match both the phonetic demands of each vowel and the pitch being sung. Increased intensity also commonly contributes to an additional degree of mouth opening. It should be recalled that there is no single ideal position for the mouth in singing; vowel, tessitura, and dynamic intensity are the determinants. (See *Una Bocca Raccolta.*)

SFOGATO TIMBRE

Question

What is meant by *sfogato* quality?

Comment

The literal translation of the verb *sfogare* is to give vent to, to pour forth, to flow, to let loose. *Voce sfogata* refers to timbre produced with freedom and passion. Music reference sources contradict each other in defining the term *sfogato.* A popular music dictionary offers "to sing lightly and airily," and mystifyingly continues, "Soprano *sfogato,* a high soprano voice." The *New Grove Dictionary* mentions two famous and contrasting examples: in Chopin's Barcarolle, *dolce*

sfogato occurs as an expression mark over a delicate filigree passage, while in Liszt's Hungarian Rhapsody no. 14, *ff sfogato con bravura* indicates a bombastic passage.

Some American commentators on vocal matters have interpreted *sfogato* to mean "smoky," perhaps mistaking *foga* (ardor, verve, impetuousness) for a cognate of the English word "fog." Several sources use the term to identify a quality they believe characteristic of African-American female voices. In male voices, the term is sometimes used to describe excessive *copertura,* or covering, at high levels of emotional energy. Sometimes even a slightly husky-sounding or low speaking voice, particularly among females, will be described as showing *sfogato* timbre. A remarkable number of Italian males have similar raspy speech characteristics. Spectral analysis indicates that in some cases, comparable noise elements may be present in a dramatic singing voice.

For Italian commentators, *voce sfogata* generally describes a production that is warmer and more emotive and passionate than the norm. Contrary to one definition cited above, *voce sfogata* does not refer to light voices. In spectral terms, *una voce sfogata* is strong in lower formants that accent the velvety character of the chiaroscuro tonal ideal, producing what some listeners perceive as a sensuous, richer sound. I personally avoid using *sfogata* as a descriptive term.

USING THE ZYGOMATIC MUSCLES

Question

How do you raise the zygomatic muscles without looking wide-eyed? How do you do it without outright smiling? Don't you have to widen the nostrils or wrinkle the nose in order to raise the zygomatic muscles?

Comment

Encircling the mouth is the orbicularis oris, a muscle that is made up of several strata of fibers, some deriving from facial muscles that insert into the lips, others from the lip fibers themselves. There are a number of muscles that converge on the two angles of the mouth. Mouth and lip postures are partly determined by the alliance of these muscle groups. Among important facial muscles are the levators and the depressor muscles that elevate and depress the lips and mouth. Of additional importance for singers are the zygomaticus minor, the zygomaticus major, and the risorious muscles. This commingled musculature assists in changing facial expression, and in shaping the lips and the mouth cavity. The minor zygomatic muscle is a paired muscle that rises from the lateral surface of the cheekbone, passing downward and inserting into muscles of the upper lip. It can elevate the upper lip, and assists in producing the characteristic nasolabial furrow above the center of the upper lip at the base of the nose.

Coming from the zygomatic arch, the zygomaticus major is a paired muscle that inserts into the angles of the mouth. It blends with fibers of the levator anguli oris, the orbicularis oris, and the depressor anguli oris. It draws the angles of the mouth upward and, as in full laughter, laterally. Its participation in facial expression is determined by the emotion to be expressed. The minor and major zygomatic muscles (assisted by the levator muscles) can raise the fascia between the lips and the maxilla (area between lips and cheeks), much as when a fragrance is slowly inhaled through the nose, producing a pleasant facial expression, but not a full-blown smile. Narrowly separated from several other levator muscles of the lips, the zygomatics can remain elevated even during expressions of contempt or disdain, independent of a smile or a grimace.

Raising the zygomatic area for singing need not provoke widening of the eyes, furrowing of the brow, dilating of the nostrils, wrinkling of the nose, or laughter, actions caused by other muscles, including the risorius, the smiling muscle. When a pleasant expression (not a smile) accompanies complete inspiration, prior to velopharyngeal closure, the velum rises slightly, changing the shape of the resonator tract in the velopharyngeal area. This slight elevation of the zygomatic arch is commonly observed among major singing artists who adhere to the international school of resonance balancing.

In addition, elevation of the zygomatics can produce expressions that induce psychological states of ease and comfort. Wrinkling the brow and the nose, or flaring the nostrils, does not. As Jussi Bjoerling once advised this author, "Never drop the cheek area, regardless of the meaning of the text." (See Elevating the Fascia of the Cheek Region.)

ELEVATING THE FASCIA OF THE CHEEK REGION

Question

During the master classes, there certainly is a remarkable improvement in tone when singers who drop their jaws switch to a pleasant look on the face. In the process, the skin over the cheek region seems to rise. You have mentioned that when the jaw is dropped excessively, the soft palate tends to lower, while in laughter it elevates. As I understand the issue, when the cheek area seems slightly raised, the soft palate assumes the higher position where it belongs for all nonnasals. If the velopharyngeal port is already properly closed on nonnasal sounds, why is it the case that the slight upward lift to the face seems to improve quality, producing a more balanced resonance?

