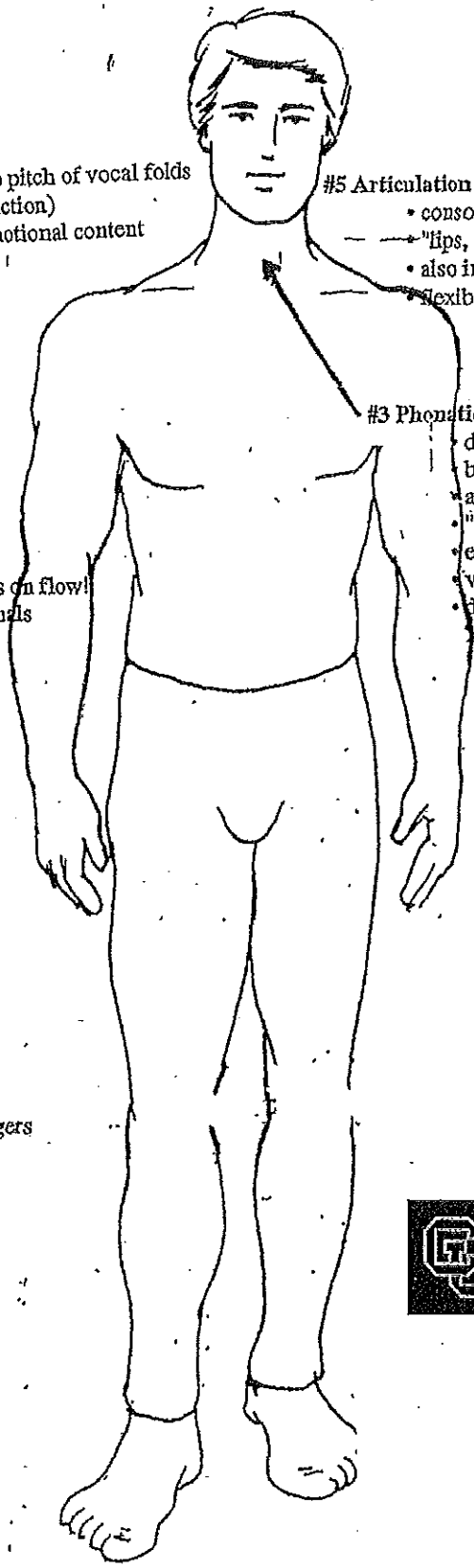
SINGING: A FULL-BODIED ENDEAVOR!



#4 Resonation
- vowels = 99% of sung sound
- focus and shape to tune vowel to pitch of vocal folds
- lips vs. tongue (importance of diction)
- vowels = sound = expressive/emotional content

#5 Articulation
- consonant articulation = intelligibility = textual content
- "lips, teeth, tip of the tongue" exercise
- also includes jaw, soft palate, etc.
- flexible, crisp, energized consonants; tongue forward and

#3 Phonation
- def. - the act of making sound
- begins as a mental process (think pitch, then sing)
- aerodynamic (air flow) vs. myoelastic (muscular)
- "sweet attack" balances flow and pressure
- encourage flow phonation
- vary articulation for flexibility
- develop head register (approach singing from top do

#2 Breath Management
- "breath energy"
- air flow and air pressure; focus on flow!
- in = diaphragm, out = abdominals
- freedom and movement

#1 Posture and Alignment
- buoyant body
- energized and flexible
- stand tall with feeling of "up"
- ribs up and out
- relax shoulder, arms, hands, fingers

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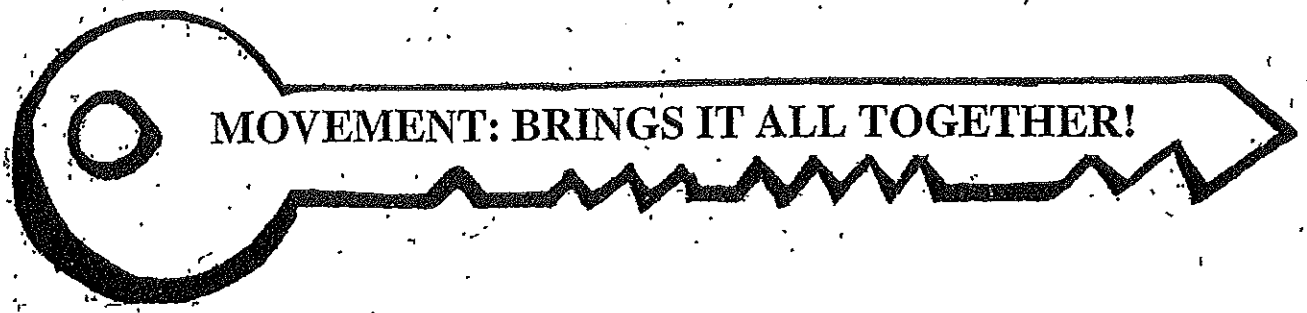
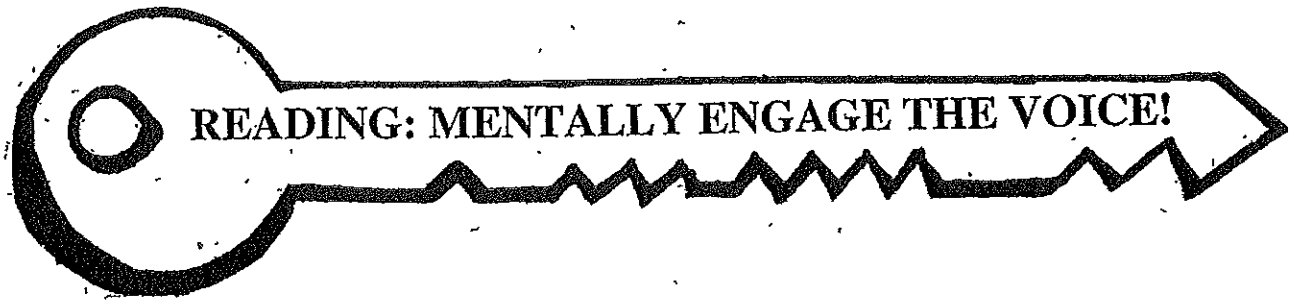
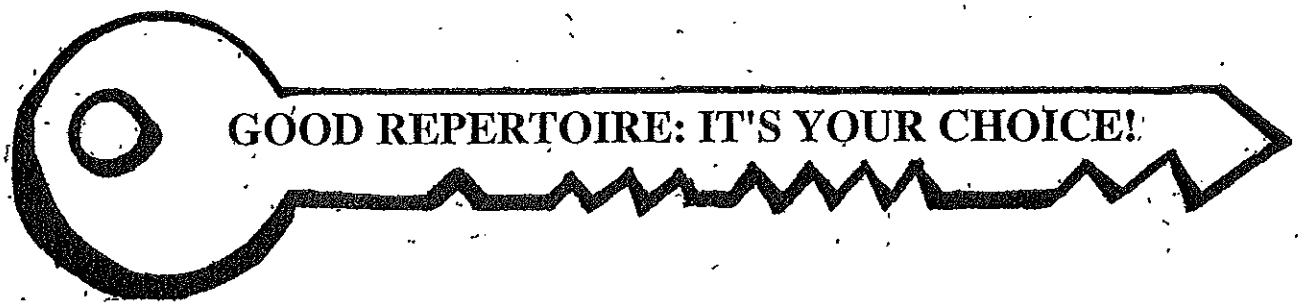


MOVEMENT: BRINGS IT ALL TOGETHER!

BALANCES	• posture and alignment • tension and release • aerodynamic and myoelastic
ENERGIZES	• singing • breath flow • articulation
CONNECTS	• phonation to breath stream • body to singing • singing to music • music to soul/spirt
EXPRESSES/ REFLECTS	• mental involvement • conquering of musical or vocal concepts • expressive nuance • awkward or inefficient action • musical "tension and release" or "tendencies and inhibitions" • music: phrase shape, line, direction, pulse, rhythm, harmonic events, articulation (legato vs. staccato), etc.
ENCOURAGES	• musical activity/action • enjoyment/fun • expressiveness and playfulness • creative exploration of sound and sensation • kinesthetic connection to the abstract or ineffable • singing/thinking "outside the box"



- Teach students to be independent musicians; reading music is the key
- Choose a system and use it consistently
- Two favorites: (1) pitch - solfege; (2) rhythm - count-singing
- These time-proven techniques are logical and well-developed; give sound solid handles and something to hold on to -- CONTEXT!
- Interaction of mind, voice, ear, eyes, body (hand signs)
- Especially helpful to connect performer to score
- Provides solid musical foundation (technical) on which to build expressiveness
- Take advantage of mental activity to stimulate motivational energy

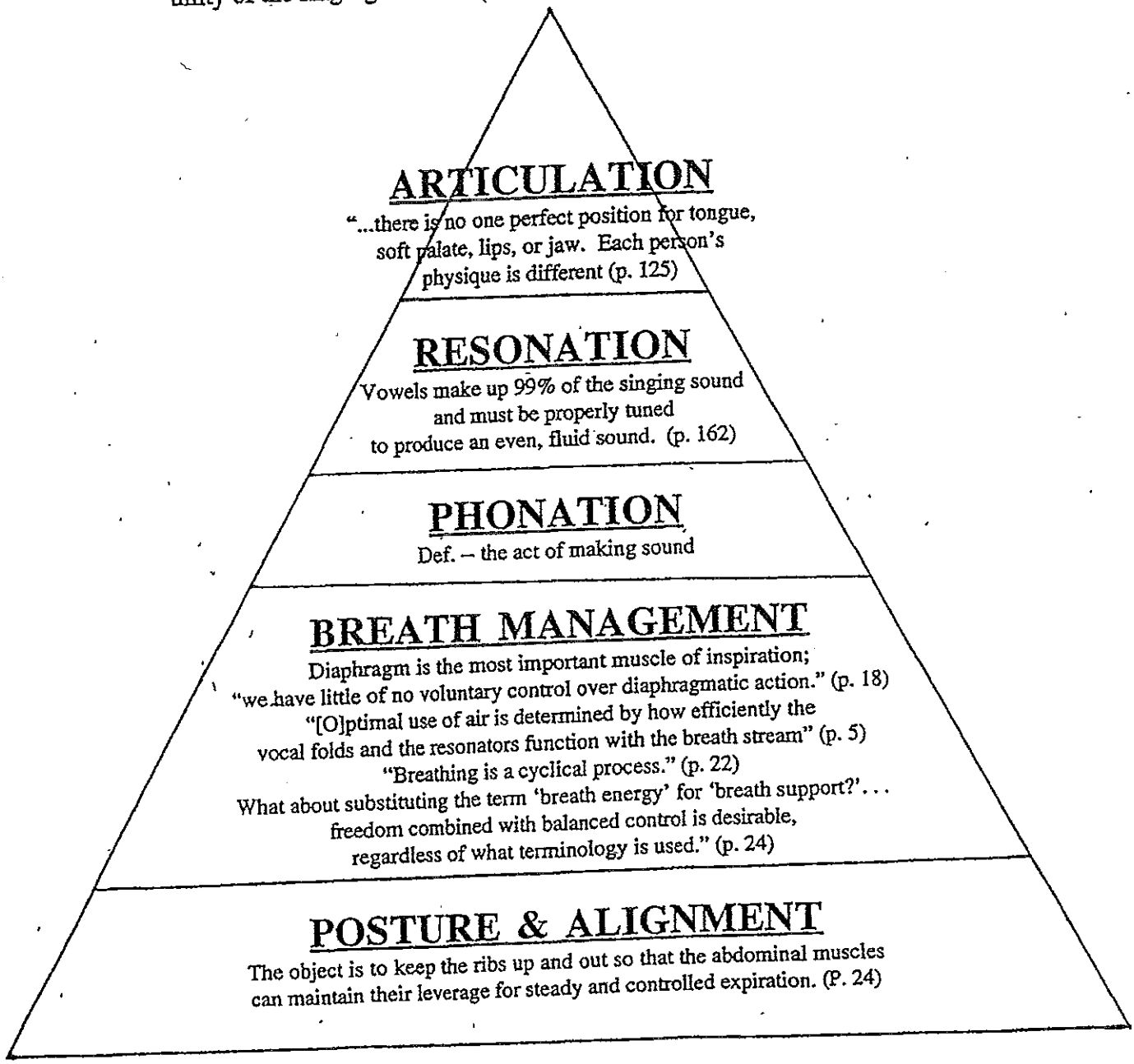


- Assessment criteria:
  craftsmanship, authenticity, imagination, sensitivity, textual integrity
- Vary styles and timbres; be innovative, thoughtful, and creative in your programming
- Mission: To go beyond mere entertainment, to explore the relationship of art and feeling with substance and depth; to seek out new works and new arrangements of high quality; to boldly go. . . .

The Functional Unity Pyramid

"Every art consists of a technical-mechanical part and an aestethical part. A singer who cannot overcome the difficulties of the first part can never attain perfection in the second, not even a genius." Mathilde Marchesi

"When the voice works as a functional unit, it allows singers to develop an extended range with an even scale, a seamless legato, secure intonation regardless of vowel, tessitura, and dynamic, sufficient transmission or projection of sound, and a wide palette of colors. These are the sensuous building blocks of their art...to achieve the gestalt or functional unity of the singing voice is the goal of all singers." Barbara Doscher



Doscher, Barbara. The Functional Unity of the Singing Voice, 2nd ed. Metuchen, N.J.: The Scarecrow Press, 1994. [Physiology, Anatomy, Acoustics, etc. of Singing]

II. Brief Overview: The Approach of Emile Jaques-Dalcroze (1865-1950)

NOTES from: Choksy, Lois, Robert M. Abramson (Dalcroze chapter), Avon Gillespie, David Woods. Teaching Music in the Twentieth Century. New Jersey: Prentice-Hall, 1986, pp. 27-69.

1. Approach named after the Swiss pedagogue Emile Jaques-Dalcroze (1865-1950) who, while teaching harmony and solfege at the Conservatory of Music in Geneva, discovered that many of his pupils, although technically advanced on their instruments, were unable to feel and express music. He believed they possessed a mechanical rather than a musical grasp of the art of music.

2. Jaques-Dalcroze spent the rest of his life inventing ways to help students:
   A. develop their abilities to feel, hear, invent, sense, and imagine;
   B. connect, remember, read and write, perform, and interpret music;
   C. convert musical knowledge into musical understanding;
   D. learn solfege and theory through experience with musical sounds, not as abstractions;
   E. free his students of conflicts between mind and body, between feeling and expression.

3. Eurhythmics is an approach to music education based on the premise that rhythm is the primary element in music, and the source for all musical rhythm may be found in the natural rhythms of the human body.

4. The total method consists of three parts -- Eurhythmics, Solfege, and Improvisation (piano) -- and sought to arouse and develop musical awareness, understanding, and response simultaneously with training the musical ear. Worked for less fragmentation and specialization of various musical studies, so that music was approached in a more holistic fashion.

