Scott McCoy, Associate Editor

Dispelling Vocal Myths. Part IV: "Talk Higher!"

Deirdre Michael

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My associate, Lisa Butcher, MM, MA, CCC/SLP, came into my office, sighing and shaking her head. "In your next 'myths' article, will you please tell singing teachers to stop telling their students 'you need to talk higher'? I'm so tired of treating singers who have muscle tension and pain because they're trying to talk at some totally inappropriate pitch and register adjustment!" I have agreed with this for years, and when we discussed the topic with other voice-specialty speech language pathologists, they lamented universally that the "talk higher" myth is common not only among singing teachers, but among nonvoice-specialty speech language pathologists as well.

This is the fourth in a series of articles aimed at clarifying misconceptions about vocal production that can cause technical problems, or reduced efficiency in singing. One of the reasons to call these misconceptions "myths" is that they seem to have been learned implicitly rather than explicitly. In this case, though, I believe there has been explicit teaching and learning of information that is no longer considered correct. Indeed, Lisa is referring to something these singers have been told very specifically by their teachers: "You're speaking at too low a pitch; talk higher." Like many of the anatomically incorrect images we use routinely in the studio, this advice is well motivated, but can have unintended consequences.

MYTH #1: "CHEST VOICE" IS DANGEROUS; ONE SHOULD TALK IN "HEAD VOICE" BECAUSE IT PROTECTS THE VOICE

Actually, while this myth was still active some twenty years ago, it isn't particularly pervasive now (as far as I can tell). But the corollaries are alive and well:

- Low pitches are dangerous; speaking at the lower pitches of the voice is dangerous.
- Women's voices, particularly sopranos, should not go below C_4 (middle C) in singing, and possibly not even in speech
- Talking in "chest voice" is "belting," and therefore bad.
  —subcorollary: Belting is bad.[1]
- Speaking voice can interfere with singing voice.
- Singers should attempt for an open, resonant, buoyant quality in speech that sounds just like singing.

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That last one doesn't sound like a myth, does it? Of course we should use our most beautiful voice to speak with. Unfortunately, not all singers find an efficient or natural way of producing that beautiful sound in speech. When the speaking voice is inefficient it can lead to fatigue or even pain. When the speaking voice is unnatural, it can contribute to the "hoity-toity" reputation of singing teachers.

Truth #1: The Thyroarytenoid Muscle is Active in Normal Speech, and That's Just Fine

The mechanism for pitch control in the voice has been well researched and well explained in many textbooks and articles on the voice.[2] I urge you to review this information if the following discussion doesn't make sense to you; I've cited a very accessible online tutorial. What is important for this discussion is the very simplified concept that the thyroarytenoid (TA) muscle is more active, or dominant, in lower pitches, while the cricothyroid (CT) muscle is more active, or dominant, in higher pitches. In the past decade or so, there has been more talk of TA-dominant and CT-dominant registers, as opposed to the old chest, head, and falsetto distinctions. There are numerous reasons why this concept might be beneficial, but one is that it may alleviate the value judgment that sometimes accompanies head/chest labels. A female singer who is afraid of talking in chest voice may be willing to accept the fact that at the frequencies of vibration typically used in speech, the thyroarytenoid muscle is more contracted than the cricothyroid. Let us explore this.

Normal Pitches for Speech

It should not surprise singing teachers that natural speech is produced near the bottom of the pitch range, but it may surprise them how low those pitches are, especially for women. There is a great deal of research on the fundamental frequency of normal speech. I will not try to provide exhaustive references, or a meta-analysis, but the following is a synthesis of some of the sources available.