COMMENT

Requesting slight elevation of the region called the masque is a recurrent theme in voice pedagogy. Early treatises stress the importance of assuming a pleasant facial expression. The old Italian adage "inhale as though smelling the fragrance of a rose" clearly has to do with elevated zygomatic muscles and a raised velum. Since the palate cannot be raised beyond the physical confines of pharyngeal structure, it is counterproductive to request a singer to locally raise the palate or to consciously hold it high. When a deep, silent breath is taken through the nose ("smelling the fragrant rose"), the soft palate elevates *before* closure of the velopharyngeal port occurs. Subsequent closure of the port ensues as a nonnasal is articulated. The soft palate remains well elevated for all phonemes except the nasals.

Because the entire vocal tract is relatively compact, any change among its components (lips, tongue, jaw, velum, and larynx) has a direct effect on resonance balance. The improvement the questioner heard is dependent on the symbiotic action among these components. Having the zygomatic muscles follow patterns associated with pleasant facial expressions achieves an uncontrived adjustment of the entire buccopharyngeal cavity. It avoids attempts to make space where it is not possible to do so.

FAUCIAL ARCH

QUESTION

What is the faucial arch and what has it to do with the singing voice?

COMMENT

The term "fauces" refers to the narrow passage from the mouth to the pharynx (sometimes called the isthmus of the fauces) that is situated between the velum and the posterior portion of the tongue; the fauces are bordered by the soft palate, the palatine arches, and the base of the tongue. Two muscular folds, the pillars of the fauces, lie on either side of the passage. It is generally conceded that the spatial dimensions of the fauces contribute to resonance factors of the singing voice, and although I am unaware of any hard data that support those assumptions, the notion appears to be a logical hypothesis. As in laughter, so in singing, the faucial arch elevates; the velum and the uvula move backward and upward, providing more space in the oropharynx. (When the zygomatic muscles are raised during deep inhalation, the fauces elevate as well.) When the jaw is dropped, the fauces, the velum, and the uvula tend to lower. (See Velum Lowering; Elevating the Fascia of the Cheek Region.)

UPPER-LIP TENSION

QUESTION

Some of us have been taught that in order to help focus tone, the upper lip should be lowered so that the upper teeth are not visible. You seem to object to that. Why?

COMMENT

During speech, lip postures vary from person to person. If the upper teeth are visible in speaking, they should be visible in singing. For both speaking and singing, the shape of the vocal tract is in constant flux, there being no one ideal position of the mouth or the lips for either. Pulling downward on the upper lip alters the shape of the articulation system. It affects buccopharyngeal space, reverses the role of the zygomatic muscles, and darkens the tone. There are indeed cases when a singer who remains in an exaggerated smile position, particularly in upper range, suffers from bright, edgy timbre, a problem for which solutions must be found. However, pulling the upper lip down to cover the upper teeth as compensation or as an antidote should be avoided. It destroys the chiaroscuro relationship among the harmonic partials. It also looks quite weird.

DIRECTING ATTENTION TO THE TONGUE

QUESTION

I am curious as to why you sometimes have students look in a hand mirror at positions and movements of the tongue. Doesn't that make a singer aware of the mechanical action of the tongue instead of concentrating on artistry?

COMMENT

Artistry will be difficult to achieve if function is disrupted. Freedom of the vocal tract is essential to resonant tone. The tongue is the chief vector for making changes within the vocal tract, occupying the mouth and part of the pharynx. With the hyoid bone and the larynx, the tongue forms an anatomical unit. (See figure 4.1.) The tongue is the main articulatory organ, and if it lacks freedom, the entire resonator tract is upset, which affects both timbre and enunciation. Whatever positioning the tongue assumes has a direct effect on the larynx. Many tension problems in the singing voice are related to a malfunctioning tongue. Indeed, the tongue is among the three chief culprits of tension in singing, others being the jaw and the neck. If the tongue is not a problem, there is no need to draw attention to it. But to ignore faulty tongue action is to be irresponsible.

The apex of the tongue belongs in contact with the inner surface of the lower front teeth, where it lodges when one says "Um-hm!" This is the case for all vowels and for the majority of both voiced and unvoiced consonants in Western languages. For production of several consonantal phonemes, the apex of the tongue ascends to the alveolar ridge, directly behind the upper front teeth. The tongue occasionally assumes other postures within the vocal tract for defining a few voiced and unvoiced consonants. But for something like 70 percent of the time, in the languages of classical voice literature, the tongue apex remains in contact with the inner surface of the lower front teeth. When the tongue apex is placed in unnatural positions during phonation, the entire body of the tongue tenses. Singers should not be taught to place their tongues in nonphonetic positions. Common tongue problems in singing are the following:

1. Curling the apex of the tongue slightly upward toward the hard palate in a retroflex position
2. Placing the tongue apex in a high retroflex location, creating a double buccal chamber
3. Pulling the tongue back from its normal contact with the inner surface of the lower front teeth
4. Placing the tongue below the gum ridge of the lower front teeth
5. Elevating the sides of the tongue against the upper molars (exaggerated /i/ position) regardless of vowel definition
6. Raising or lowering one side of the tongue independently of the other
7. Grooving the tongue as a uniform position for singing, regardless of vowel definition
8. Depressing the base of the tongue in an exaggerated /ɔ/ position, and keeping it there for all phonemes.

Tongue rigidity causes transition sounds that negate good vowel definition. When these disruptions are corrected, natural physiologic and acoustic functions tend to fall into place. Use pilot consonants such as /v/, /f/, /b/, /p/, /k/, /g/, /s/, /z/ to properly position the tongue apex where it must remain for all subsequent vowels. (See Voiced and Nonvoiced Consonant Pairs; Anticipatory Consonants; and Using Pilot Consonants for Adjusting the Resonator Tract.)