5. Initially experimented with students. Developed techniques combining hearing and physical response, singing and physical response, and reading-writing and physical response, in an attempt to arouse vivid sensations of sound.

6. Began with arm- and hand-levels to express diatonic major scales, but felt that something was missing, something deep and mysterious about the musical process, something to unify vibrations and sensation, feeling and thought, temperament and spontaneity, imagination and willpower; that is, all those faculties found in truly talented musicians.

7. Noticed natural, automatic reactions common to all ages and cultures; students changed movements when following a crescendo; sometimes they physically demonstrated the accents they heard; noticeably relaxed their muscles for a phrase ending; appeared to allow the music to penetrate, feeling its effects.

8. The questions he asked and the answers he found foreshadowed more modern theories of learning and learning situations:

   a. What is the source of music? Where does music begin?
   Human emotions are translated into musical motion.

   b. Where do we sense emotions?
   In various parts of the body.

   c. How do we feel emotions?
   By various sensations produced by different levels of muscular contraction and relaxation.

8. Questions (cont'd)

d. How does the body express these internal feelings to the external world?
In postures, gestures, movements of various kinds. Some of these are automatic, some are spontaneous, others are the results of thought and will.

e. By what instrument does a human being translate inner emotions into music?
By human motion.

f. What is the first instrument that must be trained in music?
The human body! The base of all musical art is human emotion. It is not enough to train just the mind or the ear or the voice; the entire human body must be trained since the body contains all of the essentials for the development of sensibility, sensitivity and analysis of sound, music and feeling. Any musical idea can be performed by the body and any movement of the body can be transformed into its musical counterpart. There must be an immediate reaction between the mind that conceives and the body that acts.
[Marten, Frank. *Jaques-Dalcroze*, unpublished translation by Robert Abramson as found in Choksy, et. al. Teaching Music in the Twentieth Century. New Jersey: Prentice-Hall, 1986.]

9. Hoped to find connection between the ear that hears; the body that performs, feels, and senses; and the brain that judges, imagines, and corrects.

10. In the beginning, thought it would simply be a matter of teaching to students by training the muscles to contract or relax
a. at a specific time (the speed or tempo of a sound)
b. in a specific space (the duration of a sound)
c. with a particular force (the dynamic energy of a sound)
This was a new application of the laws of mechanics of motion discovered by Sir Isaac Newton. Using correct proportions of time, space, and energy in a gravity field.

11. Exercises in regulating hearing and body movement responses through knowledge of the rules of time-space-energy proportions, coupled with special gravity exercises in the use of weight and balance, became the basis for diagnosing rhythmic movement problems. Worked out exercises to help students strengthen their feeling for metrics and their instinct for the many flows of motion called rhythm. He was determined to find the missing link in the chain of responses that begins with listening and ends with moving.

12. Jaques-Dalcroze postulated that when the body moves, the sensation of movement is converted into feelings that are sent through the nervous system to the brain which, in turn, converts that sensory information into knowledge. The brain converts feelings into sensory information about direction, weight, force, accent quality, speed, duration, points of arrival and departure, straight and curved flow paths, placements of limbs, angles of joints, and changes in the center of gravity. Today, this process is called *kinesthetic sense.* It combines with the other organs to convert sensation into information regarding feeling. This was precisely the tool that Jaques-Dalcroze needed to help his students control the rapid communications between the exterior senses of hearing, seeing, touching, and moving and the hidden, interior activities of the brain which control memory, memory retrieval, judgement, willpower, and imagination. Child learning to roller-skate, artist drawing from a model, musician studying a score, and an athlete practicing a high jump are all using this same combination of moving--feeling--sensing: *kinesthesia.*

13. Chain of connections essential to success of his methods: Hearing could be linked to moving; movement could invoke feeling; and feeling could trigger kinesthetic sensing to bring information directly to the brain and then back to the body via the nervous system. In this way the exterior forces of the body and the interior processes of the brain could be harmonized and coordinated.

14. Primary goals of Eurhythmics training:

a. development of attention
b. conversion of attention to concentration
c. social integration (awareness of similarities and differences and appropriate responses between oneself and others)
d. responses to and expression of all nuances of sound-feeling

Training "in music by music" was more than a musical education. It was, in fact, a general education using music as a humanizing force. It was designed to teach students to use all of their faculties in solving problems. His methods are complementary to many other methods and fields of study.

15. **SUMMARY OF THE GOALS OF EURHYTHMICS**

A. Mental and Emotional

1. awareness
2. concentration
3. social integration
4. realization and expression of nuances

B. Physical

1. ease of performance
2. accuracy of performance
3. personal expressiveness through performance, using the laws of

$$\frac{\text{time--space--energy--weight--balance}}{\text{gravity field}}$$

C. Musical: Quick, accurate, comfortable, expressive personal response to hearing, leading to performance, analysis, reading, writing, and improvising.

Jacques-Dalcroze and his associates had finally found the processes and methods that connected in a constant spiral of learning:

hearing to moving
moving to feeling
feeling to sensing
sensing to analyzing
analyzing to reading
reading to writing
writing to improvising
improvising to performance

16. **MOVEMENT VOCABULARY** Two types:

MOVEMENTS IN PLACE	MOVEMENTS IN SPACE
Clapping	Walking
Swinging	Running
Turning	Crawling
Conducting	Leaping
Bending	Sliding
Swaying	Galloping
Speaking	Skipping
Singing	

17. With this vocabulary an almost infinite number of combinations can be created to express everything from the simplest to the most complex rhythmical time--space combinations and flow qualities. Movements in place or space can be combined with high, low, or middle body position in space to show changes of weight and height of sound as well as melodic contour.

18. By adding gestures and postures to these movement combinations, the student can express melody, harmony, polyrhythms, counterpoint, and phrasing. By using other movements, varieties of dissonance and accent can be explored and expressed. In Eurhythmics the body is used as an orchestra to express physical, vocal, and instrumental rhythms.

19. **TOTALITY OF MOVEMENT EXPERIENCE** A total kinesthetic sensation must be invoked in every movement experience. The sequence of response is always from preparation, to attack, to prolongation, and then return to preparation.

Example, **clapping in place**:

a. *Preparation* breathe, along with a lifting swing of the arms and shoulders away from the center of the body measuring the tempo (time-space) of the beat (inhaling)

b. *Attack* (Initiation?) the instant of striking the hands together (exhaling)

c. *Prolongation* pulling the hands apart to feel and measure kinesthetically the full length of the beat

d. *Return to preparation* lifting the arms upward and outward and breathing (inhaling for recycling of energy)

In **walking exercises**, too, it is important not to allow tactility to replace kinesthesia. The instant the foot touches the floor in a walking step is only the attack of the beat; it is not the real rhythmic sensation which occurs in and carries through the preparation, attack, and prolongation of the walking step and is created by motion in the foot, ankle, knee, and hip joints and in the movements in the muscles of the trunk, thigh, calf, and foot. Remember to use preparation techniques for good walking, and be aware that students who use their bodies poorly (dragging or slapping feet, slouching posture, or lack of balance) will not receive the proper kinesthetic sensation of a walking rhythm in music and will probably have difficulty in expressing clearly what they hear and feel in music.

The Eurhythmics teacher is trained to observe and respond to all worlds or rhythm, movement, and music and to engage in a lifetime study of them.

20. Rhythm is the central subject of each and every Eurhythmics lesson. In Jaques-Dalcroze's view rhythm is not simply timing but is the constantly changing flow of motion that fives vitality, color, and interest to the regular events -- the beat -- in Western music. Like an electric current of varying intensity, rhythmic movements may vary in qualities of tension and release between the two poles of nonmovement -- total tension and total relaxation. Jaques-Dalcroze used the word *rhythm* to mean a balance and ratio of the flow among body, mind, and feelings, as well as a balance between conscious and unconscious movement. In his theory, rhythm *exists* in a time--space--energy context, but is *produced* by complicated interactions among many elements of motion.

21. REGULAR BEATS--EXTRINSIC FORMS (Crusic, Metacrusic, and Anacrusic Qualities) Extrinsic beat occurs in music when the regular beat is very forcefully presented (e.g., rock music). Jaques-Dalcroze's theory of rhythmic beat qualities goes on to classify beats as the *crusic beat*, seen as a release of energy; the *metacrusic beat*, seen as a gentle carryover or a dying away; and the *anacrusic beat*, seen as a preparation of energy for release.

21. REGULAR BEATS--EXTRINSIC FORMS (cont'd) Human breathing in a relaxed state is the ideal basis for an understanding of the anacrusic (inhaling), metacrusic (holding the breath), and crusic (exhaling) qualities of a beat. This is the three-beat norm of human respiration. In any Eurhythmics class these qualities should be expressed even in the simplest clapping and walking exercises. Attack, prolongation and decay, and renewal of beats should be carefully studied.

22. ARTICULATION (Staccato, Legato, Portamento; Attack, Release, Sustain; Vibrato Possibilities). Possibilities of articulation of the arms, hands, shoulders, and torso. Articulation requires the exploration of many ways and places to begin a motion and many ways and places to connect or stop motions.

23. RESTS always express inner activity. The most important focus in the study of rests is to keep the beat internally while inhibiting outward motion.

III. Practical Application: Music in (is) Motion! Let's do it!

A. Gesture [Movements in Place]:

oo-ee-oo-ee-oo	painting (circles, infinity sign, paint the barn, etc.)
Thi-eh, thi-o, thi-a	right, left, both
Tha-The-Tha-The-Tha	martini (milkshake) shaker
John is (as) the son of my mom	juggling, frisbee, pizza; bounce ball for arpeggio
Solfege practice/tuning	Curwen hand signs for Solfege

B. Larger scale movements (Movements in Space):

Many mumbling mice	step pulse
Su-ma-ma	step melodic rhythm
Yi-wa-tho	step text, use arms
Thi-thE-tha-tho-thu	skating
w/8ve arpeggio	tip-toe
Yo-a-mo-cantar	step, sway, use opposite arms

C. Application to Repertoire:

Ice Breaker: Row, row, row your boat
New piece: One these fine mornings
Renaissance: Palestrina "O bone Jesu"
Gospel: Kum-bah yah/Come By Here

IV. Goals, Benefits, and Final Thoughts on Music in Motion

A. Main goal: to promote a heightened awareness of musical events so that all are contributing to the music-making process and not simply (or only) reacting to the conductor's gesture. Such activity will encourage a deeper connection and heightened sensitivity to the music Allow opportunities for students to explore their musical options:
   1. Move to rhythmic notation
   2. Express internal energy, direction and flow of any note (especially longer values) and the relation of one note to another; in larger view, relate one phrase to another and, simultaneously, one voice part to another.
   3. Understand the musical direction (feeling) a phrase might take
   4. Understand articulation (legato vs. detached)

5. Understand the musical energy, impulse, context of rests
6. Develop a sense, individually and in ensemble, of starting, moving from note to note, ending phrases, and hooking phrases together
7. Understand counterpoint
8. Understand harmonic progressions and functions through physical representation (e.g., cadences, tension-release, suspensions, hemiolas, etc.)
9. Understand concept of phrasing (e.g., relaxation, growth, forward motion, unfolding of line; multi-faceted nature of melismas)
10. Be sensitive to textural considerations (e.g., proper flow of line as dictated by accented syllables of text rather than metric accent (especially Renaissance music); text as tableau, individual expression of the drama; interaction with ensemble through face and body; understand phrasing of text through changes of direction

B. Benefits to Singers, Vocal Technique, and Process
1. Actions influence production of sound and vocal technique; contribute to a healthy, flexible, buoyant, natural and comfortable approach to singing by releasing unwanted tension and encouraging a freer approach to singing.
2. Focuses attention of singers on musical elements (line, expressivity, sensitivity) and thereby encourages a relaxed concentration on musicality and not simply the technical aspects of vocal production.
3. Responsibility of conductor to devise movements that encourage all of the above (with experience, students will want to try out ideas); allow time for free movement to explore these possibilities; use students as resource in this important endeavor.
4. As students take more control, they also acquire ownership of the musical performance and all of the benefits that go along with it (e.g., commitment, dedication, careful work, stronger ensemble as group endeavors to "make it work").

C. Final Thoughts
1. While the conductor may have to relinquish some control to promote such musical exploration, the leadership role of conductor-as-facilitator is crucial. Certainly, the conductor must have strong goals related to the music, i.e., feelings and ideas regarding interpretation, sound, performance practice, etc. In the rehearsal process, however, it is the conductor's ability to lead the ensemble in a *discovery process* to meet these goals that is key.
2. While the conductor may have to relinquish some control to promote such musical exploration, the leadership role of conductor-as-facilitator is crucial. Certainly, the conductor must have strong goals related to the music, i.e., feelings and ideas regarding interpretation, sound, performance practice, etc. In the rehearsal process, however, it is the conductor's ability to lead the ensemble in a *discovery process* to meet these goals that is key.
3. Ultimately, the true test is if the choir can perform well without the conductor – can the conductor "get out of the way" to allow the ensemble to show their musical "thinking in action"? This is one way to assess the choir's understanding of the musical material to see (and hear) if they have learned the piece well.
4. Demonstration through the action of sung performance, accompanied by movement, reflects an internal knowledge of the score and sensivity to the music. Such activity leads to a greater potential for reaching higher levels of musical understanding and performing excellence.

