



A Teacher's Journey: Things Learned Along the Way

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My sincere thanks to the organizational committee for the opportunity to speak to this International Congress of Voice Teachers.

I come before you as a fellow voice teacher. I was once a singer, then a teacher who sang, and eventually, due to a health issue, a teacher who no longer performed. I taught for 42 years at an undergraduate conservatory where I primarily served vocal performance majors in the literature of Western classical music along with some musical theater.

I assume I was invited to speak because of my work in translating voice acoustics into pedagogic applications. When I learned that I would have to address that subject in less than thirty minutes, I realized that for anyone new to it, a deep dive into acoustics would most likely confuse and frustrate. And so, while I *will* offer a few teasers to tweak your interest in what I consider to be a very fruitful avenue into voice work, I will spend most of my time offering perspective on how a somewhat isolated voice teacher at an undergraduate conservatory managed to develop a workable pedagogy: A Teacher's Journey: Things Learned Along the Way.

Though I may have been invited for my writings on voice acoustics, let me be clear: I am not a scientist. I value voice science highly and work at being science-informed, but I am not sufficiently trained in its disciplined methodology to *do* science studies on my own. I rush to add, admitting that I am not a scientist is neither humility nor an apology. Instead, it underscores what I hope to convey today: how a voice teacher comes to *know* how to teach singing.

We can all surely agree that knowledge is a good thing. There are various ways of knowing and of *seeking* to know. The scientific method is the most rigorous method humans have devised for knowing things that can be measured. And yet, all human knowing, even science-based knowing, is tentative, incomplete, and finite.

To summarize the words of a former US official:

There are known knowns: things we are confident that we know.

There are known unknowns: things we realize we do *not* know.

And there are *unknown unknowns*—things we don't know and *don't* realize we don't know. Those can be dangerous.¹

I would add a fourth category:

There are also unknown *knowns*: things we know that we don't realize we know or, at least, that we don't know *how* we know, such as the intuitive, creative, diagnostic skill

gleaned from experience. This kind of knowing is procedural and cannot be quantified nor even easily articulated.

Dr. Kittie Verdolini is a highly regarded voice-specialized speech language pathologist who has made her career studying and advocating evidence-based practice. She reported asking an effective pathologist, “How do you know which therapy to use with a client?” The therapist thought for a moment and replied, “I see them and I know.”² An unknown knowing. We don’t fully know *how* we know, since some of those mental processes proceed below the level of conscious cognition, and yet we know—from our own singing and teaching experience. That kind of knowing deserves a respected seat at the pedagogic table.

Although we realize that knowledge is good and necessary, the apostle Paul offers this caution:

Knowledge puffs up, but charity *builds* up. If anyone considers himself to know anything, he does not yet know in the way that he ought to know.³

All of us possess some knowledge: knowledge can puff up its possessor, but charity seeks to serve. It is generous, benevolent, magnanimous, and strives to make a positive difference for others, to build them up. This is a teacher’s mission. It is not so much about our being *right* as it is about our being *helpful*.

Whatever I may have noticed and been able to contribute to voice pedagogy has come from:

- my own personal vocal journey
- respect for successful historic pedagogy
- careful listening to great singing
- trial and error explorations in the studio; and yes
- corroborations, confirmations, and occasionally, innovations from voice science

One life lesson “learned along the way” that I recommend to us all is: you can learn really important things from people with whom you think you disagree, if you can just get over yourself. Unfortunately, that is a lesson that has to be relearned every time.

Like the scientist, in my own vocal and teaching journey, I formed hypotheses, explored strategies with my own voice and with many student singers over a long time-span. I tried to be fully present and attentive in lessons and observant of student responses. I read current and past pedagogic texts, talked with colleagues, listened to successful singers, and read their descriptions of what they thought they were doing.

Unlike the scientist, I could not ethically limit lessons to a single, narrowed protocol, nor restrict all variables, nor have an “untreated” control group. I used careful attention, intuition, and individualized exploration to help each singer along their particular path.

Great singing and successful teaching of singing *predate* voice science by centuries. Pedagogy continues, necessarily, to venture out beyond the moving edge of what *has* been or even *can be* measured and fully vetted by scientific protocols. Voice teachers should welcome *wholeheartedly* the partnership and advances that voice science offers to our evolving practice. It is an invaluable ally and partner to our pedagogy. But voice teachers *did* not and *cannot* wait for voice science to teach us how to teach singing. Ideally in the 21st century, what happens in the voice studio ought increasingly to be *science*-informed, but *must* primarily be pedagogy- and performance-informed. Voice teachers, like clinical practitioners, learn things in the give and take of working with students that cannot be learned any other way. We therefore *know* things of real value. We observe strategies that get predictable, repeatable results, that form a valid kind of evidence. Our interaction with voice scientists should therefore not be viewed as subservient or hierarchical, rather as a mutually respectful partnership, one that acknowledges what each brings to the conversation, and yet is appropriately aware of the limitations of each perspective.