The student must become aware of mechanical aberrations of the tongue in order to correct them. Taming an unruly tongue should be a major pedagogic aim. The hand mirror is the best feedback mechanism for corrective assistance.

LEARNED, HABITUAL, OR NATURAL TONGUE POSITIONS?

Question

A young baritone performed the Count's aria from *Le nozze di Figaro* with a fair amount of skill. Despite a rather good performance, you told him he at times held his tongue in a retroflex position, which you called inefficient, and you had him work with a hand mirror to correct it. Isn't it possible that what you termed a retroflex tongue was natural for that singer? It seemed to give his sound a certain depth and maturity. When his tongue was located where you wanted it, I admit that his sound became more lyrical.

Comment

A constant reflex location is not a natural, permanent phonetic position for any tongue. Tongue positions in singing can be classified as learned, habitual, or natural, the last being in accordance with the vowel and consonant formations of well-executed speech. It is easy for a singer to mistake what is habitual for what is natural. This young baritone had become accustomed to positioning his tongue in a retroflex manner.

Occasionally one encounters a singer, generally a low-voiced male, who has been taught to hold the tongue in a retroflex position because it darkens timbre by lowering the base of the tongue and depressing the larynx. The depth you noted was the outcome of pharyngeal spreading and of erroneous elongation of the resonator tube. This technique had become a compensatory habit. When he no longer pulled his tongue back in the retroflex posture, the sound lost its manufactured, throaty character and achieved chiaroscuro balance. It was also remarked, by a large number of listeners, that the problem of occasional pitch vagaries was corrected, and diction and the agility factor immediately got better. Above all, as the singer himself noted, the fatigue element was taken away. Timbre falsification was removed by eliminating improper tongue behavior. (See Directing Attention to the Tongue; Retroflex Tongue.)

TONGUE-POINT TRILL

Question

What, exactly, is the tongue-point trill? How is it done? What is its usefulness in teaching?

Comment

The tongue-point trill is an extended rolled or doubled /r/, executed by short, quick fluttering of the tongue apex at the alveolar ridge (the gum region immediately behind the upper front teeth). Its duration is dependent on dramatic or emotional surroundings. The sustained rolled /r/ is typically heard in a child's imitation of motor noises, as in B*rrrrr*M! B*rrrr*M! B*rrrr*M! European singers often find the double /r/ easy to execute, whereas North American singers, accustomed to the so-called retroflex, the Midwestern /r/, may need to learn how to do it. (See Learning to Flip and to Roll the /r/ Phoneme.)

The base of the tongue is attached to the hyoid bone, from which the larynx is suspended by a membrane. Without instrumentation, it is not possible to see the base of the tongue, but the apex of the tongue remains visible to the naked eye. When the tongue is rapidly trilling in the region of the alveolar ridge it cannot be held rigid in its body or at its base. This ensures that no tongue tensions affect the larynx or inhibit the changing shapes of the vocal tract. Tongue trilling can be a liberating device. Extended over short melodic patterns, the tongue-point trill alerts the singer to sturdy appoggio engagement. While rolling a sustained /r/ at a relatively high dynamic level, place the hands at the sides of the body just below the rib cage, to feel the contact among the abdominal muscles. It is quickly apparent that the tongue-point trill can spur good breath management. A useful exercise is composed of a three-part rapid pitch sequence on the rolled /r/ in comfortable midrange:

1. Sing a *gruppetto* of uninterrupted sixteenth notes on a 5–6–7–8 tongue-trill pattern, in easy range, retaining a fermata on the sustained 8
2. Sing the same pattern, concluding with a vowel on the fermata note of 8
3. Sing the same 5–6–7–8 pattern, followed by a vowel on the fermata note of 8, which now forms the first note of the descending arpeggio 8–5–3–1
4. Onset the vowel at 8 without the rolled /r/, and complete the descending arpeggio.

LIP TRILLING

Question

During this course, you have never once mentioned the lip trill. Several of my students encountered this thing at a major summer music program, and they are driving me bananas by lip trilling in the hallways, in the studio, and probably everywhere else. I have had much success as a teacher for many years, and this seems to me to be a new and very uncalled-for gimmick. Does it have any real value?

Comment

At least in part, I tend to agree with the spirit of your reaction. The lip trill (also lip flutter) has become a ubiquitous cure-all fetish in some segments of American voice pedagogy. It is true that during its execution, a reduced stream of air vibrates the vocal folds and the external lips. It has been suggested that because of resistance to exiting air at the fluttering lips, the vocal folds themselves come together at a lower closure rate. That may be possible, but does it follow that the same action is transferable to the phonetic tasks of singing?

Beyond providing certain psychological benefits, it is doubtful that the lip trill is as significant as some of its advocates believe. Lip trilling is claimed to be beneficial for keeping the lips and the jaw relaxed. But in point of fact, the lips and jaw in normal phonation are flexible, not tensed. As you read this, are your lips or jaw tensed? Read a sentence or two aloud. Are your lips and jaw tensed? Of course not! On a more positive note, the lip trill does involve the respiratory muscles in much the same way as the tongue-point trill, thereby increasing appoggio awareness. It also may have some as yet unproved influence on resonator and laryngeal adjustments, but my own investigations do not support that.

I tend to downplay the current lip-trilling craze, in part, no doubt, because I think it a mistake to give a minor device the major role it has assumed in some current pedagogy circles. A real danger is that it may become a weak surrogate for technical maneuvers that prove far more productive. Precious lesson and practice time can probably be put to better use.