V. Closure Discussion: Reflection, Feedback, Questions

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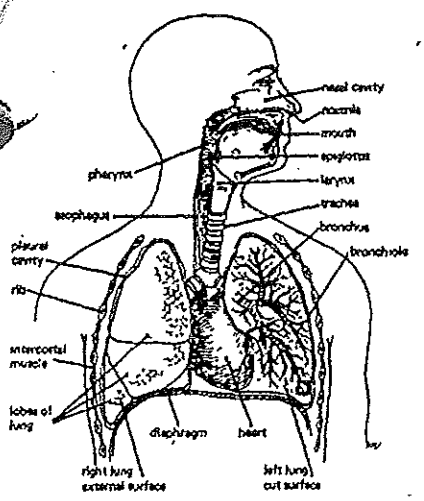


A. Respiratory system

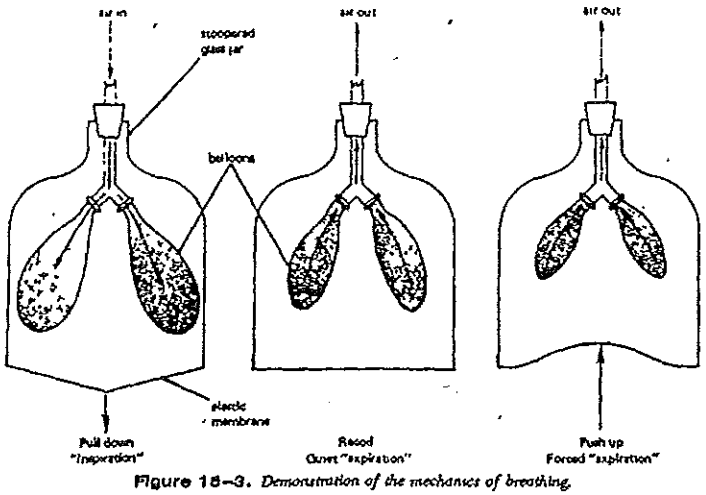
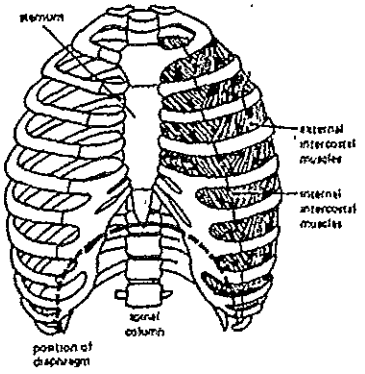


Figure 18–3. *Demonstration of the mechanics of breathing.*

Figure 18–4. *The rib cage. The air-tight thoracic cavity is bounded by the rib cage, which is hinged to the sternum and spinal column, and the diaphragm. The two sets of muscles connecting the ribs are shown.*



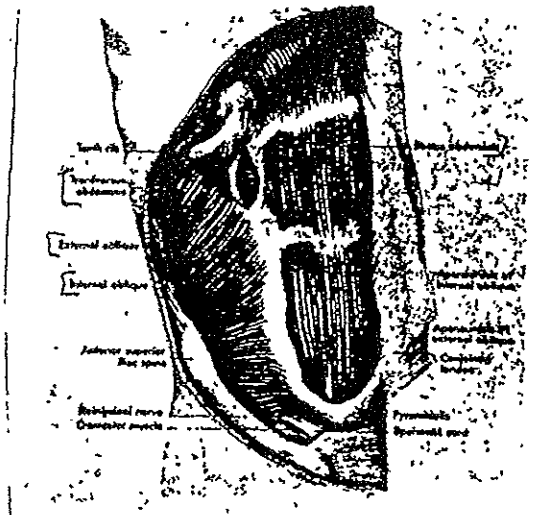


Plate 8. Deep muscles of the abdominal wall.

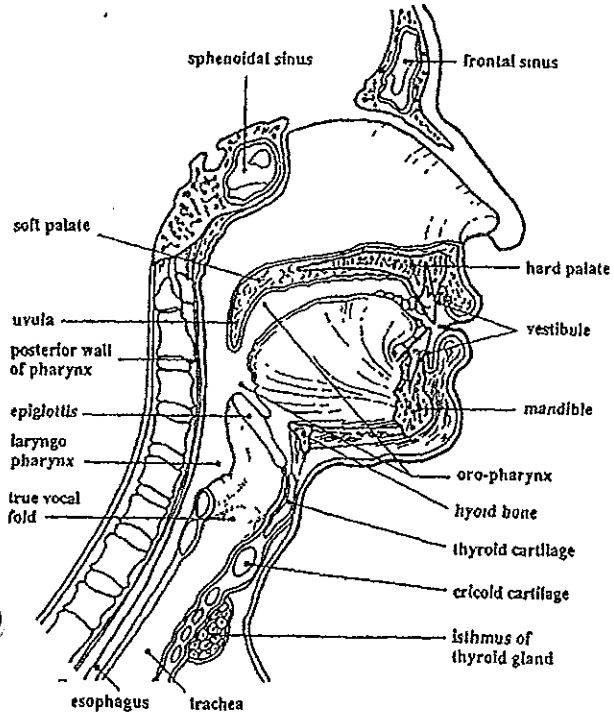


Fig. 33 Outline of the Resonators and Related Organs

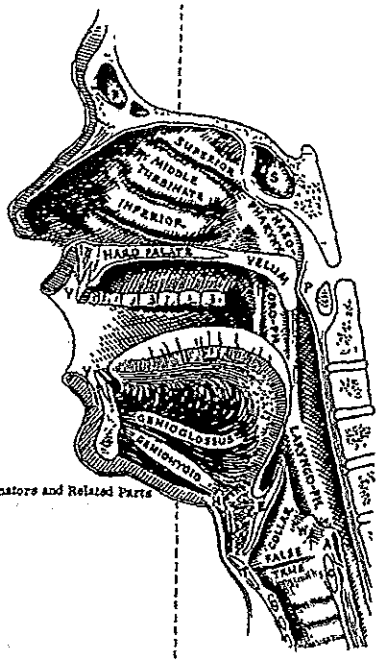
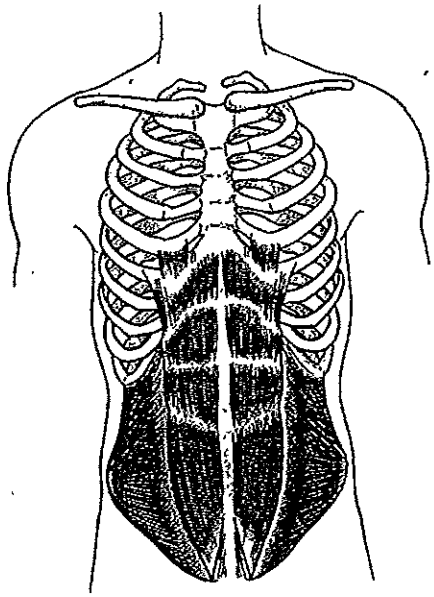


Fig 42 Vocal Resonators and Related Parts

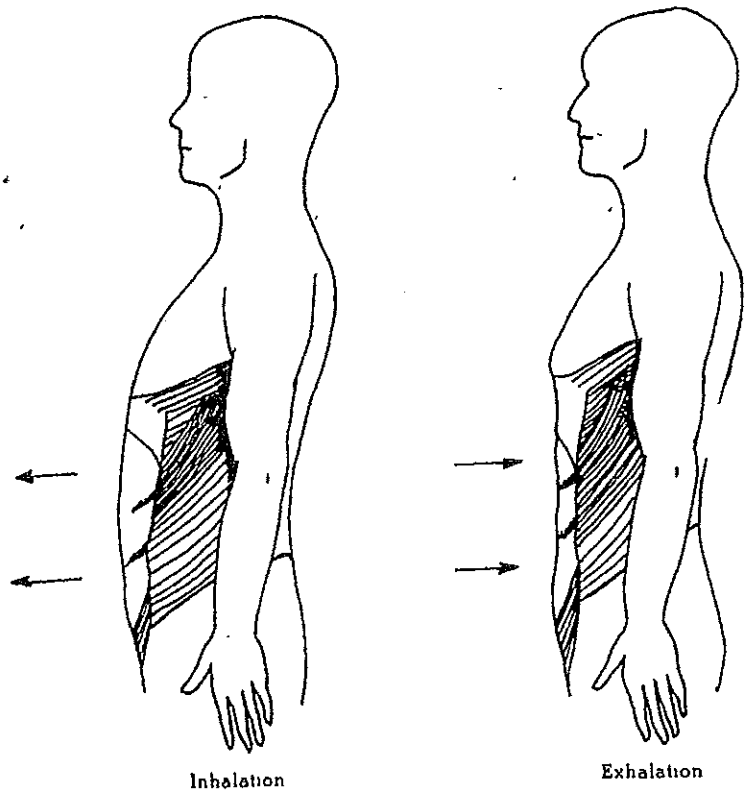
12

13



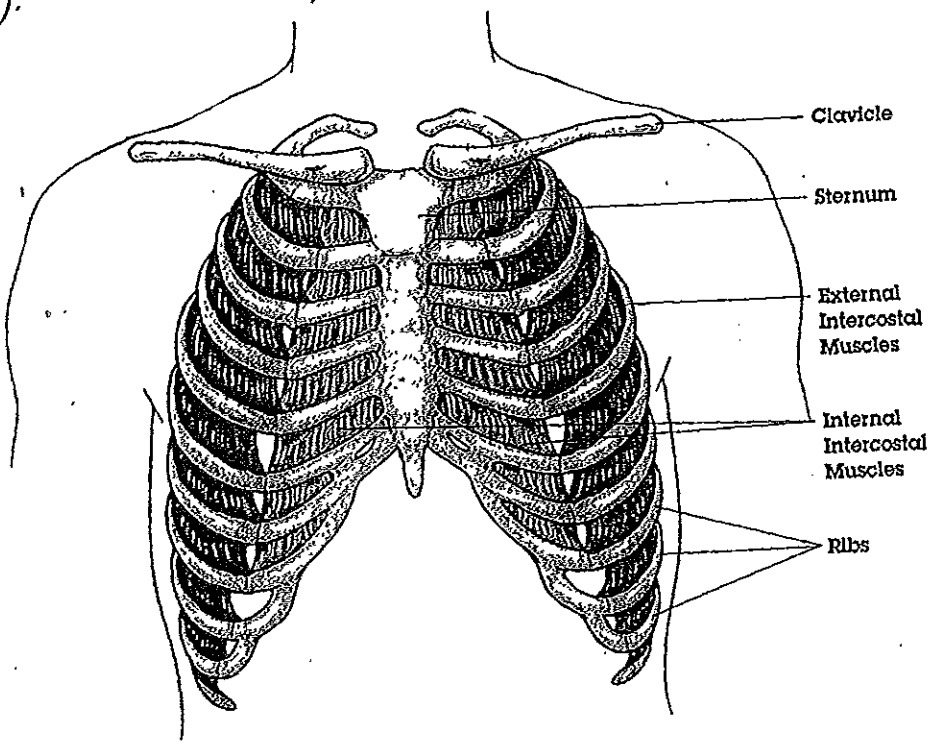
Muscles of the abdomen

14



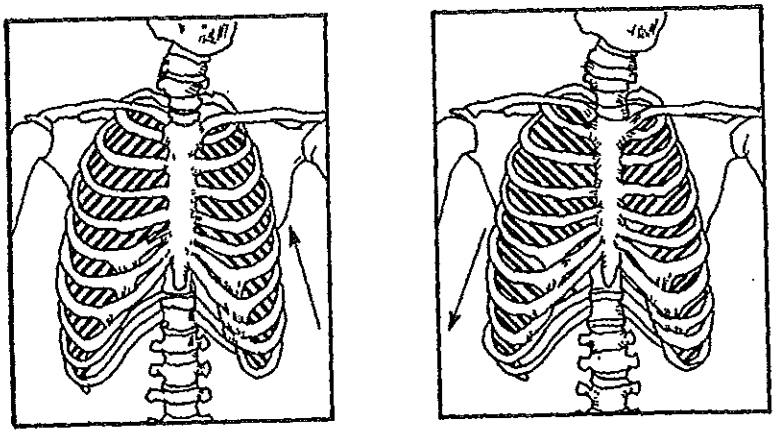
Muscle action during breathing

(11)



Internal and external intercostal muscles

(12)



Action of the Intercostal Muscles

Notes from "Breathing for Singing" Video

Goal: good breath management; consciously learn to mange breath for singing

Two processes: inhalation & exhalation through
1) nose/mouth, 2) throat, 3) larynx, 4) trachea, 5) bronchial tubes, and 6) lungs

Purpose: oxygen exchange

Four members of breathing "team" are:
1) Lungs, 2) Diaphragm, 3) Ribs and Intercostals, and 4) Abdominals

Pleural Sac -- connects lungs to surrounding tissue

Lungs -- not muscles, but organs composed of soft elastic tissue which must be expanded by surrounding attachments (ribs - outward; diaphragm - downward) to create partial vacuum that draws air in.

Goal: simply expand bodies downward and outward and allow air to flow in easily.
Avoid: sucking in air to fill up; avoid heaving shoulders

Diaphragm -- large muscle that controls movement at bottom of lungs; shaped like a bowl (upside down, tilted backward, shaped like an amoeba or double dome), with tail in back that attaches to spine; attaches to ribs and sternum in front. Note: lungs are attached to diaphragm
-- separates thorax (upper body) from abdomen (lower body)

Central tendon -- top of diaphragm (dome); stabilizes up and down movement

Ribs and Intercostal Muscles

External Intercostals (outer layer) -- contract to pull ribs upward and outward
+ more important in singing!

Internal Intercostals (inner layer) -- contract to pull ribs downward and inward

Contracting diaphragm presses against lower ribs and assists in expanding rib cage.

We breathe in and out 25,000 times a day (at rest).

**The ribs cover a large portion of the surface of the lungs, which is why the movement of the ribs has such an effect on the lungs.

Moving ribs outward causes the lungs to expand, resulting in a partial vacuum causing air to flow in; moving ribs inward compresses the air, causing it to flow outward. In everyday breathing this process is small and quick. But in singing, we need to expand the ribs much more and then keep them expanded as singing begins. External intercostals must remain contracted so that ribs stay out, suspended in an open position, and only gradually relax toward the end of singing. This is why it is so important to **keep an open rib cage!!!**

Abdominal Muscles -- bottom attached to pubic arch, span across entire abdomen to top, where attached to ribs and sternum. Exist in four separate layers:

1) External Obliques -- \\\ ///
   attached high on ribs, downward from side to center and contract obliquely
2) Internal Obliques -- /// \\\
   run upward side to middle
3) Rectus Abdominus -- ||||
   pubic bone to sternum; 4 independent bellies
4) Transverse Abdominals -- ≡
   most inner layer

Abdominals contract in several different directions; inspire different breathing methods

Viscera -- contents of abdomen (liver, stomach, large/small intestines, other organs), constitute a large mass which moves in and out with every breath. Since stomach is below the diaphragm, it is not a good idea to eat a large meal before singing.

-- supported and held in by abdomen; diaphragm fits snugly on top; when diaphragm contract, it pushes again viscera and abdominals, which must release to permit full descent of diaphragm.

More breath control is needed for singing...inhalation is larger, exhalation is slower and more precisely controlled. This extra control comes from **muscle antagonism** or two muscles pulling against each other. The abdominals (pulling downward and inward) vs. the external intercostals (pulling upward and outward).

Another stabilizing factor (more muscular antagonism) comes from the downward force of the diaphragm against the upward force of the abdominals. This creates a line of opposing pressures that gives the singer precise control of the outward flowing air.

Opposing pressures are trained to become well coordinated so they feel smooth, steady, easy, and flexible. Breathing in this way provides a foundation for the command of a wide range of musical expression, from the most delicate to the most powerful.

VOCAL PEDAGOGY: PERTINENT PEDAGOGICAL POINTERS
(Primo Packet)

Simple Suggestions

1. "Hook, sip, ssss" exercise
2. "Smell the rose"
3. Quick/catch breath -- cold glass of water on back in shower
4. Blow the candle out, be aware of action in mid-section
5. "Expand balloon in stomach;" Balloon in middle of body -- feel expansion in all directions
7. **To feel abdominals in action:** (a) sit with elbows on knees, hands on chin, breathe and feel expansion, let air out on slow "ss" very slowly as if through a leak in an inner tub. Concentrate just on normal breathing and then lengthen time of inhalation and exhalation; (b) everyone's favorite: lie on back with books on stomach and *breathe naturally*; (c) push fingers in at separation of ribs to identify (feel) muscles that control exhalation.
8. Remember that breathing should be:
   a. inaudible,
   b. unnoticeable,
   c. rhythmic,
   d. a natural expansion of the normal breathing process.