And so, I will share a few things I have learned along the way, drawn from experience, checked against voice science where possible, but always checked against the razor of effectiveness and repeatability.

Personal Journey

I began voice lessons and serious awareness of classical singing late, as a college freshman. As an aspiring young tenor, I happened upon recordings that *amazed* me with the sounds that are possible from a human voice, particularly, recordings of Jussi Björling, Fritz Wunderlich, and Franco Corelli. One particularly glorious moment in a Björling recording marked the beginning of my acoustic journey—a phrase from Amy Beach’s “Ah Love, But a Day” in which Björling sang an ascending portamento on an /a/ vowel into his upper voice. I was so mesmerized by the thrill of that color transition, that I played it over and over and over again, trying to glean some insight into how he did it.

Björling example: “Look in my eyes” from “Ah, love but a day” by Amy Beach

<https://youtu.be/eR7jUgIg4NM>

Ten years later I attended a presentation by Dr. Tom Cleveland at a NATS conference in Minneapolis. Tom played a synthesized tenor voice singing an /a/ vowel on an F major scale. I became very excited as I heard it ascend the *passaggio* with a color change similar to Björling’s, so I asked Tom what he had done to program that color transition. He had done nothing but change the pitch. I was struck with the notion that the “turning-over” of the voice must be acoustic, not laryngeal.

Eight years later I arrived at the conclusion that that amazing timbral effect was neither from a special laryngeal adjustment, nor even from a change in vocal tract tuning. Rather, it resulted from the passive migration of the vowel and voice from open timbre to close timbre, from *voce aperta*

to *voce chiusa*—a pitch change with no shape change, as the second harmonic of the sung pitch surpassed the stable first resonance of the sung vowel. With that knowledge I was able to refine the closing, turning phenomenon in my own voice:

Bozeman Example: “will I kiss you fondly” from *The Mikado*, Arthur Sullivan and W. S. Gilbert
<https://youtu.be/VIDivhnDWJM>

From *those* experiences, I learned how to teach *passaggio*. Here is a tenor I trained, Tim Augustin, who is now singing in the Malmö, Sweden opera house. Ironically, the acoustic pilgrimage first stimulated by the singing of Björling came full circle with Tim’s winning of the Jussi Björling prize in Sweden this past year.

Tim Augustin Example: “un dolce ristoro” from *Così fan tutti*, Mozart
<https://youtu.be/rmse5IIUiw>

Let’s consider *what* voice is, *why* humans voice, and *how* they voice. According to Aristotle (ca. mid 300’s B.C.E.), “voice is a sound caused by the soul by means of the repercussions of the air, made in the throat, with the intention of signifying something.”⁴

“In the wild” voice occurs in response to a soul’s impulse to express feelings. The first thing a baby does is to draw a breath. The second is to apply that breath to its vocal folds to express how it feels about what just happened and its new situation. Later, as language develops, we give those feelings specificity by adding thought content.

Hap Harburg, the lyricist of the popular song, “Somewhere Over the Rainbow,” wrote:

Music makes us feel feelings.
Lyrics make us think thoughts.
Songs make us *feel thoughts*.⁵

Expression organizes and coordinates *everything* vocal:

- from the quality and pattern of our respiratory response to that impulse to express
- to the activation of low abdominal and pelvic floor muscles to move air
- the coordination of that activation with just the right amount of glottal resistance
- our pitch and melodic inflection
- the dynamic, timbre, duration, and emphasis of our prosody

Melodic notation is a kind of choreography for expression. I learned to build on this primal affective foundation.

I also learned that things aren't always what they seem:

- Our sense of throat space is backwards: a yawn is not open-throated—the tongue is backed into the laryngopharynx. Wherever you feel cooling when you inhale, you are narrow. Cool quietly in front.
- It is innate and universal to sense bright as being forward and dark as being back. Their resonance tuning is mostly the opposite of this. Think bright and concentrated in the pharynx for better timbral balance.
- The concept of vocal registers as exclusively or even primarily laryngeal is misleading. In a voice well-trained to smoothly negotiate range, the larynx ceases to cause timbral shifts abrupt enough to be perceived as changes of vocal register. But *acoustic* registers persist and become even more prominent and expressive.