EXTERNAL-FRAME SUPPORT AND THE TREMBLING JAW AND TONGUE

Question

What is your opinion about a trembling or wagging jaw and tongue, particularly in soprano upper range? What causes this, and how can it be eliminated?

Comment

Shaking jaws and trembling tongues are matters for concern. Tightening of the submandibular (below the jaw) musculature can produce high levels of tension in the jaw, the tongue, and the larynx. (See Submandibular Muscles.) The body's natural response to muscle tension may cause shaking of chin, tongue, neck, and head. This trembling rejoinder to tension resembles what happens in the arm musculature when one vigorously pushes against a resisting object: the arm muscles begin to tremble. For example, if your car gets stuck in a snowdrift, and you and your friends try to push it out, as muscle effort is measurably increased, the arms begin to shake in a rhythmic cycle-per-second sequence, because such shaking relieves the potentially destructive strain placed on muscle tissue. As you and your friends vigorously push your imprisoned automobile, a trembling ballet of heads, necks, torsos, and legs may transpire. In short, a protective response to muscle tension is transferred to all parts of the body. A wagging jaw can similarly result from excess tension and a lack of external frame support. (See *Appoggio della Nucca.*)

Another cause of jaw trembling comes from the downward dragging of the platysma muscle, the grimacing muscle that covers the lower jaw and part of the

neck; it pulls down the lips and the jaw. This tendency is reversed when the zygomatic muscles (cheek area) are elevated, as in a pleasant facial expression. (See Elevating the Fascia of the Cheek Region.) Conscious pharyngeal distention is a companion culprit of the trembling jaw and chin. Intentional spreading of the pharyngeal wall encourages jaw displacement. (See Submandibular Muscles.) This action is often accompanied by retention of a laryngeal position that resembles the beneficial temporary yawn, but that plays no role during sustained phonation. With conscious pharyngeal enlargement, as in induced yawning, there is little hope of relieving the shaking jaw. Slow or rapid vibrato rates, depressed larynx, and pharyngeal distention contribute to oscillating jaws and tongues. (See Making Space in the Throat.) For correction of abnormal pharyngeal distention, have the singer place the fingers lightly over the muscles below the chin, just above the laryngeal prominence, and speak a phrase from a song text. Then sing the same phrase with no greater involvement of the submandibular muscles than took place during the spoken segment.

It is not solely from faulty technical premises that some slight trembling activity may be seen in jaw and tongue. The tongue is a complex muscle bundle, the only muscle group in both genders anchored at one end while free to move at the other. The larynx is suspended from the hyoid bone by the hyothyroid membrane (also known as the thyrohyoid membrane, because its origin and insertions are equally mobile), and together with the position of the larynx, is a chief agent for producing change in the shape of the vocal tract. The larynx/hyoid bone/tongue complex functions as an anatomical unit. (See Directing Attention to the Tongue.) Tiny movements of tongue and jaw can be the normal consequence of the vibrato, which serves as a relaxant principle. Vibrato motion is not restricted to the intrinsic muscles of the larynx. Fiberoptic observation reveals synergistic motions of the pharyngeal wall, the epiglottis, and the base of the tongue. As has been noted, the tongue floor and the jaw musculature are closely related. For that reason, external movement generated by the vibrato is transferred to the body of the tongue through the tongue's attachment to the hyoid bone, and to the submandibular muscle system. (See Free-Swinging Vibrancy, and Identifying and Steadying the Vibrato Rate.)

The first step in the correction of problematic trembling or wagging of tongue and jaw lies in heightening a singer's awareness of its presence and extent. Several separately employed devices may help establish proper external-frame support, correcting elevated head and larynx postures that lead to oscillatory motions of tongue and jaw:

1. Looking straight ahead, clasp the hands well forward on the top of the head, being certain that the head is neither elevated nor lowered, and that the chin and head do not bob up and down with changing pitch; sing passages from the literature where shaking has occurred.

2. Remaining axial, place the palm of one hand on the occipital bone at the posterior of the head. This self-monitoring device assists in recognizing any tendency to move the head upward or forward during intervallic leaping.
3. Place the little fingers at each temporomandibular joint (the jaw hinge sagittal to the ear), the remaining fingers and thumbs resting at the mastoid bone (located just behind the ear), to make certain that the axial posture of the head and torso is maintained during singing.
4. Remaining in the noble posture, cross the arms over the upper chest, taking care not to move the shoulders forward. One hand lightly cups the chin to ensure that the mandible does not drop beyond the requirements of vowel, tessitura, and amplitude. Make certain the chin does not jut forward or move upward.
5. Place the back of one hand just under the chin to recognize, minimize, and stabilize jaw movement.

Another corrective device for excessive oscillatory movements of the jaw and tongue is momentarily to sing a sustained pitch while rapidly moving the lips and jaw in small lateral movements. Such mobility will lessen pharyngeal spreading and correct jaw tension. (See Relaxing the Tight Jaw.)

Most teachers of singing agree that jaw trembling is more prevalent among female singers than among males. An explanation lies in gender differences in physical structures. The comparatively small larynges of many sopranos are less firmly anchored in the neck scaffolding than are the larger larynges of most males. (Slight tongue and jaw trembling may also be more visible among *leggiero* tenors than is the case with robust tenor, baritone, or bass voices.) Minute trembling of the tongue and jaw, so slight as to go largely undetected by the naked eye, but observable when magnified by the relentless, zooming camera lens, can be detected in all vibrant phonation. As the scale ascends, a number of premier female singers show an almost imperceptible movement of tongue and jaw. Yet when this activity greatly increases in the region of the *secondo passaggio,* laryngeal stability has not been sufficient to support rising pitch and a commensurate increase in breath energy.