Ideas and Suggestions from Other Sources

from Miller, Kenneth E. Principle of Singing, 2nd ed. Englewood Cliffs, NJ: Prentice Hall, 1990.

p. 17 -- **What to Do** -- Stated in a brief, direct manner, the proper physical conditions for breathing are as follows:

1. Maintain a comfortably raised chest.
2. Keep the shoulders and arms loose and free from rigidity.
3. Keep the head in a natural, vertical position.
4. Maintain an open rib cage for maximum ease in lowering the diaphragm.
5. Maintain a resistance of the diaphragm to the upward lift in the abdominal region. *[This is a subtle and natural antagonism]*
6. Maintain flexibility at the base of the rib cage.
7. Use both the mouth and the nose for inhaling. (This is of particular importance when taking a "catch" breath.)

p. 18 -- **Physical Exercises** -- Keep in mind that exercises are intended to help you produce a better tone; they should not be considered as an end in themselves. As soon as possible, you should coordinate the exercises with actual singing. The physical exercises will most often be helpful when used in singing short musical examples....

I. Deals with holding the breath - YUK!

II. 1. Inhale quickly.
2. Exhale slowly. Spin out the breath through a hissing sound or a verbalized 's.' This is sometimes described as a "surprise breath."

III. 1. Stand tall; do not slump.
2. Raise your arms up to shoulder height, as in a gesture of appeal. Extend your arms, slightly bent, in front of your body and slightly to your side; then lower your arms slowly. Practice this step with the palms of your hands held upward.
3. Repeat the exercise described in number 2, but now coordinate the movements with your breathing. (Inhale while raising your arms, and exhale while lowering your arms.). You should keep your chest comfortably raised, your rib cage open, and the base of your rib cage flexible. Keep you lips parted, and take your breath primarily through your mouth.

IV. 1. Lean forward from a sitting position, and place your forearms on your knees.
2. Slowly take a deep, full breath, and observe the expansion of your lower rib cage around your body.

V. 1. Sit tall, with your back straight and your chest comfortably high.
2. Slowly take a deep, full breath, and observe the expansion of the lower rib cage around your body.

from Alderson, Richard. Complete Handbook of Voice Training. West Nyack, NY: Parker Publishing Co., 1979.

Developing Posture [Up against the wall]

p. 40 --

"If he, or especially she, has difficulty lifting the thorax into its proper position, I have him or her stand against the wall while trying to touch it with head, shoulders, back, buttocks, legs, and heels. Obviously, this is an awkward position in which to sing, but it creates a feeling of posture which is better for singing than the normal, casual stance....

"After a few scales, I ask him to step away from the wall but maintain the posture. Most students slump a bit when away from the wall, but their posture is better than before. If possible, I have a mirror opposite the spot where they stand against the wall, so they may see their posture does not look as rigid as it may feel. Then when they step away from the wall, they can continue to see if their posture is the same of if they slump."

Feeling the Epigastrium [Touchy-Feely]

p. 40-41 --

"When the student begins to use the proper posture, I have him put one hand on his upper chest and the other on his epigastrium. As he sings a vocalise, I ask him if there is any movement. I want the student to feel the epigastrium move, but not the upper chest. If he feels no movement at all, I have him breathe deeply and exaggerate the movement of the abdomen. Most students have trouble moving the epigastrium outward, especially athletes. Their muscles seem so rigid they will not stretch. Sometimes there is not a good understanding of abdominal movement, so I let the students place their hands on my chest and abdomen as I demonstrate what I am saying.

"After a few breathing exercises, I continue with vocalises as the student places his hands again on his chest and abdomen. It is important to correlate the training of the breathing muscles to singing so the student keeps ultimate goals in mind. From the beginning he learns that breathing is an element of singing and is different from any other method of respiration he may learn."

Using Rests for Breathing [Vocalises are for breathing too!]

p. 41 --

"Another important idea is that the scales and arpeggios the student sings are designed to develop his breathing as well as tone quality and facility. The rests within the vocalises are as significant as the notes, because they are intended to coordinate the end of one phrase with the beginning of another by breathing in rhythm in between....Thus, breathing becomes an integral part of the vocal line and the singing experience."

Symptoms of Improper Breathing [and How to Fix Them]

p. 42 -- **1. Lifting the shoulders**

"A common mistake among young singers is lifting their shoulders when they breathe....I ask them to hold their arms out in front with palms down as they breathe. If their shoulders rise with each inhalation, their arms will feel a tug. Watching their arms and looking in a mirror are two ways the students become aware of this improper method of breathing. If the voice lessons are taught in a class [or you are in a choral situation], the members of the group may observe one another and even lay their hands on each others' shoulders to help relax the muscles of the neck and head."

p. 43 -- **Use of the Throat as a Valve**

"...vocal bands may be thought of as a valve at the top of the trachea, but this concept is not useful in teaching singing. The conscious use of the throat as a valve to interrupt the flow of air from the lungs leads to many problems, the worst of which may cause damage to the vocal bands.

An audible symptom of such use of the throat is noisy inhalation, or gasping. When the throat is properly opened, there is absolutely no sound to inhaling either through the nose or mouth. I teach my students to breath noiselessly because it is more efficient...[it also] prepares the voice better and is less likely to dry the throat."

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p. 43 -- **Rigid Breathing Muscles**

"Usually when a student breathes properly, some of his muscles can be seen moving. Breathing is an act of muscles in motion, and deep breathing should cause external abdominal and back muscles to move noticeably.

"Some of the exercise which help make the epigastrium move in and out are (1) lying on the floor and breathing with a heavy book on the stomach, (2) standing against the piano and forcing the abdomen out in such a way that one is pushed away from the piano, (3) pulling the stomach in to look as thin as possible, then pushing it out to look as fat as possible, and (4) other variants of these...."

[Use caution with these exercises and make sure your student realizes that you are only exploring the nature and feel of these muscles. Remember, just because these muscles are moving does not mean that it is the breath or act of breathing that moves them! It is important that these muscles are activated as a natural part of breathing for singing! Too much focus on this myoelastic aspect of breathing can make a student (especially an experienced one) more uptight and less able to breathe well.]

Developing Awareness of the Breathing Mechanisms

p. 44-46 -- "One of the most fundamental problems I have found in students is the lack of awareness of where the breathing mechanisms are and how they feel....I ask them to try the following:

1. **Partially sit** -- "The student starts to sit but stops about three inches above the chair. In this position he should feel some stress in the muscles around the rib cage, the abdomen, and back. He can feel with his fingers for the areas of tension and perhaps feel inner tension in the diaphragm. If he stands and partially sits several times, he should be more and more aware of the external breathing muscles.

2. **Hold a heavy object at arm's length** -- "This exercise is designed to achieve much the same as partially sitting. Holding a chair at arm's length causes stress on the intercostals, epigastrium, and back muscles, but in different ratios from partially sitting.

3. **Express delighted surprise** -- "Inhaling and saying 'Ah...' as if surprised and delighted is a good example of the breath and larynx coordinated through psychological means. The student imagines a time when he was happily surprised, and the response of the muscles is automatic. As with other instinctive features of singing, the teacher's task becomes one of helping the student sustain the response for a time so it becomes useful in singing.

4. **Inhale through a pinhole** -- "A current advertisement on television for a breath freshener asks us to test our breath by sipping through a small opening in the mouth. The result of this test is to show that the breath freshener is still working. Actually, the test shows a positive response even when a person has not used the product. The small opening causes the inhaled air to be cooler through a jet effect. For our purposes the test is good for demonstrating the pull of the back muscles, which are usually difficult to sense. Drawing the breath through a small opening in the mouth makes the back muscles expand. Putting the hands on the sides and back and sitting in a slight crouch help induce the feeling of expansion. In this way the student learns a new aspect of intercostal and back breathing....

5. Pant rapidly and vigorously -- "On a hot day everyone has seen a dog lying on his side panting with the heat. The rib cage and abdomen were moving violently in and out. Imitating this action is excellent for increasing awareness of the epigastrium and of developing stronger muscles. The student holds his rib cage steady, and the abdomen moves rapidly in and out with each panting breath.

6. Whimper -- "An exercise similar to panting is that of whimpering. The difference, of course, is that the student makes a vocal sound in whimpering, so the throat does not dry out as in panting. Actually, I prefer whimpering to panting because it involves phonation and the muscle response is not so violent as in panting. The problem with whimpering is the students' reluctance to make a sound which is associated with hurt or pain during childhood....

7. Staccato vocalises -- "A good staccato which originates on the breath involves the epigastrium in much the same way as whimpering but is real singing, which is important to the student.

"There should be a small amount of air immediately preceding the sound of the voice, and the student should feel as if the vocal bands were 'riding on air.' There should be no feeling of restriction or squeezing in the larynx while singing staccato. The vocalise is generated by the breathing muscles, especially the epigastrium, and is felt in the abdomen, around the sides, and in the back.

"If the student has difficulty with staccato vocalises, I ask him to sing them very slowly, beginning each attack with an 'h' and a bit of air before the vocal sound. As he improves, the amount of 'h' and preceding air lessen, and the tempo quickens. Eventually, he should be able to sing rapid staccato exercises without an 'h' and without tightening his throat.

Developing Coordinated Breathing

p. 47-48 -- "Besides the exercises above...there are several which I have found useful in further coordinating respiration.

1. Proper posture -- "To maintain the expansion of the rib cage the student may hold his arms over his head, lifting his chest and ribs. Then he lowers his arms but leaves the thorax in the upraised position. The arms relax and hang to the sides.

2. Controlled exhalation -- "Breathing to sing is essentially controlled exhalation, and all my suggestions to this point have been to enhance such control. There are two further concepts which I find meaningful: epigastrium independence and singing on the rebound of the breath.

"I believe the epigastrium should act independent of the intercostal and back muscles. The intercostals hold the rib cage in position whether the singer inhales or exhales....When the epigastrium is independent, breathing can be most efficient and most finely controlled....

"The old masters often spoke of the proper attack as 'singing on the breath.' This meant to sing with the glottis open and letting the breath cause the sound to begin. My idea of singing on the rebound of the breath evolved as a way of feeling just that sort of attack. I ask students to think of the breath as a ball which bounces up *in slow motion* after it is dropped, so the breath is not locked in or held immobile between inhalation and exhalation. The breath is constantly moving in or out during singing. Thus, the glottis stays open. **[see also Alderson, pp. 49-61.]**

10(5)

from Coffin, Berton. The Sounds of Singing: Vocal Techniques with Vowel-Pitch Charts, 2nd ed. Metuchen, N.J.: Scarecrow Press, 1987.

[The late Dr. Coffin took several lessons with Paola Novikova (1896-1967) over a period of ten years and made copious notes of her teaching. He also observed her instruction of many world-famous artists. Mme. Novikova had a traditional Italianate intuitive approach to the teaching of singing, which influenced and clarified the pedagogical concepts on which Dr. Coffin and Dr. Doscher have researched and written about extensively in their publications. The following are quotes of Paola Novikova.]

The Instrument

p. 16 --

"I consider the human voice to be a wind instrument. Our resonators are mask, teeth, and chest; to coordinate these resonators is the job of the teacher" [Coffin: "The resonators are the air spaces, enclosed by those members mentioned, which can be placed in vibration."]

"Work only for the schooling of the machine (ribs, abdomen and mask). There are no good sounds that come by chance!"

"Points to watch. 1) Mask position (the cheeks should be up), 2) passive palate, 3) collar bone support for below the passaggio, and 4) flexible rib support for passaggio and above."

"It is absolutely necessary that a singer have a strong machine, if he is to support the voice. The machine must be healthy and strong." [Coffin: "The machine become stronger through good singing."

"We must learn to train our breathing and resonance machine. Voice development is a training of the machine -- not the sound."

"If it feels wrong it is bad -- if it sounds wrong that is a matter of opinion."

Breathing

p. 17 --

"She seated students so that they worked only from the waist up -- this demanded much more effort from the ribs."

All the work was in the tank -- didn't bother with the larynx itself. "The muscles get stronger through preparation."

"The action of the flexible ribs is up at the end of a phrase and when singing a descending musical passage."

p. 18 --

"The catch breath is always taken with the mouth open -- during which time the chest does not drop."

"The flexible part of the ribs has to be trained, never the chest."

"Take a full breath for each exercise in vocalizing -- throw away unused part."

"Don't command the broad back -- only the flexible ribs."

"Mobilize the ribs for high notes, economize the ribs for low notes."

"The chest must never drop -- it is held up by the low ribs."

"Give abdominal support before, not with high tones. The greatest intensity of he machine is on the way down, not on the way up."

"We have only one muscular thing to think about in singing: the muscular control of the machine (abdomen and ribs). One sings on the focus but without muscular pressure except at the breath in support and control. If support is dropped, then the tone falls back on the throat, and other muscular support steps in."

"Hold back the breath, not the sound. After rib expansion, let sound go! It will find its way into the mask where focus is. The mask is the keyboard; play on it. The breath opens it up."

p. 19 --

"Watch sensations; let them be your guide. The sensation of fixing or holding is at the breath. The chest must never drop; held up by ribs. The tone hangs suspended on the breath. Less effort; more sonority!"

"Don't inhale half-heartedly, don't inhale without thinking of the mask."

"Never classify voices until breathing is set, never before 5 or 6 lessons. Impossible to classify by sound. Get it on the breath then it will show."

"The lifted up chest should never drop during the exercises because when the chest drops, it squeezes the air out of the lungs in an artificial sudden way. The chest lifts up when we inhale. The whole casaharmonica gets more volume when it fills from the bottom of the lungs and lifts up everything that it finds in its way. If the chest does not lift up then something is tense."

"Singing is how to breathe and what to do with the breath."

"The legato is of the breath -- the sound is a consequence."

"Sing with breath and not voice."

"Too narrow on inhalation. Inhale as through the back of the ears to give width of the mask." [Coffin: This also calls into action the downward and widening influence of the omohyoid muscles and the widening muscles between the hyoid bone and the tip of the chin as well as the hyoid bone and the mastoid process. These can be felt with the fingers. These opening muscles become strengthened in singing.]

"Before singing and during singing think up the expanded ribs. The muscles of the back get stronger."

12(7)

VOICE CLASS STUDY GUIDE: Chapter 9 -- Making Sound [PHONATION]

1. Vocal tract: Voice box (larynx), soft palate (and nose for nasal sounds)

2. Initiation of voiced sounds comes from vibration of two _____ of _____.

3. The _____ (Adam's apple) sits on top of the _____ (windpipe).

4. The larynx consists of several _____ and is a housing for the _____ _____ that are activated by _____ from the _____.

5. The sound is then _____ and _____ by _____ in the "vocal tract" (the _____ or throat and mouth).

6. When air is sent through these folds with the intention of making sound, they _____, creating sound [phonation] and the pitches we use for speech and singing.