There is a push for objective language in science-informed pedagogy. This is understandable: it flows from the laudable desire for clarity and uniformity of definitions, and is necessary for discussing physical realities. However, objective language is almost useless for motivating intentions to guide motor behavior. After all, singing is utterly subjective. In fact, all human experience is subjective, being mediated through sensory perception. We don't sing by micro-managing its complex biomechanics, rather from stored memory of the sounds and sensations associated with expression and language: from somatosense and auditory targets. Our teaching directives must necessarily be descriptive, *and* simple enough to be executable.

All language is metaphorical, representative, not the thing itself. The only exceptions are spoken vowel sounds. /i/ is not a representation of /i/, it *is* /i/. A vowel's sound *is* the vowel. Everything else is metaphor. Models are necessarily simplifications. They deliberately exclude information to highlight particular concepts.⁶ Therefore, "all models are wrong, but some are useful."⁷ So, subjective, perceptual, metaphorical language is our only effective option to motivate function.

The more things change, the more they stay the same. Almost everything migrates, necessarily, across range: vowel color, buzziness, sensation and its location, and acoustic register. Trying to keep things the same *disrupts* continuity. *Honoring* necessary migrations facilitates both efficient function and a continuity of timbral balance.

From Dr. Ian Howell we have learned about absolute spectral tone color: humans hear frequency as vowel-like and on a brightness gradient.⁸ All sounds are blends of vowel-like tone colors to our perception. Vowels are composed of a blend of at least *two* vowel-like tone colors: those being featured by the first two resonances of the vocal tract. One of those provides the defining, **target tone color** of the vowel in the word. The other adds a modifying **complementary tone color**.⁹ A singer can learn to attend to those two tone-color components and vary their percentages for best effect. An adapted whisper, the *chiaroscuro* whisper,¹⁰ can be used to practice that skill, and can be filtered to demonstrate vowels' frequency-dependent tone color components.

This is a spectrograph of a whispered set of cardinal vowels. The second formant “over-vowel” pitch will probably dominate your perception.

Example: chiaroscuro whisper file.

<https://www.youtube.com/watch?v=GAFSyjmR218>

This is the same sample filtered for the lower, first formant “under-vowels,” all of which are in the /u o ɔ/ tone color range. The “under-vowel” is complementary for most vowels, except for /u/ and /o/, for which it is the target tone color.

<https://www.youtube.com/watch?v=tSxmfDxPUII>

Now the sample is filtered for the second formant “over-vowel” tone colors—they are the target tone colors for vowels other than /u/ and /o/, for which they are complementary.

<https://www.youtube.com/watch?v=Df4NezmmdO8>

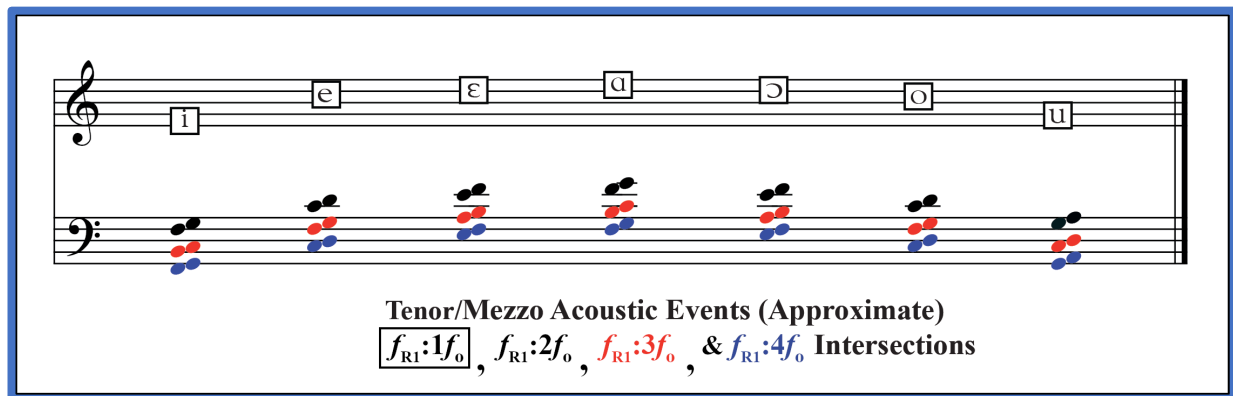
The singer’s formant cluster is all high, hissy, bright /~i/-like tone color.