If tensions are present because of slack external-frame function of the neck, the singer must be brought back to a noble posture, imagining the ears are lined up with the spine, the back of the neck long, the front of the neck short. At the same time, the anterior-lateral abdominal wall must remain in the inspiratory position, in response to airflow increases demanded by ascending pitch or increasing intensity. The teacher must differentiate between the very slight oscillatory movements of tongue, jaw, and neck—the natural outcome of the vibrato phenomenon—and the presence of tension. Slight vibratory motion may be transferred from the lar-

ynx to the tongue or jaw without vitiating good timbre. Habitual shaking is indicative of technical deficiencies.

BACK TONGUE TENSION

Question

What are some good exercises to loosen or relax tension in the back of the tongue?

Comment

Numerous muscles compose the bundle called the tongue. Tension in any part of the tongue is not confined to a particular region, such as front, midportion, or base; it is experienced throughout the entire organ. Both front and back regions of the tongue have great mobility, which is essential to definition of lateral and rounded vowels, and for structuring consonants. When in the acoustic-at-rest position, the tongue feels loose and relaxed. The tongue apex normally remains in contact with the inner surface of the lower front teeth for all vowels and for numerous consonants. It rises to the alveolar ridge only for certain consonants, and it occasionally assumes transitional locations for yet other consonant formations. (See Directing Attention to the Tongue, and Learned, Habitual, or Natural Tongue Positions?) Tension results when the tongue is not in accord with the rest of the vocal tract that produces phonetic formation—that is, when the tongue is not permitted to move to the normal postures of speech production. The tongue does not know where to go if the cavities of the jaw and the mouth are fixated in one hypothetically ideal position for singing. It then behaves a bit the way it does in the dentist's chair!

Allowing the lips, jaw, and tongue to follow patterns of spoken enunciation will cure most problems of tongue tension. Speak a phrase while retaining its rhythmic values; then sing it on a single pitch in lower-middle range with the same patterns of phonetic articulation as occur in speech. As pitch ascends, the mouth opens conformably, but relative relationships among phonetic shapes remain. (See *Si Canta come Si Parla.*)

Several specific exercises are useful in reestablishing phonetic mobility during singing. Have the singer sustain an affirmative spoken "Hm!" at comfortable pitch and dynamic levels. Draw attention to the contact of the tongue apex with the inner surface of the lower front teeth. While executing a vowel sequence, such as /i–e–a–o–u/, quickly move the apex of the tongue in small back-and-forth motions against the inner surface of the lower front teeth. While sustaining the tone, stop the lateral movement of the tongue apex. The acoustic-at-rest posture of the tongue is reestablished, eliminating tension in the tongue musculature. Return to musical phrases, insisting that the tongue retain this freedom.

RETROFLEX TONGUE

Question

I see some famous singers pull their tongues back, especially on high notes. At difficult spots, others look like they are raising the tip of the tongue toward the hard palate. I assume these are technical mistakes, because I hear unfavorable changes in the quality of the sound, yet these people continue to have successful singing careers. Why do they do those things?

Comment

There is not, nor has there ever been, a perfect singer (forgive me, Jussi!). The questioner is right that neither a retroflex tongue position (the tongue apex pulled back into the buccal cavity) nor an elevated tongue apex can offer advantageous positions for elite singing. She is also correct that there are some noted singers who occasionally display those faults. (Males seem more afflicted than females.) In an ascending scale, or on specific pitches, even a major artist may have technical problems caused by mismanagement of the tongue. There is no doubt that a singer will sound better when tensions that stem from maladjusted lingual positions are eliminated. Certainly, greater technical security and timbre consistency ensue.

Tongue postures largely determine clean vowel definition. The apex of the tongue remains in contact with the inner surface of the lower front teeth. For the production of lateral (or front) vowels the anterior portion of the tongue is elevated, increasing space in the pharynx; the contribution of the mouth cavity as a resonator is diminished. Conversely, the back vowels require a lower tongue position in the forward part of the buccal cavity, and an elevated position in the posterior. The resonating room of the vocal tract extends from the internal vocal lips (vocal folds) to the external facial lips. (See figure 4.1.) What the tongue does within that chamber largely determines language intelligibility and voice timbre. Singers eventually put aside concern for the innumerable configurations of which the vocal tract is capable, but any habitual, pejorative, nonfunctional tongue alterations must be addressed.

In speech (particularly that of North America), vowels experience a high incidence of rapid diphthongization with fluid transition sounds, one vowel migrating quickly in the direction of another. On-glides (a change in shape and timbre of

the vowel as it approaches an oncoming consonant) and off-glides (the continuing influence of a departed consonant on a forthcoming phoneme) occur with great frequency during speech, but are destructive elements in diction and timbre consistency for cultivated singing.

A recitation of the alphabet, in any of the European languages that chiefly are used for singing the elite vocal literature, reveals that all vowels are formed with the apex of the tongue at this acoustic-at-rest posture. It is to be heard when a speaker "thinks aloud," as in "*uh*—yes!," or when producing an affirmative "*m-Hm!*" Many consonantal phonemes are formed at the same tongue-point location. Voiced and unvoiced pairs such as /b-p/, /v-f/, /g-k/, and /z-s/ serve as guiding pilots for subsequent vowels. (See Appendix III.) Particularly efficacious is the use of the voiced consonant /v/, as in /va-ve-va-ve-va/. To make the point, I like to use the passionate Italian expressions "Va via!," "Viva la vita!," and "Viva la verità!," both spoken and sung. While using the hand mirror to observe tongue maneuvers, the singer should make certain that in singing each subsequent vowel, the apex of the tongue does not pull away from the initial /v/ location, despite movement of the tongue body for vowel definition.