7. The cleaner and more efficiently these folds _____, the clearer and healthier the _____.

8. The number of times the vocal folds vibrate determine the _____. (e.g., A4 (above middle C = _____ cycles (times) per second).

9. The larynx is _____ and _____ in the neck from in front, behind, above, and below by groups of _____ _____. [See Dr. Gemmell's handout: STRAP MUSCLES.] It has a complex relationship with the throat (pharynx), soft palate, tongue, jaw, neck, and chest. The position of the neck and chest, movement and tension in the tongue and jaw, and flexibility or constriction of the muscles of the pharynx all contribute to laryngeal efficiency and affect tone quality.

10. The vocal folds act as a sensitive _____ and guardian for preventing foreign material from entering the lungs.

11. Swallowing raises the larynx, shortens and narrows the throat, and causes vocal folds to react by closing tightly to prevent food from going down into the lungs. Singing demands the _____ physical situation – a wide-open air passageway with no constriction or hindrance to the balance of the larynx in the neck or its ability to vibrate freely.

12. Main structures of the larynx (four cartilages and a bone):

a. cricoid cartilage – looks like signet ring

b. two arytenoids cartilages – looks like two pointed hats and sit atop cricoid; attached to them are (1) the vocal folds, (2) the muscles that cause the arytenoids to move the vocal folds together and apart, and the vocal ligament.

c. thyroid cartilage – shaped somewhat like a shield, open at back, and has upper and lower horns; serves as anchor for folds and forms joint w/cricoid. Muscle attachments to hyoid bone, sternum, pharynx, underneath skull, and palate. (Note: most muscles comes from above).

d. hyoid bone – shaped like horsehoe (sitting horizontally), located between jaw and throid cartilage; considered part of laryngeal structure. Complicated attachment and is suspended in neck by muscles and membranes that attach to the thyroid cartilage, sternum, scapula, jaw, tongue, pharynx, and skull (see Fig. 9-4).

13. Vocal folds:
    a. to make sound: come together
    b. to breathe: open
    c. to create higher pitches: must be able to stretch
    d. to create lower pitches: must be able to relax
    e. to do all of this: some small muscles do a lot of work w/o a lot of thinking

14. Briefly define:
    a. vocal folds
    b. *conus elasticus*
    c. crico-arytenoids
    d. inter-arytenoids
    e. crico-thyroid
    d. adduct (close); abduct (open)

15. When the lengthening of the folds is done smoothly and evenly with no extra tension in the throat and larynx, the pitch change happens _____. At the highest pitches, the vocal folds are fully stretched and the vocal ligament vibrates, When the vocal folds are not stretched, they are _____. This configuration produces the low, heavier sounds (sometimes called _____). When the folds are stretched, the sounds are higher and lighter. It is when you sing the high notes with a very heavy sound that "muscular arguments" (_____) a can occur and create uneven changes in the sound.

16. While vocal folds are responsible for initiating the pitch, they are not the only determining factor for singing *on pitch*. What else influences this?

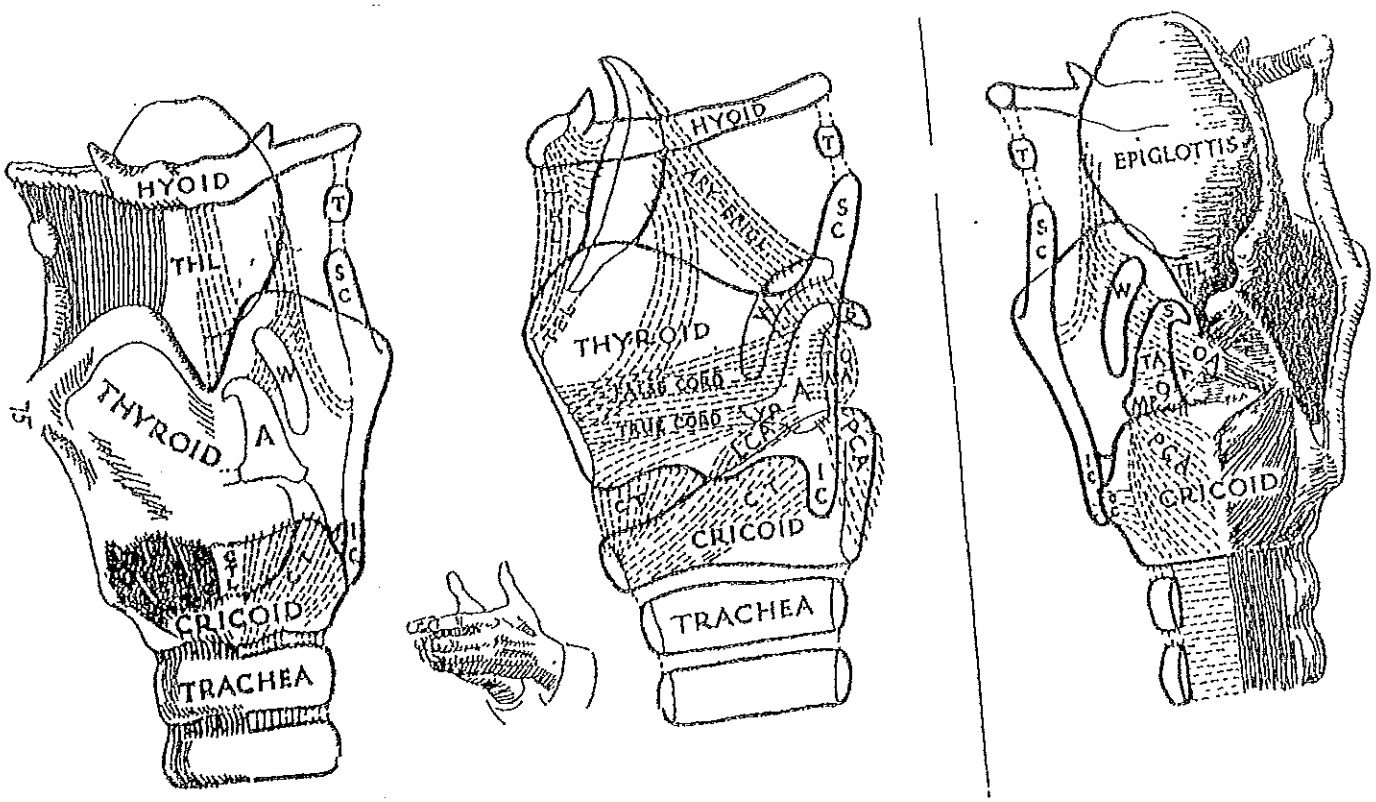
17. Fortunately, the body is more clever than we are and manages to regulate all of this by the _____ to sing, by _____, and good physical _____.

18. The initiation of sound is called the _____ or _____. Little explosions of sound are called _____ attacks. Continual abuse like this can cause growths on the folds called _____.

19. Inefficient coordination can also cause the sound to be too _____. This happens when the folds do not close well and air leaks out; consistently breathy sound is indicative of poor vocal balance.

20. A balanced voice produces a sound that is _____ from the _____ to the _____ of the singer's vocal range. Singers self perception: good singing can be very noisy internally and will sound and feel very uneven and bussy to you. This is why it is imperative to have a teacher with good eyes and ears, or audio, and preferably, video feedback.

21. Vibrato. Read pp. 267-268. Dr. Gemmell's favorite definition: an even fluctuation of pitch that does not draw attention to itself and is *the product of a freely functioning voice!* (Wobble: too slow; Tremolo: too fast; Straight tone: too held)



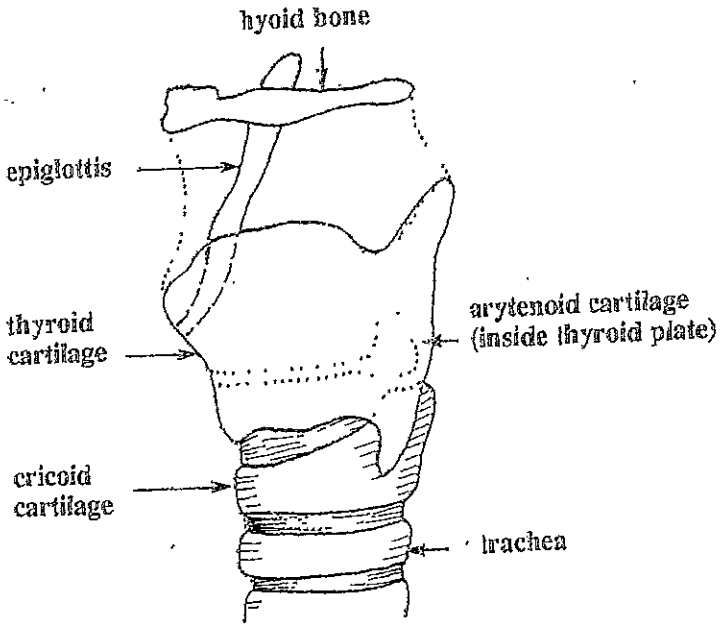


Fig. 9 Schematic Sideview of the Larynx

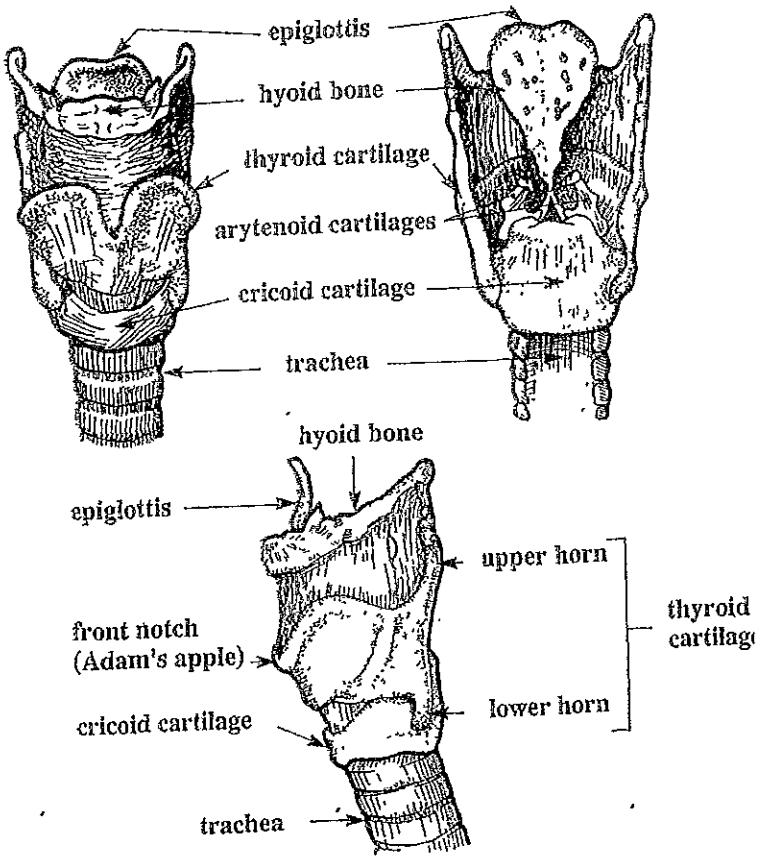


Fig. 10 Cartilages of the Larynx

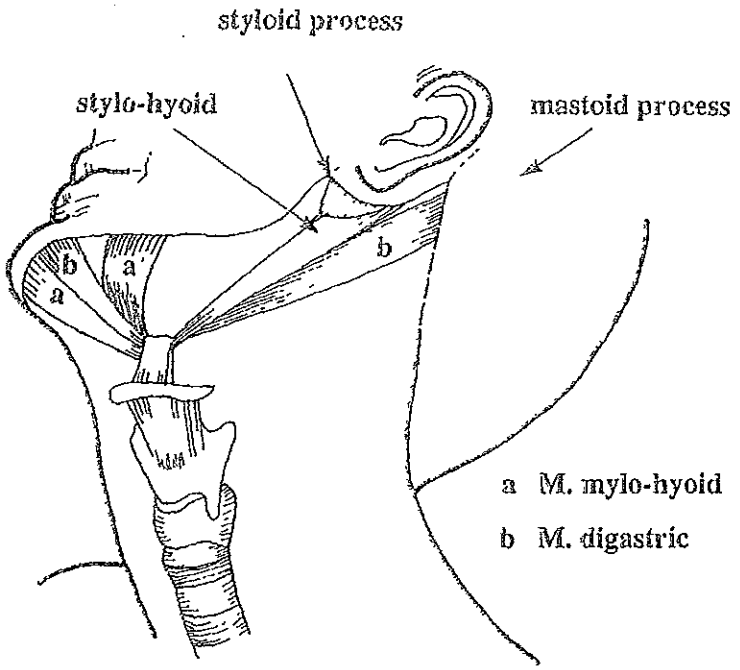


Fig. 16 Diagram of the False Elevators
Genio-hyoid is hidden by the mylo-hyoid.

