

PVA Study Guide

(Adapted from Chicago NATS Chapter PVA Book Discussion by Chadley Ballantyne)

Chapter 2

How are harmonics related to pitch?

Which harmonic do we perceive as the pitch of a musical tone?

What is another name for this harmonic?

If the pitch G1 has a frequency of 100 Hz, what is the frequency for the following harmonics?

H1 _____

H2 _____

H3 _____

H4 _____

What would be the answer if the pitch is A3 with a frequency of 220 Hz?

H1 _____

H2 _____

H3 _____

H4 _____

Figure 1 shows the Harmonic series beginning on C3. If the frequency of C3 is 130.81 Hz, what is the difference in Hz between each harmonic in this figure?

How is that different from the musical intervals between these harmonics?

In the voice, what produces harmonics?

What does the vocal tract filter/resonator do to these harmonics?

Can a singer change the frequency of a harmonic without changing the pitch?

Which two sets of muscles primarily control laryngeal registration?

Where are they located?

What are the traditional names associated with vibration modes 1 and 2?

Of the two muscles groups responsible for laryngeal registration, which one is the dominant contraction in vibration mode 1?

Which one is dominant in mode 2?

Chapter 3

Has the theory of vocal tract acoustics changed, or remained the same over the last 50 years?

What is the primary difference between a linear and a non-linear source-filter model?

What is the basic shape of a quarter-wave resonator?

What are the corresponding parts in the human voice?

Chapter 4

What do we call the resonances* of the vocal tract? (*though inconsistent in the literature)

Are they fixed or tunable in the human voice?

What does tube length refer to in this discussion?

Where does the tube begin and end?

What effect does tube length have on the frequencies of the formant set?

What is the difference between a formant and a harmonic?

Which formants are the most tunable?

What is their collective name?

How are the first two formants tuned?

What effect does lip rounding have on both vowel formants?

What effect does lip spreading have on both vowel formants?

What effect does jaw dropping have on both vowel formants?

What is the difference between an acoustic register and a laryngeal register?

What causes acoustic registration events?

What part of the vocal mechanism is primarily responsible for tuning the vowel formants?

Why do we now use the term Singer's Formant Cluster (SFC) instead of Singer's Formant?

What role does the SFC play in perceived Fach?

What is the primary factor in stabilizing the SFC?

What are the conditions that create a strong SFC?

What are the benefits of the SFC?

At pitches above D5, which formant is primarily responsible for resonance?

What is *chiaroscuro* in terms of vocal acoustics?

What conditions in the vocal tract are needed to create *chiaroscuro*?

Chapter 5

What is meant by "coupling"?

Which formant-harmonic tracking creates Yell coupling?

Which formant-harmonic tracking creates Whoop coupling?

What is the difference between yell coupling and yell timbre?

What is the difference between whoop coupling and full whoop timbre?

Why is formant tuning more important on higher pitches than on lower ones?

What acoustic events cause opening and closing of timbre?

How is the use of yell coupling different in classical singing and musical theatre belt timbre?

What is the difference between a convergent and a divergent resonator?

Which vowels are naturally convergent?

Which vowels are naturally divergent?

What are the two primary ways to raise the first formant?

Which is preferable and why?

What is meant by the term “pitch of turning?”

Is the pitch of turning different or the same for the different vowels?

What determines the pitch of turning?

What is the difference between “turning over” and “full whoop timbre?”

What are the strategies to delay arrival at full whoop timbre?

Considering the characteristics of yell and whoop timbre, what are the primary differences in resonance profiles between male and female (treble) voices in classical singing?

Why would a treble singer want to raise the first formant through tube shortening?

What are the effects of tube shortening through raising the larynx in the male passaggio?

Chapter 6

Why do women (treble) singers have roughly half as many harmonics within the keyboard range as men?

What are the implications of this for vowel/resonance?

Why do women typically have fewer formants within keyboard range than men?

In Western classical singing, which formant-harmonic coupling should primarily be tracked by female (treble) voices?

Why is this formant-harmonic coupling important for classical singing?

Why are open vowels problematic in the middle voice for female singers?

Why are they helpful in the upper middle and high voice?

Why are close vowels most helpful in the middle voice?

Why must close vowels be opened/modified in the upper middle and high range of treble voices?

In the Leontyne Price examples, why must the vowels /e/ and /y/ be opened/modified in the melismatic passages?

Are the vowels still intelligible even though she is actively modifying them?

What would be the result if she attempted to sing these passages without modifying or opening the vowels?

What would happen in terms of formant-harmonic relations?

What would be the result vocally or in the sound?

Chapter 7

Describe the yell instinct: What is the action of the vocal tract and the laryngeal register?

How does this affect the formant set, timbre and perceived *Fach*?

What is the primary thing that young male singers must learn to overcome the yell instinct?