Some idiosyncratic vocal pedagogies sanction placing the tongue in unnatural locations. To increase the strength of the first formant, one prominent twentieth-century pedagogue recommended placing the apex of the tongue below the roots of the lower front teeth, thereby depressing the tongue apex while elevating the midportion of the tongue, to increase frontal mouth resonance. In actuality, such a position closes off part of the resonance potential of the buccal cavity and changes the shape of the entire buccopharyngeal resonator. It does not create more space, but rearranges it in a less efficient manner. Another current pedagogy endorses retaining the /i/ position of the tongue (high frontal elevation) for all vowels in order to heighten upper harmonic partials that display acoustic strength in the region of the third formant. Still another source believes that if the tongue is curled slightly backward and upward toward the hard palate, two buccal chambers are created (double-buccal resonator theory), resulting in twice as much mouth resonance as would occur from a single buccal chamber! These theories ignore a basic rule for achieving resonance balancing in the singing voice: *it is not the absolute dimension of either chief resonator of the vocal tract (mouth or pharynx) that produces an ideal resonance balance, but the manner in which they are conjoined.* This acoustic rule demands that for each vowel, the vocal tract ought to match the laryngeally generated source of the sound. Because they do not correspond to recognizable vowel definitions, nonphonetic shapes of the vocal tract produce timbre distortions.

Tensions in the tongue can easily be transferred to the larynx. Recall that the tongue is attached to the hyoid bone, from which the larynx is suspended. For freedom in singing, it is essential that nonphonetic tongue positions and retroflex tongue postures be avoided. (See Back Tongue Tension.)

STRUCTURE OF THE NOSE

Question

Does the size and shape of the nose affect the resonance of the singing voice?

Comment

That either the size or the shape of the nose significantly determines quality of the singing voice is not a supportable conviction. If there are impediments to free aeration of the nasal passages—from a deviated septum, polyps, or cartilaginous spurs—vocal timbre may be distorted during the production of nasals, as also happens in some forms of a head cold. Of importance for the singing voice is the unimpeded ability of the nares (nostrils) to permit free inhalation, and the ready emission of airflow for the production of nasal continuants and the French and Portuguese nasal vowels. It is the nasal cavity, not the external structure of the nose, that resonates—and then, only during the production of nasals. The natural height or breadth of the bridge of a healthy nose has nothing to do with resonance.

External cartilage that forms the bridge of the nose serves to protect the eyes from intrusive foreign objects. The cartilaginous external nose responds to sympathetic vibration, as do the bony structures of the skull, but it is not a resonator. Proprioceptive awareness of sympathetic vibration in the facial region, including cartilaginous parts of the nose, varies from individual to individual, dependent in part on overall skull structure. Many outstanding singers feel little or no vibratory sensation in any part of the skull, while others do. The height or breadth of the forehead, the size of the cranium, the prominence of the occipital bone, the dimensions of the mandible, and the length and height of the nose bridge do not determine resonance. Contemporary speculation that a large nose ought to give an indication of greater resonance is not surprising, inasmuch as that notion was generally held by some teachers of the eighteenth and nineteenth centuries, who refused to accept singers who lacked large noses. (This tenor would have been totally out of luck!).

Vibratory sensation in the cartilaginous structure of the nose is strongly marked during the singing of nasal continuants. Nasals induce acoustic energy in the spectral region associated with the singer's formant, often eliciting a common error: trying to increase the strength of the third formant by resorting to nasality. Much regional American speech is characterized by a high degree of nasality, with sound partially emitted through the nose on nonnasals (low velar posture). This unpleasant condition becomes exacerbated when the student is told to "feel the resonance" in the nose. (See Dreadful Speaking Voices.)

One of the most pernicious influences on twentieth-century French vocal pedagogy was the way in which Jean de Rezski's statement "Resonance is a ques-

tion of the nose" came to be interpreted. Despite what may have been De Rezski's original intent, several generations of French singers and teachers literally followed the suggestion that nasality equates with resonance. They attempted to "place the tone in the nose," even in the nonnasals. (With regard to its nonnasal phonemes, the French language is no more "nasal" than others. It just happens to have a quite high incidence of nasal vowels, as does Portuguese.)

The nose is a distinguishing part of facial geography, and it is of importance in defining planes and contours of the face. A nose can be charmingly petite, or rival in size that of Cyrano de Bergerac or of the proboscis monkey, yet be equally adequate to the functional purposes of the singing voice. The size of the nose is not an indication of resonance enhancement for any species of animal. (See Correcting Nasality; Duration of Sung French Nasals.)

FLARING THE NOSTRILS AND WRINKLING THE FOREHEAD

Question

A quite well known vocal coach told me that I should flare my nostrils to give more resonance space to the voice. What about that?

RELATED QUESTION

The choral conductor at my university says that by raising the eyebrows and spreading the nostrils, I will open my throat and increase resonance. Is this true?

ANOTHER RELATED QUESTION

You seem to want a singer, while keeping a quiet forehead, to have a lift in the cheek region. Isn't it a normal reaction to crease the forehead muscles when you try to raise the cheek muscles? How could these two actions be separated during singing?