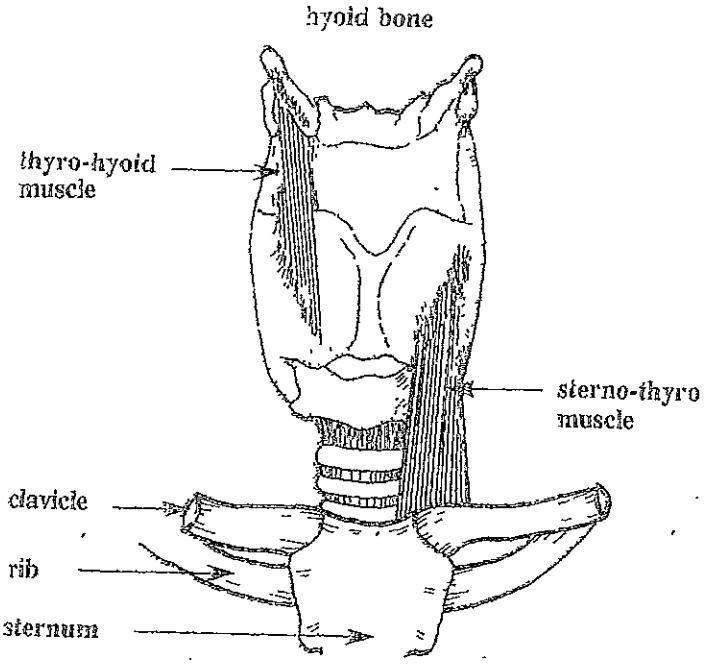


Fig. 17 Diagram of the primary antagonistic extrinsic muscles, the sterno-thyroid depressor and the thyro-hyoid elevator

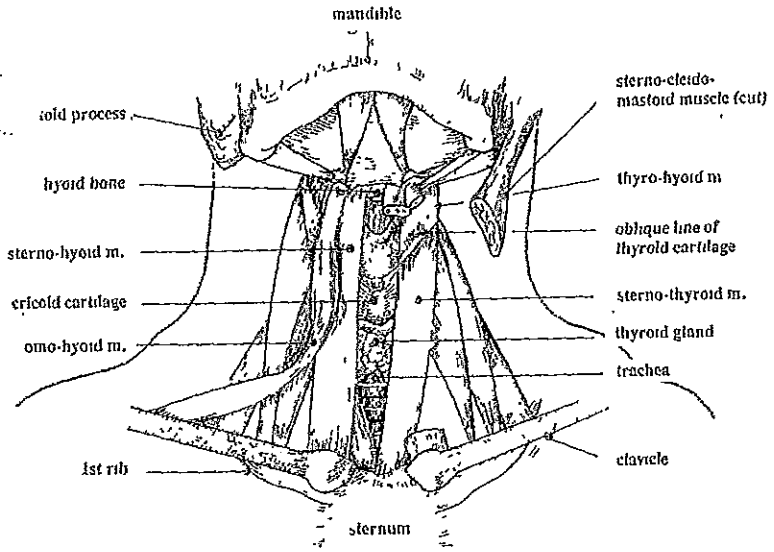


Fig. 19 Extrinsic muscles of the larynx

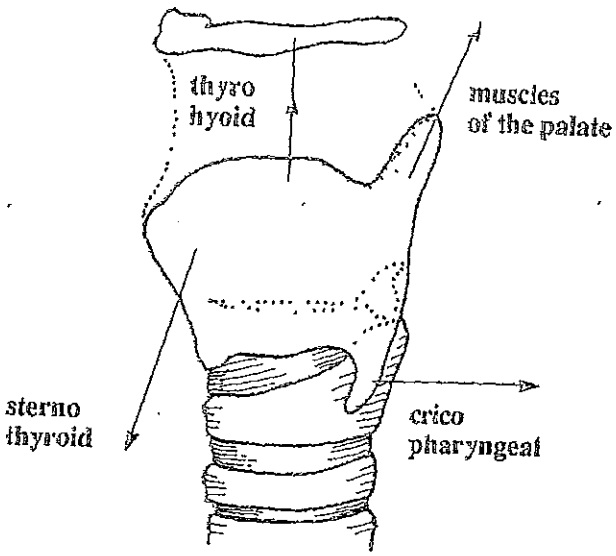
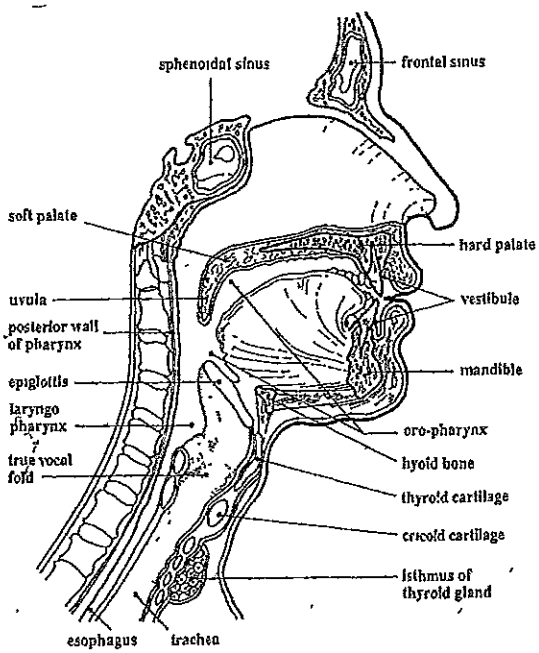


Fig. 20 Directional Schematic of the Suspensory Network

RESONANCE: Vowels have pitch!

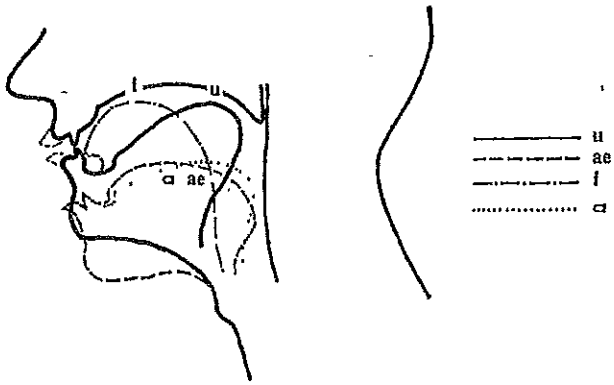
I. Creating Resonating Space.

- hard palate --
- soft palate --
- middle vault --
- As you raise your soft palate

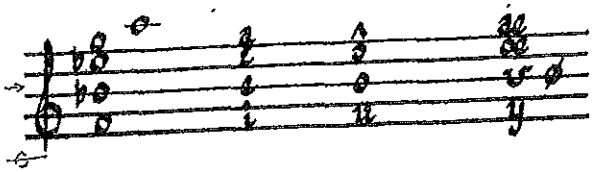


II. The role of the tongue in articulating vowels.

- While the tongue must remain flexible, it should generally be _____.



III. Vowels have pitch. Specifically:



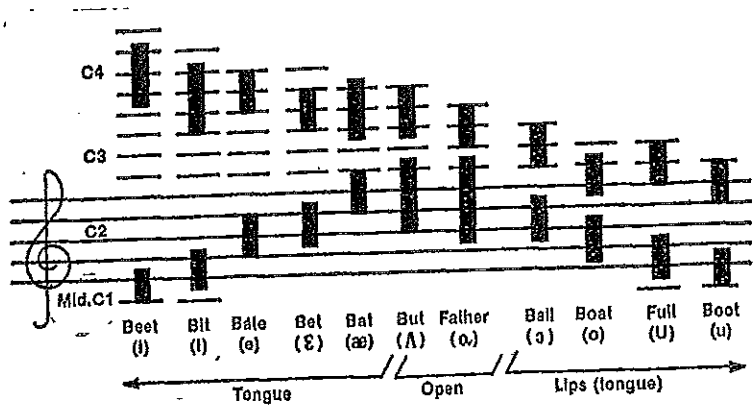
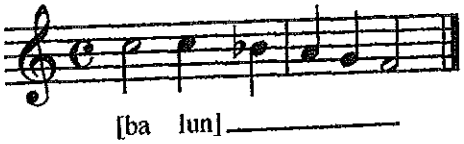


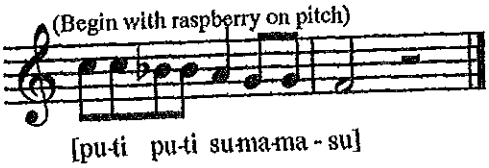
Illustration 5.1 Vowel Formant Chart

Voice Class Vocalises:
Resonance



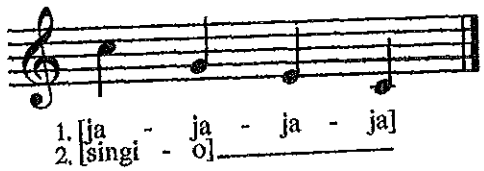
1. Opener and Focuser

Note: Create space with the [a] and keep back space spacious as you focus the [u] in front.
Sustain pitch with spin (caress) and slide between pitches to sing on breath.
Use gestures to reinforce this.



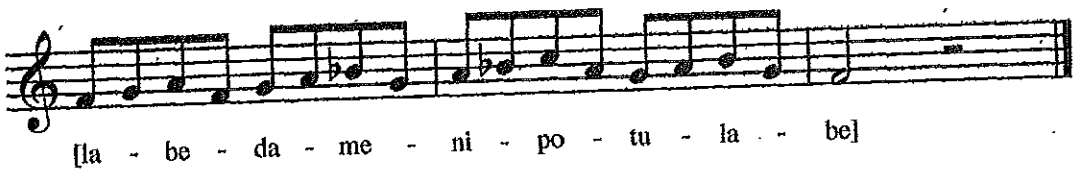
2. Female Focuser for Middle Voice

Note: Modify [u] to [ae] or [a] as you ascend. Use lots of middle vault space.

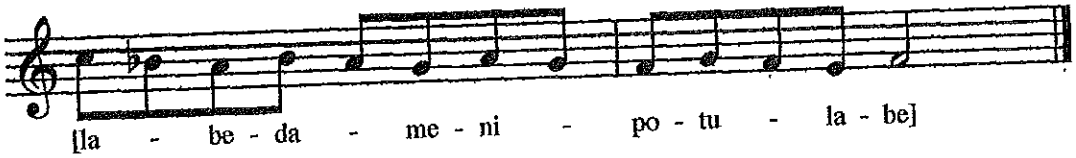


3. Opener, Extender, Focuser, Releaser

Note: #1 better for females; #2 better for males. Why? "Ng" releases soft palate.



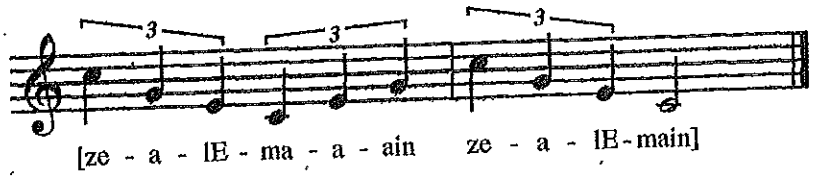
4. For Consistency



5. For Consistency

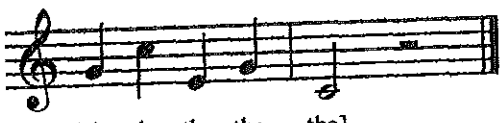
6. Male Range Extender (more myoelastic)

Note: modify [e] to [i] as you ascend.
Initial [m] creates forward resonance, final [m] releases palate.



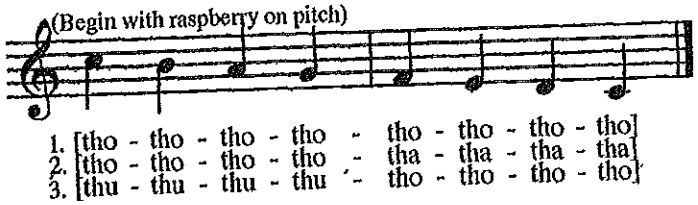
7. Male Range Extender, Focuser, Opener (more myoelastic)

Note: modify [e] to [i] as you ascend.



8. Female Range Extender with focuser and opener

Note: Eliminate consonants for highest pitches; modify [u].



9. Male Blender for consistency (more aerodynamic)

Note: Begin in mid-range w/ #1; take #2 into lower range;
take #3 into higher range.

Barbara M. Doscher
University of Colorado

FIXED VOWEL FORMANTS

1. A region of pitch in which all partials are strengthened is called a formant, and we may say that for every vowel there are two formants of fixed pitch. This result was anticipated in 1879 by Graham Bell, the inventor of the first practical telephone. (Wood, 1944, p. 75)

2. Vowels are perceived and identified on the basis of two main resonant frequencies of the vocal tract. These resonant frequencies are called formant frequencies. (Titze, 1984, p. 30)

3. Each vowel sound that one may wish to produce has its own characteristic spectrum envelope. . . . The peaks that are observed in the spectrum envelope are called formants. (Benade, 1976, p. 374)

4. As the sound passes through the resonating cavities of the throat and mouth, the profile of the spectrum changes, since each cavity resonates to some of the tones in the spectrum more readily than to others and each adds its own characteristics to such tones. This reinforcement gives the partials greater energy at the point of cavity resonance. These points of greater energy are called formants. (Appelman, 1967, p. 126)

5. . . . the frequency band in which exaggerated partials will be found is called the formant. (Vennard, 1967, p. 125)

6. Pronounced resonance peaks (in the spectrum) were given the name of formants by L. Hermann (1890). . . . For example, the vowel sound "o" is characterized by its preference for resonance in the frequency area of 400-600 cps, the vowel sound "a" in the area of 800-1200 cps. (Winckel, 1967, p. 13)

7. The shaping of the resonance tube produces prominent distributions of acoustic energy, a phenomenon that has led to the identification of two frequency maxima called formants for each vowel sound. (Miller, 1986, p. 50)

8. Resonances of the vocal tract are called formants, and their frequencies, the formant frequencies. Every configuration of the vocal tract has its own set of characteristic formant frequencies. (Denes and Pinson, 1963, p. 58)

9. Formants are the most significant earmarks of sound and every vowel is formed by two or more formant ranges . . . . Changes in the shape of the vocal tract will alter resonances and inevitably pitch. Such alterations may account for out-of-tune singing by a singer. (Bunch, 1993, pp. 95 and 97)

10. The closer a particular partial in the source spectrum is in frequency to a formant frequency, the more its amplitude at the lips is increased. If the frequency of a partial in the source is the same as that of a formant frequency, the amplitude radiated at the lips will be maximum. (Coffin called this phenomenon "superposition," i.e., maximum sympathetic resonance) (Zemlin, 1988, p. 294)

11. Those frequencies most easily transferred by the vocal tract are called the formant frequencies. Those partials in the spectrum of the voice source, which are closest to a formant in frequency, are radiated from the lip opening with a greater amplitude than other partials. (Sundberg, 1987, p. 93)

12. . . . the most obvious advantage that comes from even an approximate tuning of the first formant is a very large increase in the loudness of the sound a singer can achieve for a given vocal effort. (Benade, 1976, p. 384)

13. . . . as soon as the ordinary value of the first formant frequency is <u>lower</u> than the phonation frequency, the first formant is changed and tuned to a frequency near the phonation frequency. . . . We realize that the tuning of formant frequencies gives the singers' vowels a high loudness at a low price in terms of muscular energy. (Sundberg, 1987, p. 126)

14. . . . if a vowel is formed in a particular way and a particular form has a specific frequency, vowels have pitch. (Therefore) resonating space = specific concentration of tonal energy or formant. . . . Despite variations of formant locations because of different vocal tract dimensions, the general locations of vowel formants are the <u>same</u> for both sexes. (Doscher, 1994, pp. 133-137)

15. Against this background (fixed vowel formants and vowel modification or coloring) it seems highly remarkable that skilled singing teachers are capable of teaching both sexes how to sing; they are actually teaching two entirely different techniques of vowel articulation. (Sundberg, 1987, p. 132)

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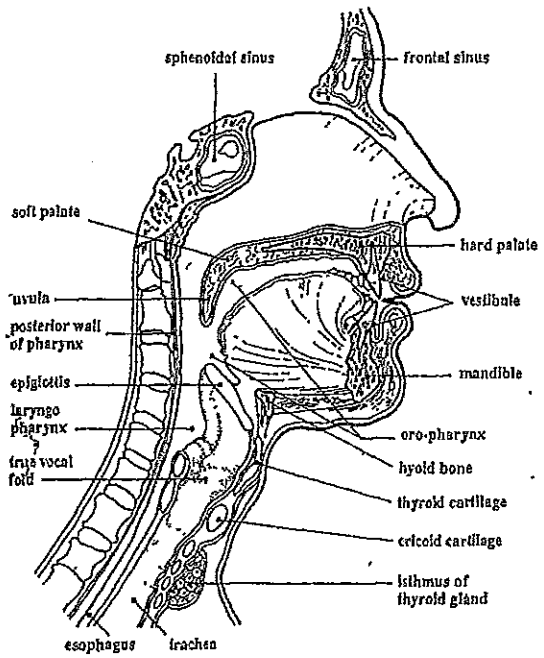
Zemlin, Willard R. Speech and Hearing Science, 3rd ed. Englewood Cliffs, N.J.: Prentice Hall, 1988.