<https://www.youtube.com/watch?v=Uw1mIwpaNyk>

As you can hear, frequencies are indeed vowel-like. Said another way, vowels have pitch. And so, vowel timbre migrates a little with every pitch, *without* shape change. It is inevitable. As you change pitches, you change the harmonic “paint set” from which timbre is constructed and rising harmonics move in and out of vocal tract resonances. Vowels migrate toward their *complementary* tone color with ascent, especially at acoustic register transitions where a harmonic moves through the first resonance.

Buzziness, called auditory roughness in psychoacoustics, is indicative of closely clustered, high frequency content.¹¹ It migrates across range, register, and voice type from a low, coarse roughness, through an intermediate sizzly mix, to a smooth, pure high. It is associated perceptually with laryngeal register, *regardless* of actual laryngeal register. “Chest voice” is buzzier, “head voice” is smoother. Tracking the migration of auditory roughness across range can be effectively used to train efficient laryngeal registration.

Register transitions are primarily acoustic in a voice trained for smooth laryngeal registration. They occur relative to the pitch locations of the first resonance of the vowel being sung. Shifts therefore differ by vowel—the voice doesn’t turn over on the same pitch for every vowel. Its turnings parallel first formant locations.



This synthesized voice will demonstrate an /a/ vowel passively migrating through *acoustic* registers.

<https://youtu.be/fFHUSVmyPXQ>

In spite of Bernoulli, a *coup de glotte*, properly done, is the most efficient way to start a sound. (Garcia, Stark)¹²

- It facilitates immediate complete timbre, high frequency content, and flow phonation.
- It occurs spontaneously in satisfying, expressive phonations: “Um um good.”
- You can model it with a voiceless lip brr. Notice: that begins with lips closed.

Pleasure of sensation and satisfaction of expression are diagnostic of functional efficiency: If voicing is generous, expressive, and feels good, it is very probably efficient. Pleasurable play encourages functional efficiency.

In conclusion:

The dancer, La Meri, maintained, “The only reason to master technique is to make sure the body does not prevent the soul from expressing itself.”¹³

Finding your voice is a process of self-formation.

Freeing your voice is a process of self-actualization.

Voice is our primary means of developing empathy with one another. We express feelings to invite others to feel what *we* are feeling in order to *connect*, with ourselves, with each other, or, in prayer, with God. This is crucial, for empathy is the very basis of civilized society,¹⁴ of individual health, and of communal health.

We who train voices are in the business of helping souls *find* and *free* their voices; of helping souls *express themselves* more fully, in order to *connect* more fully.

It is important work, done one soul at a time.

¹ Defense.gov News Transcript: DoD News Briefing – Secretary Rumsfeld and Gen. Myers, United States Department of Defense (defense.gov), <https://archive.ph/20180320091111/http://archive.defense.gov/Transcripts/Transcript.aspx?TranscriptID=2636>. February 12, 2002.

² From private conversation with Kittie Verdolini.

³ 1 Corinthians 8:1.

⁴ Aristotle, *On the Soul (De Anima)*; 420b ff. This appears on page 7 and is related to the faculty of imagination (Phantasia).

⁵ <https://libquotes.com/yip-harburg/quote/lbf313a>

⁶ Ian Howell on models.

⁷ <https://www.lacan.upc.edu/admoreWeb/2018/05/all-models-are-wrong-but-some-are-useful-george-e-p-box/>

⁸ Ian Howell, “Parsing the Spectral Envelope: Toward a General Theory of Vocal Tone Color” (DMA thesis, New England Conservatory of Music, 2016), 29–30; <https://www.academia.edu/29162454>.

⁹ Kenneth Bozeman, “The Pedagogic Use of Absolute Spectral Tone Color Theory,” *Journal of Singing* 74, No. 2 (November/December 2017): 179-183.

¹⁰ A *chiaroscuro* whisper is a whisper from a settled larynx and relatively open throat, in contrast to a typical whisper that is done with a high larynx. The typical whisper reduces or eliminates under-vowel contribution and exaggerates the over-vowel component.

¹¹ Howell, Ian, “Necessary Roughness in the Voice Pedagogy Classroom,” *VoicePRINTS*, May-June 2017, 4-7.

¹² Stark, J. *Bel canto: a history of vocal pedagogy*: University of Toronto Press; 1999.

¹³ laMeri; <https://www.inspiringquotes.us/author/5564-la-meri>.

¹⁴ Lynn Holding, “Emotion and Empathy: How Voice Can Save the Culture,” *Journal of Singing* 73, no. 4 (March/April 2017): 432.