Comment

It is not possible for wrinkling the forehead and flaring the nostrils to produce more favorable spatial arrangements at the laryngeal level. A corrugated forehead is an enhancement neither to physical beauty nor to resonance balancing. (See The Scotch Tape Threat.) As with any distracting maneuver, attention directed to some extraneous event may occasionally offer momentary compensatory results, but one might just as well wiggle the ears or elevate the big toe as distracting devices. Intentional nostril spreaders and forehead wrinklers adhere to pedagogies built on gimmickry, not on efficient function. The question itself raises eyebrows and furrowed brows among informed teachers and singers who find it difficult to believe that such admonitions can be seriously offered the student.

Some teachers and choral conductors believe that flaring the nostrils produces sensations in the mask area and contributes to "forward placement." Others feel it produces a sense of openness. The admonition is a psychological crutch lacking actual acoustic value. As with all compensatory physical devices, nostril flaring gives with one hand what it takes away with the other. The nares (nostrils) and the nasal cavities properly are involved as resonators only in the production of nasal continuants and in French and Portuguese nasal vowels. (I am unfamiliar with Asian languages, but my ear hears a fair degree of nasality in some speakers.) Neither the external construction of the nose nor the degree to which the nostrils may be widened or narrowed at their anterior aperture, has anything to do with efficiency as respiratory channels. The nasal cavities are not conjoined with the laryngeal/buccopharyngeal resonator system for phonation except in nasal phonemes.

Consider the structure of the nares (nostrils). The nares angle backward from their external origins at the front of the face and open internally into the nasopharynx. Wrinkling the nose or distending the nares does not improve spatial arrangements between nose and pharynx, nor do they open the throat, despite the fact that dilated nostrils are often conjoined with sensations of distention in the submandibular musculature. Spreading or wiggling the nostrils produces a distinctly unaesthetic appearance. The habit may be appropriate to the nibbling rabbit, but not to the communicating singer.

Pursuit of a feeling of openness in the nares has been taken so far as to suggest that before a performance, Q Tips soaked in alcohol be inserted into the nostrils and moved backward toward the nasopharynx (which actually has a drying effect.) Equally pernicious is reliance on vasoconstrictor sprays to produce increased room in healthy noses. Flaring of the nostrils often accompanies heavy physical activity, as in strenuous lifting or pulling; wrinkling the forehead registers concern and perplexity; raising the eyebrows furrows the forehead, and transfers tension to the mastoid region. None of these have a place in communicative singing. In normal interplay, a pleasant expression on the face does not include furrowing the forehead. Nor is wrinkling the forehead common to agreeable social interchanges, whereas maintaining a pleasant facial expression is. Indeed, a pleasant face and a furrowed brow serve opposing psychological and physiological purposes. The corrugated forehead indicates worry or fear, not well-being. During singing, if the one function cannot take place without the other, faulty tone-placement theories are the cause.

Nasality, when occurring in nonnasal phonemes, places the velum in unfavorable positions, upsetting relationships among components of the vocal tract. It also introduces unwanted noise in the spectrum. Nostril-flaring brings tension to the face and inhibits the natural registration of emotion. In forced inhalation through the nose, or in labored breathing, the nostrils flare, but nostril-flaring has no positive role in singing. (See Structure of the Nose, and Correcting Nasality.) Nasality as a transition sound—on-glides and off-glides—in subsequent vowels still plagues some classically trained vocalists. (See Nasal Continuants and Non-

Nasal Consonants.) Nasal quality plays an important stylistic role in pop vocal idioms.

THE SCOTCH TAPE THREAT

QUESTION

You joked about the Scotch Tape threat, but you didn't demonstrate it. Why would you ever want to place a piece of Scotch Tape across a singer's forehead?

COMMENT

The Scotch Tape threat is spoken of partly in jest, yet placing a bit of flexible tape directly across the forehead can prove a helpful studio device for alerting persons who habitually raise the eyebrows and wrinkle the brow when singing. The threat should be delivered in a spirit of fun, and the tape, if used, is only a temporary reminder. Brow-wrinkling can transfer tension to the mastoid area, with direct effect on the external-frame musculature of the back of the neck. Its presence also makes the singer look worried and tense. (See Flaring the Nostrils and Wrinkling the Forehead.)

If you or your students are brow wrinklers, try placing a two-inch piece of Scotch Tape laterally across the forehead during a lesson or practice session. Every time the eyebrows rise or the brow is wrinkled, the Scotch Tape band will bring about awareness of those events. With this simple procedure, the forehead wrinkler and eyebrow raiser can be broken of those bad habits very quickly. Don't forget to remove the Scotch Tape when the lesson is over!

MAKING SPACE IN THE THROAT?

QUESTION

I studied with several teachers who told me that in singing, the throat should be enlarged beyond what happens in speaking. I was taught at various times to feel I had an egg, a grapefruit, a dumpling, or a banana in my throat. I have also been told to hold my throat in the yawn position, because that will make more space for vocal resonance. (I spent years and large sums of money on those lessons, by the way.) You seem to be advocating a disturbingly different system called "vowel tracking." I take it you don't want singers to enlarge the throat to improve resonance. How, then, does a singer get additional resonance for singing if throat space is not greater than it is in speaking?