RESONANCE: Vowels have pitch!

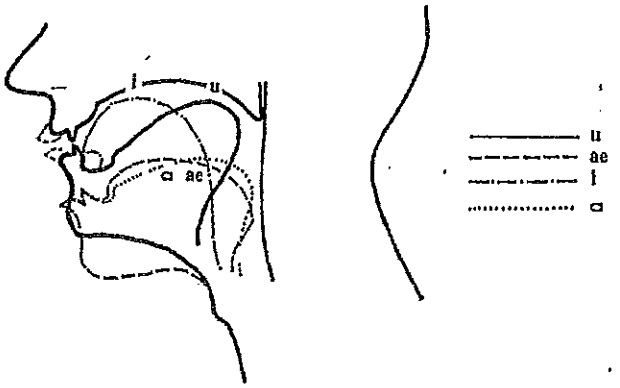
I. Creating Resonating Space.

- hard palate --
- soft palate --
- middle vault --
- As you raise your soft palate

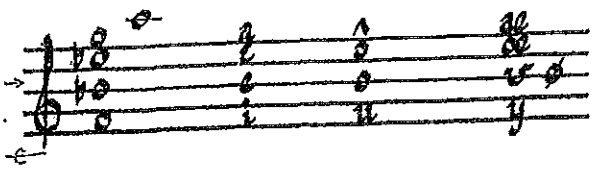


II. The role of the tongue in articulating vowels.

- While the tongue must remain flexible, it should generally be_____



III. Vowels have pitch. Specifically;



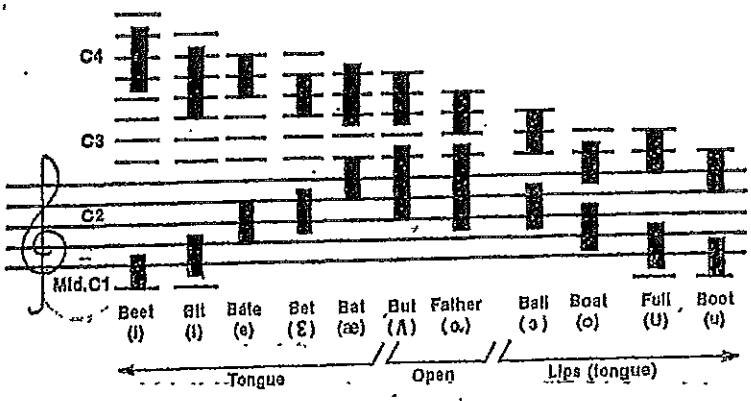


Illustration 5.1 Vowel Formant Chart

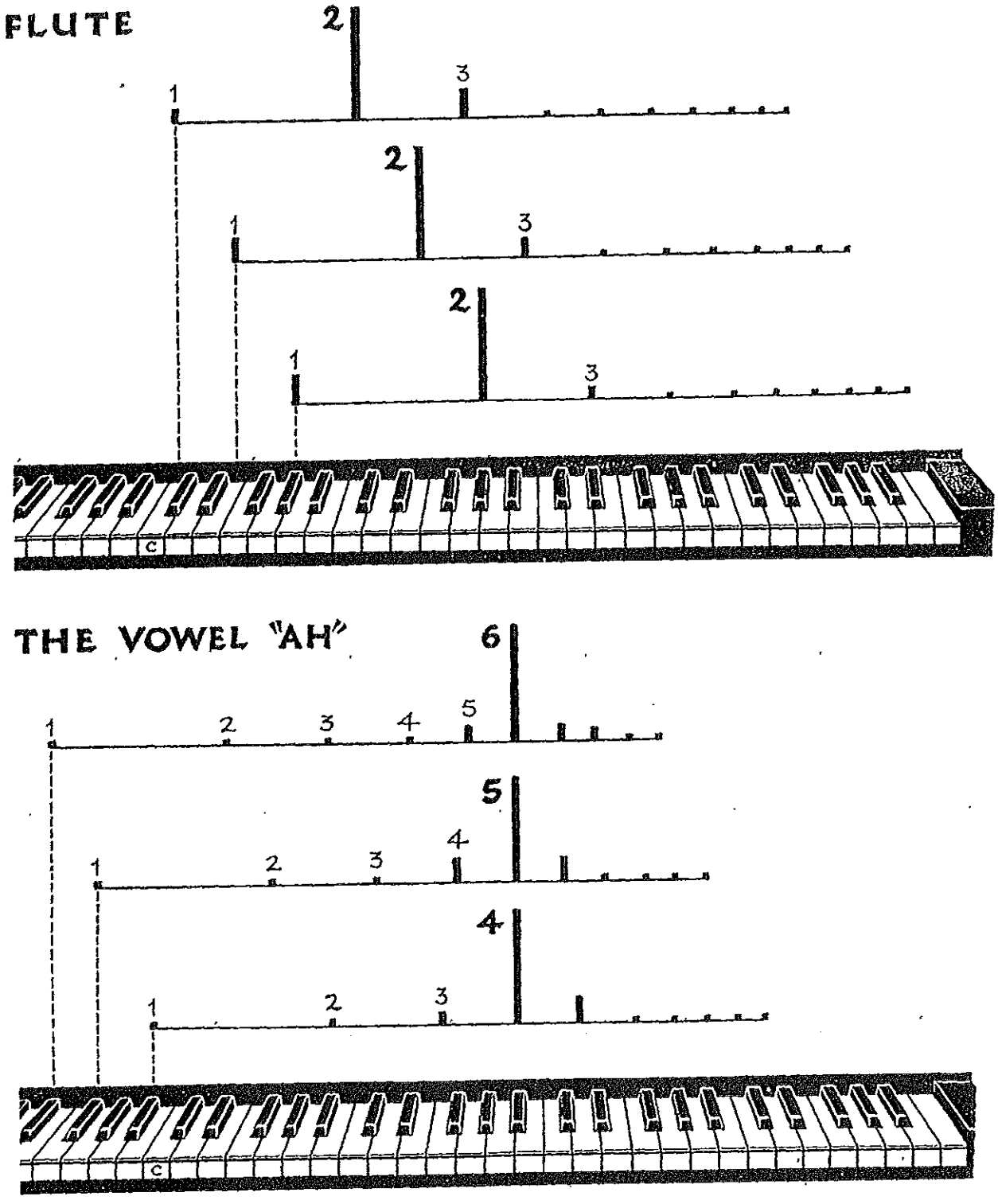


Fig. 54. Spectra of Flute and Vocal Tones
From Dayton C. Miller, *The Science of Musical Sounds*., Copyright, 1916 by the Macmillan Company and used with their permission, p. 256.

cal Findings as to Vowel Formants

. 55 shows the formants for the five "pure" vowels, as derived from various acoustical investigations. Each line in the five spectra represents the finding of some physicist for that parti-

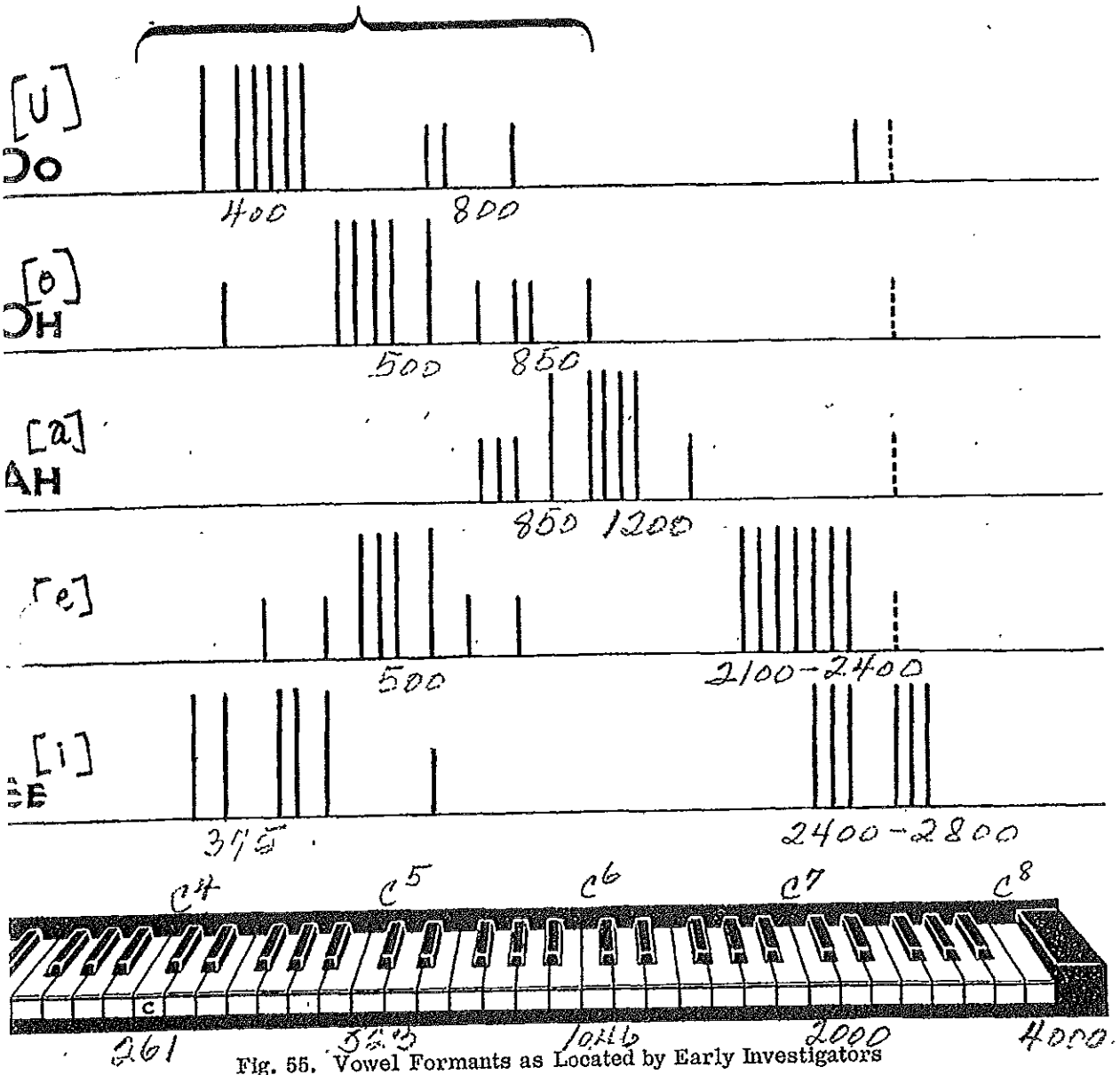


Fig. 55. Vowel Formants as Located by Early Investigators

Based on the following sources:

I. B. Crandall, "A Dynamical Study of the Vowel Sounds," *Bell System Technical Journal*, Vol. III, No. 2, 1924, pp. 232-7.

Harvey Fletcher, *Speech and Hearing* (New York, Van Nostrand, 1929).

M. H. Liddell, "Physical Characteristics of Speech Sound," *Purdue University Bulletin 16*, March 1924, p. 20.

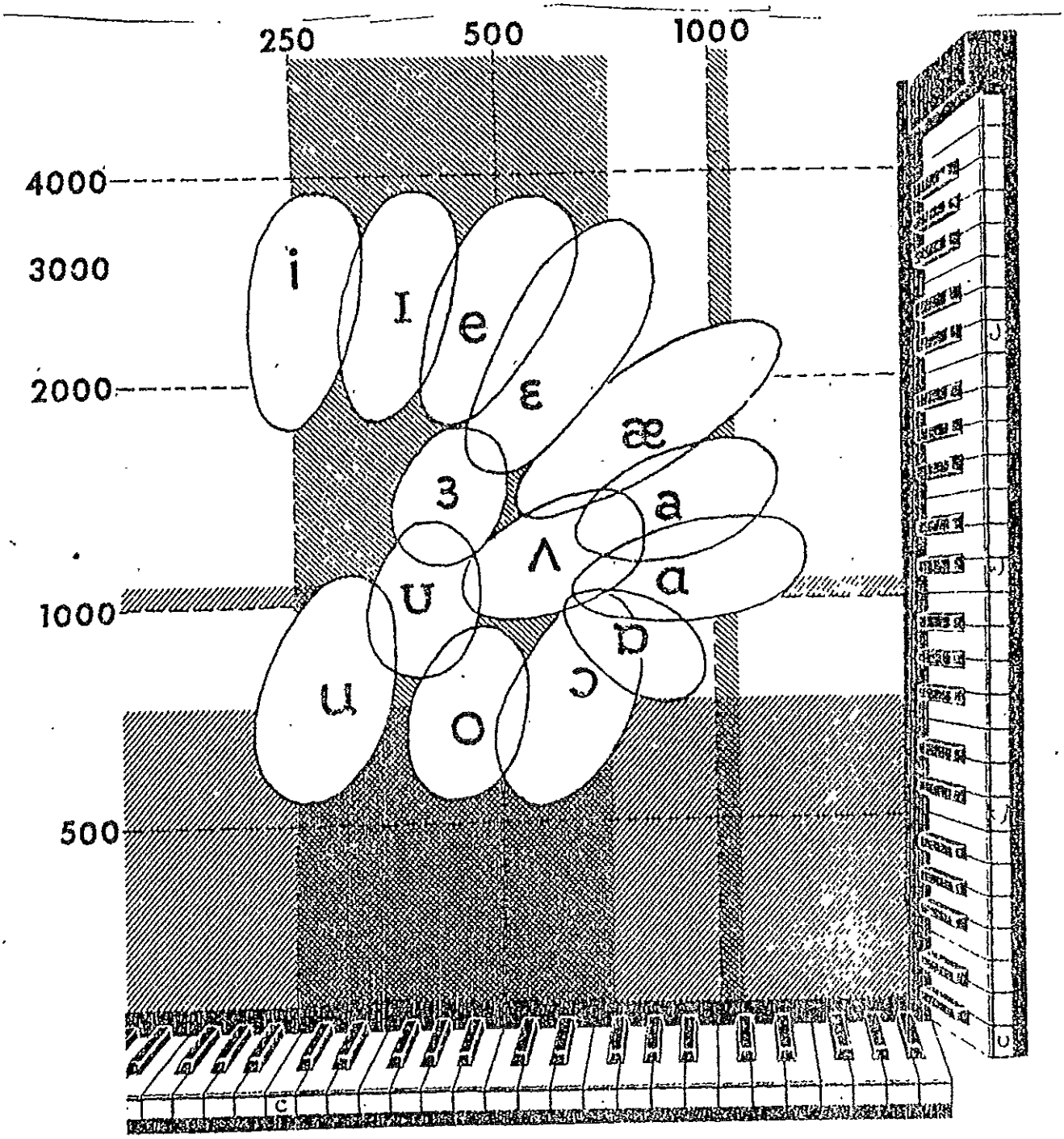
R. J. Lloyd, "Genesis of Vowels," *British Association Paper*, 1896, p. 251.