Acoustically, how is the yell avoided?

What are two common terms for this shift?

When a vowel does not turn over, what is the resulting timbre?

What are the two (or three) likely causes?

Why do different vowels turn over on different pitches?

What implications does this have on traditional theories about the *passaggio* or *zona di passaggio*?

What is the difference between passive and active vowel modification?

What is the goal of passive vowel modification in the male *zona di passaggio*?

While the author advocates passive vowel modification for most vowels in the *zona di*

passaggio, when is active shape change necessary:

within the *zona di passaggio*?

above the *zona di passaggio*?

What is meant by closed quotient?

What are the conditions that increase inertive reactance?

Which vowels are naturally convergent?

What must be done to maintain convergence in vowels that are not naturally convergent?

What are some other factors that might affect students as they try to create and maintain a convergent resonator in singing?

What acoustic events are responsible for the sensation of “narrowing” or the “hourglass perception” of the *passaggio*?

What is a formant-harmonic explanation for the location and actions of the *primo* and *secondo passaggio*?

Chapter 8

Why is “turning over” primarily a phenomenon in male voices rather than in female or treble voices?

From the perspective of the singer, describe the difference in perception of “turning over” vs yell timbre.

Why must /i/ and /u/ be actively opened or modified through the *zona di passaggio*? (implied in an earlier question)

What acoustic (or formant) factors could assist in maintaining a clear, ringing sound through the turn as H2 ($2f_0$) passes above F_1 ?

In terms of formants and tube length, how would you describe the technique of “hooking” or heavy covering?

How does it differ from passive vowel modification at the point of turning?

Why would early $F_1:1f_0$ coupling be beneficial for soft dynamic effects?

Chapter 9

How are resonance and vowels related?

Concerning the “General Principles,” are there any that are unclear?

Which ones do you find most helpful in your own singing and teaching?

If tube length and vowel opening or closing control F_1 , what controls F_2 ?

How is whoop timbre postponed above the $F_1:2f_o$ crossing (turning)?

How are tones in whistle register resonated?

What happens when F_1 can be raised no further?

Is whoop timbre the same thing as mode 2 vibration?

If it is different, how is it different?

Chapter 10

Why is /i/ the most open throated vowel and not /a/?

Bozeman describes the association of the open throat and yawny /a/ as a “false kinesthesia.” What are some examples of false kinesthesia that you have encountered in your own singing or teaching?

Why is excessive orality a problem for Western classical singing?

Bozeman says the discussion of tonal placement sensations is “risky.” Specifically for this discussion, how could a student’s misconceptions of tonal placement affect tube length stability?

Why is /u/, a back vowel, often felt in the front of the oral cavity?

Which formant is perceptually associated with the oral cavity?

Chapter 11

Why is a divergent resonator useful for belting?

Why are /a/ and /e/ particularly useful vowels for belting?

What are three physical aspects of a divergent resonator/vocal tract?

If belt only commences above the normal F_1-2f_0 intersection of the mid to open vowels, at approximately what pitch does belting begin?

How does that relate to the natural break between mode 1 (chest) and mode 2 (head) vibration?

Bozeman coins the term *chiarochiaro* to describe belt timbre as opposed to *chiaroscuro* of classical singing. In belt timbre, how is F_1 used to achieve *chiarochiaro*?

Under strategies employed by belt specialists, point 4 mentions perceived pressed phonation or a timbral emphasis on upper partials (harmonics) in the tonal ideal. What are some implications of this on belt technique?

If Broadway singers are expected to belt to D, what are some possible resonance strategies to assist this requirement?

Bozeman references clustering F_1 and F_2 to extend yell timbre in belting. Since F_1 and F_2 are the vowel formants, what vowels would most easily facilitate clustering of these formants?

Once clustered, how could these formants be raised or lowered?

Under Vocal Tract Factors, point 3 deals with false fold compression. What is meant by a possible “noise element?”

Would there ever be moments in pop-belt singing when this noise element would be beneficial?

Chapter 12

What is “cover?” (What is the acoustic action that produces cover?)

How would you describe the acoustic effect of cover in the youtube examples of Pavarotti?

What does Bozeman mean by “heavy cover?”

Bozeman suggests teaching “turning over” by a sequence of / ε e ɪ i/ on the pitch D4 in a tenor voice. In terms of F_1 , why would this vowel chain be effective in teaching turning over?

How are the terms “open” and “close” vowels related to the physical location of the

tongue hump?

What are the implications of this when working to maintain a convergent resonator?

What is meant by a “fronted tongue?”

What could “destabilizing acoustic factors” be, based on the formant-harmonic discussion of this book?

If H2 ($2f_0$) prominence is the primary characteristic of belt, how is this different from whoop timbre?

Why is belting equated with skillful yelling?