COMMENT

You have become a student of comparative voice pedagogy! Certain late nineteenth-century and early twentieth-century pedagogies, by using the subjective language you mention, advocated localized enlargement of pharyngeal space, resulting in a timbre known as *Knödel* (dumpling). (See *Knödel.*) The early Italian international school remained on a different path, suggesting that when in the speech range, one tends to sing as one speaks. Breath energy is increased, and vowels are modified as the voice moves to higher pitches. This historic approach corresponds to the contemporary phonetic doctrine of vowel tracking, in which a match occurs between what the larynx is saying and how the resonator tract above the larynx responds to that sound generating source.

Persons who attempt to make space locally in the throat do not achieve more space, but simply rearrange the components of the vocal tract, mostly in disregard of the laws of acoustics. Recall the rule that it is not the shape of either the pharynx or the mouth—chief resonators of the voice—that stimulates a good resonance balance; it is the nature of the shifting relationships among them. Trying to hold the throat in some one ideal position for singing is a bit like holding the leg in one position while trying to walk. Both in speech and in song, there must be constant flexibility during articulation. Only as the vibrator (larynx) and the resonator (mouth and pharynx) are allowed to respond freely to each other can balanced resonance happen. Tension can never result in freedom. Pharyngeal-wall spreading is pharyngeal-wall tensing. (See The Idiot Jaw, and Three Fingers in the Mouth.)

With a silent, complete breath intake, the larynx descends slightly; it remains there throughout subsequent phrases and during breath renewal between phrases. Through this process, natural pharyngeal spaciousness is attained without allusions to eggs, grapefruit, dumplings, or bananas. Whether in speech or in song, the spatial arrangements of the pharynx and the mouth follow the phonetic requirements of linguistic communication. Direct eggs, grapefruit, dumplings, and bananas to the esophagus, not to the larynx.

THROAT SENSATION DURING SINGING

QUESTION

During singing, how much sensation should I feel in my throat?

COMMENT

Sensation anywhere in the body during singing is such an individual matter that to attempt a single comprehensive assessment may be deceptive. That is why placement language is dangerous. In speaking, most of us experience no awareness of sympathetic vibration in the throat, yet if asked to think about it, we prob-

ably can identify some. When a singer goes from speech to song on the same note in the speech range, he or she may notice a slight increase in sympathetic vibration in the pharynx and at the front wall of the neck in the laryngeal region. Close observation of fine international artists reveals an almost imperceptible movement in the voice box related to the cycles-per-second vibrato rate. This is the case with one of today's reigning tenors, who has long been at the apex of the performance world, as he sings a high B or C. His larynx and the front of his neck visibly exhibit a slight oscillation, yet the tone is glorious. He well illustrates the point that increased breath energy required at high fundamental frequency demands a commensurate laryngeal involvement. Even proper laryngeal resistance to flowing air may produce small, externally visible vibratory movements. Despite firm laryngeal anchorage, superficial oscillatory movement from the vibrato can be conveyed to surfaces of the neck and tongue. A singer may or may not be conscious of them.

For both male and female voices, during dramatic singing in upper voice, slight visible vibratory motion in the laryngeal area may increase. With females it is occasionally conveyed from the laryngeal region to the tongue, neck, and jaw, because vibrato is not simply a function of the larynx. During the execution of vibrato, periodic oscillatory movements, comfirmable by fiberoptic observation, are transferred to the tongue, the epiglottis, and the pharyngeal wall. These movements, no matter how minimal, may be transmitted to the external musculature of the neck. (See Free-swinging Vibrancy.)

More vibratory sensation will be surfacely apparent in thin, long-necked singers (both male and female) than in short-necked singers who have more deeply embedded, hidden laryngeal prominences. Therefore, a limited sympathetic vibratory action, discernible on the neck surface, is not necessarily problematic. However, a shaking neck, together with a wagging jaw and a waving tongue, is an entirely different matter. They are indicative of faults that originate in poor breath management or structural support. Noticeable perturbation during singing, whatever its source, is generally attributable to slack coordination among contributive muscle groups. (See External-Frame Support and the Trembling Jaw and Tongue.)

Yet another point regarding throat sensation should be raised. When a nonvibrant singer first discovers vibrancy, he or she may become conscious of new responses in the throat and neck regions, described by some singers as "a buzz." Because such vibratory sensations go beyond those of speech, the singer may worry that they are being produced through tension. Quite the contrary—they may be the consequence of the desirable relaxant principle coupled with energy that characterizes the vibrato phenomenon. Most skillful singers have become so accustomed to sympathetic vibratory sensation that they no longer take notice, unless attention is drawn to it. There is no need to be concerned about subtle vibratory sensations in the throat, so long as they are not induced by malfunction. These favorable comments regarding consciousness of minimal sensations in the laryngeal region should not be construed as an endorsement of induced, localized sensation.

5 NASAL CONTINUANTS AND NONNASAL CONSONANTS

IPA SYMBOLS FOR CONSONANTS

Question

Do you make as much use of the IPA symbols for consonants as you do for vowels?

Comment

Precise consonant symbols are equally necessary for achieving phonatory accuracy in the singing voice. How a singer handles voiced and unvoiced consonant phonemes helps determine the success of phrase direction and legato line. The consonant is as important as the vowel. Appendix III illustrates IPA symbols for most of them, with model words in several languages. In my teaching I draw particular attention to the need for skillful handling, in every musical phrase, of anticipatory consonants, single consonants, doubled consonants—both voiced and unvoiced—and the retention of their phonetic values. Relationships among properly articulated vowels and consonants are the very substance of good vocalism. Diction is not something that is added on as an overlay to voice technique; it is one of its chief determinants.