Dayton C. Miller, *The Science of Musical Sounds* (New York: The Macmillan Co., 1916).

Sir Richard Paget, *Human Speech* (New York: Harcourt, Brace & Co., 1930), p. 42.

Brace at top indicates approximate range of soprano voice. See Par. 565-571.

Example 4. Vowel formants.[15]



[15]Ibid., p. 137.

A formant of the vocal resonating system may be broadly defined as

- a specific concentration of energy within the vocal sound wave
- frequencies most successful in traveling through the vocal tract
- certain partials the leave mouth opening w/ greater amplitude and intensity than others
- resonating space (= specific concentration of energy or formant)
- a peak in the frequency curve of the vocal tract filter; thus, all partials are enhanced that are close to formants

Formants are shaped by adjustments of lips and jaw opening, tongue, soft palate, and larynx; any change in any one of these changes formant frequency. Energized band of frequency and resonating space are identical.

NOTE: the pattern of partials making up sound wave is determined by vocal folds; no amount of resonance adjustment can reinforce a partials if it's not there!

Most instruments operate according to law of **relative pitch formants** (strong partials of tone always same in relationship to fundamental (e.g., flute, 2nd partial). In singing sound, however, proportioning of harmonics controlled by **fixed formants**. Shape of resonating space has optimum frequency and will augment partial(s) in the tone which match that frequency. Vowels have pitch. Every vowel needs specific resonating spaces, and the shapes of these spaces have certain frequencies. See shape discussion on p. 136 and relate to previous chapter.

When formant frequencies coincide w/ harmonics of sung frequency, the voice will benefit from symphathetic resonance and gain in quality and projection. Maximum amplitude (super-position) is achieved.

5 major formants, the two lowest determine vowel color (vowel formants), higher ones determine timbre (quality formants).

Despite variations in formant locations because of different vocal tract dimensions, the general locations of vowel formants are the **same** for both sexes. Example: [i], [y], and [u] have first formant frequencies between 275-400 c.p.s. (D4 and A4). For tenors and high baritones, this frequency near top of range, but it is lower part of female range. These vowels very difficult for women to produce an octave higher without modification.

Vowel formants vary in exact location, depending upon a myriad of individual differences, not the least of which are variations in the physical dimensions of the resonating cavities. These differences are best treated through the discriminating ear of an experienced teacher familiar with the need for vowel modification. Whatever your teaching method, vowel formants are an acoustical fact and must be observed if the singing voice is to be efficiently tuned and optimum sympathetic resonance achieved. (139)

Alderson, Richard. Complete Handbook of Voice Training. West Nyack, N.Y.: Parker Publishing Co., 1979.

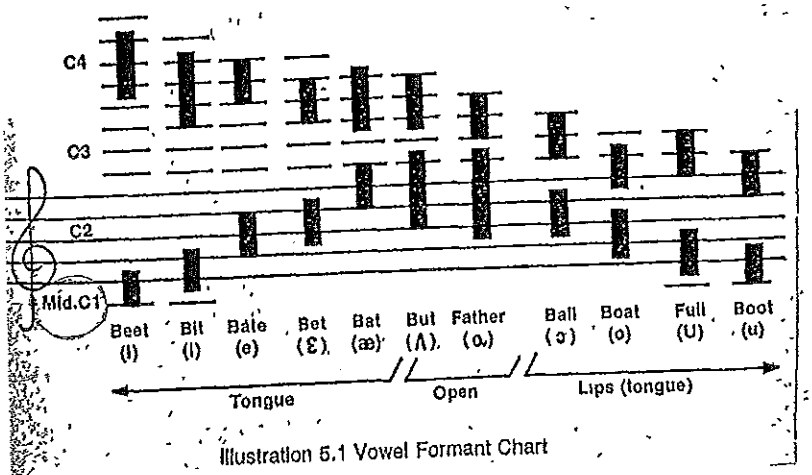
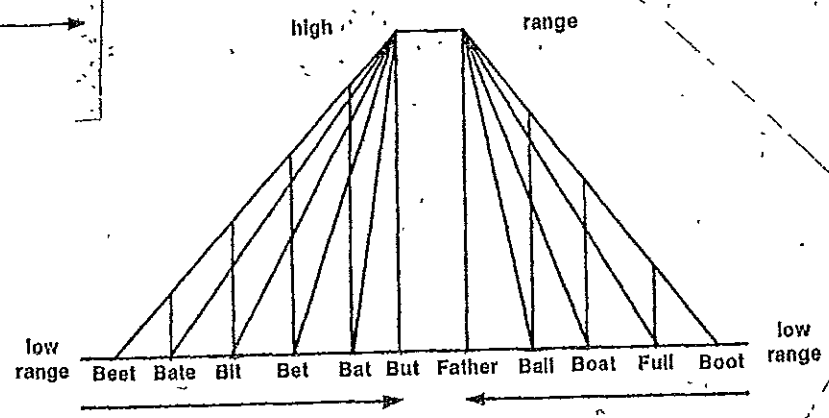
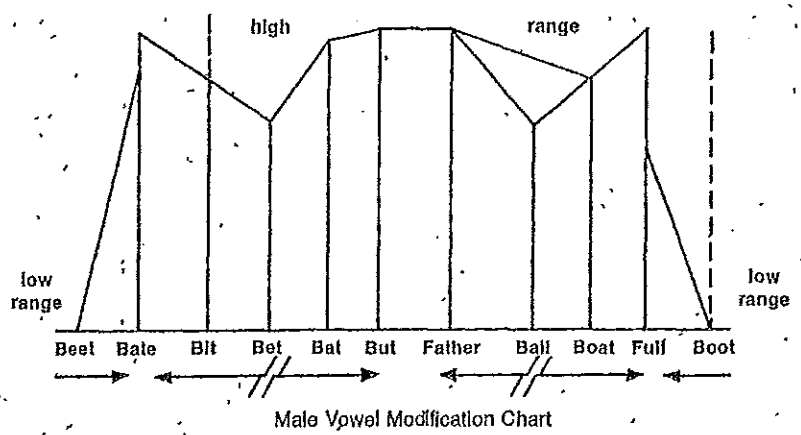


Illustration 5.1 Vowel Formant Chart



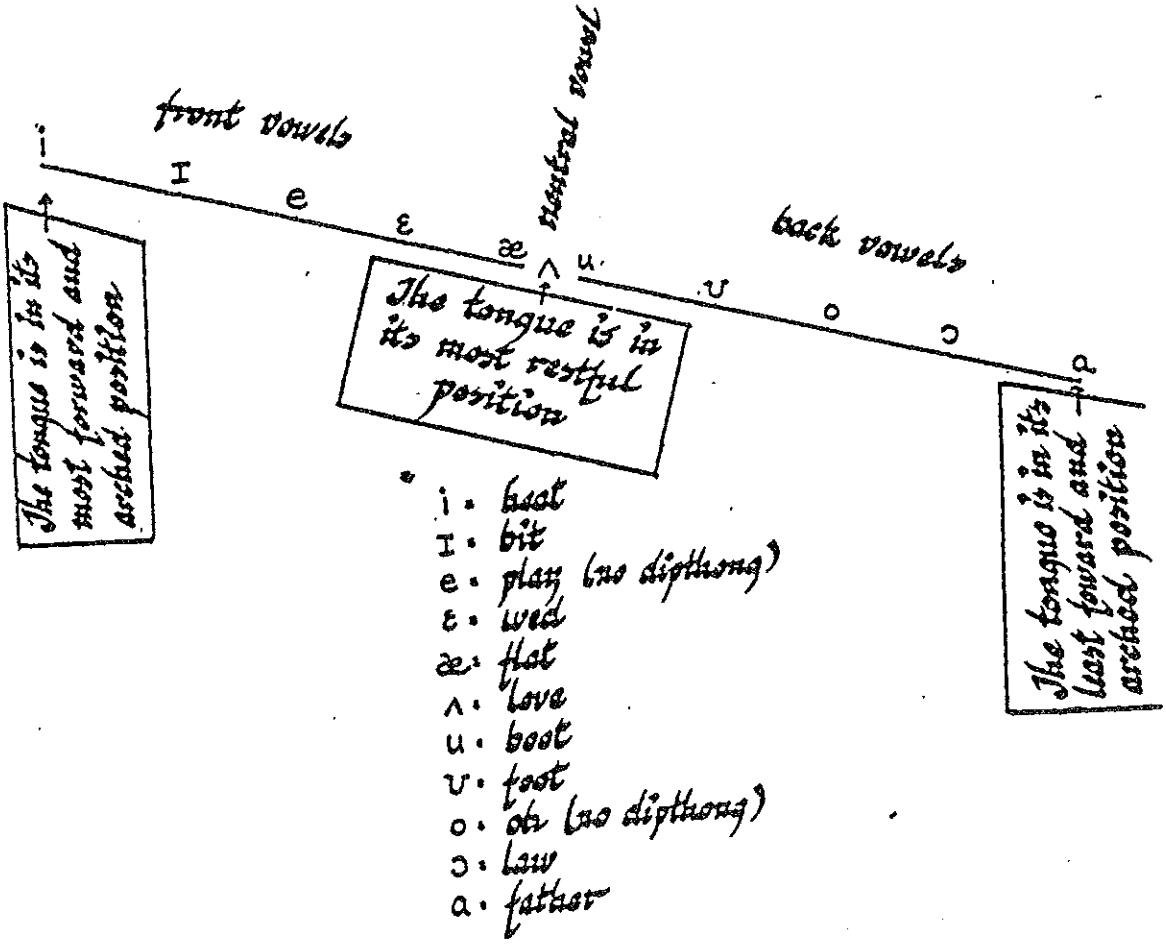
Female Vowel Modification Chart



Male Vowel Modification Chart

Figure 6 below is a graph of the most common vowels used in singing the English language. These vowels are placed phonetically on a line that progresses from front to back vowels.[3]

Fig. 7. Vowel Modification Guide



* Symbols of the International Phonetic Alphabet

[3]Special thanks are extended to Robert Harrison, Associate Professor of Voice at the University of Colorado at Boulder, for permission to include this graph within this document. Harrison designed this graph as a teaching aid for his private voice-studio. The slant of the phonetic line is due to tongue position, highest and most forward on front vowels and lowest and least forward on back vowels.

THE INTERNATIONAL PHONETIC ALPHABET (revised to 2005)

CONSONANTS (PULMONIC)

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k g	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

CONSONANTS (NON-PULMONIC)

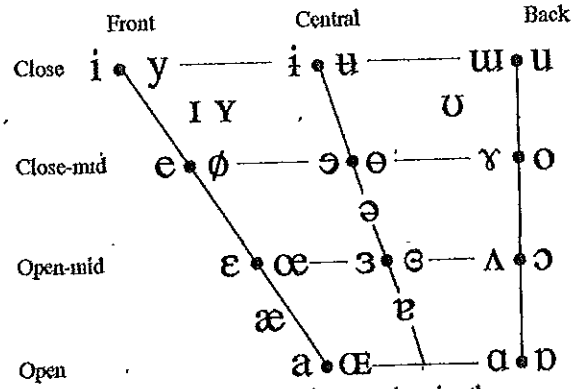
Clicks		Voiced implosives		Ejectives	
ʘ	Bilabial	ɓ	Bilabial	ʼ	Examples:
ǀ	Dental	ɗ	Dental/alveolar	pʼ	Bilabial
ǃ	(Post)alveolar	ʄ	Palatal	tʼ	Dental/alveolar
ǂ	Palatoalveolar	ɠ	Velar	kʼ	Velar
ǁ	Alveolar lateral	ʛ	Uvular	sʼ	Alveolar fricative

OTHER SYMBOLS

ʍ	Voiceless labial-velar fricative	ɕ ʑ	Alveolo-palatal fricatives
w	Voiced labial-velar approximant	ɺ	Voiced alveolar lateral flap
ɥ	Voiced labial-palatal approximant	ʢ	Simultaneous ʃ and x
ʜ	Voiceless epiglottal fricative		
ʡ	Voiced epiglottal fricative		
ʡ	Epiglottal plosive		

Affricates and double articulations can be represented by two symbols joined by a tie bar if necessary: k͡p t͡s

VOWELS



Where symbols appear in pairs, the one to the right represents a rounded vowel.

SUPRASEGMENTALS

ˈ	Primary stress
ˌ	Secondary stress ˌfoʊnəˈtɪʃən
ː	Long eː
ˑ	Half-long eˑ
˘	Extra-short ĕ
|	Minor (foot) group
‖	Major (intonation) group
.	Syllable break ɹi.ækt
‿	Linking (absence of a break)

DIACRITICS

Diacritics may be placed above a symbol with a descender, e.g. ŋ̊

◌̥	Voiceless	n̥ d̥	◌̤	Breathy voiced	b̤ a̤	◌̪	Dental	t̪ d̪
◌̬	Voiced	s̬ t̬	◌̰	Creaky voiced	b̰ a̰	◌̺	Apical	t̺ d̺
◌ʰ	Aspirated	tʰ dʰ	◌̼	Linguolabial	t̼ d̼	◌̻	Laminal	t̻ d̻
◌̹	More rounded	ɔ̹	◌ʷ	Labialized	tʷ dʷ	◌̃	Nasalized	ẽ
◌̜	Less rounded	ɔ̜	◌ʲ	Palatalized	tʲ dʲ	◌ⁿ	Nasal release	dⁿ
◌̟	Advanced	u̟	◌ˠ	Velarized	tˠ dˠ	◌ˡ	Lateral release	dˡ
◌̠	Retracted	e̠	◌ˤ	Pharyngealized	tˤ dˤ	◌̚	No audible release	d̚
◌̈	Centralized	ë	◌̴	Velarized or pharyngealized	ɫ			
◌̽	Mid-centralized	e̽	◌̝	Raised	e̝	(ɹ̝ = voiced alveolar fricative)		
◌̩	Syllabic	n̩	◌̞	Lowered	e̞	(β̞ = voiced bilabial approximant)		
◌̯	Non-syllabic	e̯	◌̘	Advanced Tongue Root	e̘			
◌˞	Rhoticity	ɚ a˞	◌̙	Retracted Tongue Root	e̙			

TONES AND WORD ACCENTS

LEVEL			CONTOUR	
é or ˥	Extra high		ě or ˩˥	Rising
é ˦	High		ê ˥˩	Falling
ē ˧	Mid		ě ˨˦	High rising
è ˩	Low		ě ˧˩	Low rising
ȅ ˩˩	Extra low		ě ˥˧	Rising-falling
↓	Downstep		↗	Global rise
↑	Upstep		↘	Global fall