Titze provides the following averages for speaking pitch for voice classes:

Bass	G_2 (98.0 Hz)
Baritone	B_2 (123.5 Hz)
Tenor	E_3 (164.8 Hz)
Contralto	F_3 (174.6 Hz)
Mezzo	G_3 (196.0 Hz)
Soprano	B_3 (246.9 Hz)[3]

Baken provides data from 14 studies of speaking fundamental frequency.[4] These studies used a variety of methods, and some reported single average frequencies while others reported ranges. Speaking pitch range for college-age men is reported as 90.5 Hz to 165.2 Hz (approximately $F^{\#}_2$ to E_3) and for men ages 26 to 79 as 84 Hz to 151 Hz (approximately E_2 to D_3). (You should know, though, that it is generally accepted that in senescence, men's voices get higher, and women's voices get lower.)[5] Reported pitch ranges for women are variable depending on the age range and speech task, but the overall range in these studies is from 127.3 Hz (approximately C_3, and something of an outlier) to 275.4 Hz (approximately C_4). More studies have the lowest pitch as between D_3 and $F^{\#}_3$. Most of these studies used a reading task as opposed to spontaneous conversational speech, which may have a wider pitch range and more use of higher pitches. Still, we can see that normal speakers, especially females, talk at pitches that many female singers cannot or would not sing (at least not in public). Therefore, when females are led to believe that they should not talk below middle C, this contradicts what research tells us about normal speech.

It's important to recognize that for all voice types, in the natural average speaking pitch range, the thyroarytenoid muscle is dominant. Speech is a TA-dominant activity; speech is "chest voice." For many millennia, humans with normal and even supranormal singing voices have used a TA-dominant muscle configuration for most of their speech, and they have done it without doing any harm to their singing voice or their vocal folds. While it is true that there is greater natural adductory force associated with thyroarytenoid contraction than with cricothyroid contraction (and thus greater potential impact to the vibrating vocal folds), natural speech that is produced with adequate airflow and muscular balance has impact to the vocal folds that they are well designed to withstand.

A Common Clinical Problem

One of the problems I see commonly in the clinic is female singers, usually in their fifties or older (thus most often postmenopausal) who have vocal fatigue and a loss

of quality and control in their singing voice. The problem is usually in the lower or middle pitch range, when the voice "flutters"[6] or cracks, and initiation of phonation may be very shaky, unstable, or diplophonic.[7] The cracks in the voice may be phonation breaks, pitch breaks, or register breaks. Upper pitches may be preserved, or may be tight and unpredictable. Sometimes, the problem is simply a matter of loss of conditioning. (I often ask, "Did anything else change in your body in the last five years?")

Along with the simple effects of aging though, there is often a disconnect between the singing voice and the speaking voice with these women. Two different scenarios are possible. One is that the speaking voice is very low, and quite husky, or strained. The other is that the speaking voice is artificially high, either using an upper register production (talking in head voice) or speaking in a tight, weak, strained quality that may sound careful or protected. For the women with low, rough voices, there may a number of reasons why the natural speaking pitch has lowered (a topic for another column). However, they may have adapted to these forces with compensatory muscular hyperfunction, leading to chronic overeffort that leads to fatigue. The singing voice is the first indicator, so these women are often surprised that their speaking voices are problematic. The conundrum is that these women may have been trained in the "old school" of singing, in which the head voice was carried down as low as it would go (around C_4), and there were no notes below that. The sound of C_4 with inadequate TA contraction is weak and breathy, and/or it may "flutter," as the vibration cannot be maintained without adequate underlying muscle bulk. Thus, with these women, a C_4 in singing can be very breathy and unstable, while in speech, it is strained, rough, or heavy sounding. In singing, it is "too heady," while in speech, it is "too chesty." In treatment, we work on establishing a more balanced use of muscles throughout the lower pitch range, so that speech and singing use the same TA/CT coordination within that range of pitches. It is amazing how the entire singing voice is righted when the lower register is better adjusted.

In the other scenario, the speaking voice is slightly raised in pitch, but may be tight and strained. Though it cannot be proven medically or scientifically (not easily, anyway), the sense is that she is using a TA-dominant production that is optimal for pitches that are lower than those she is using. It is a mild, speech-version of the old definition of belting: carrying the chest register up too high. Other times, the TA/CT adjustment may be correct, but there is a lack of airflow and tense musculature as she subconsciously "protects" her voice by keeping it "high and light." Often, this patient has the impression that low pitches are dangerous for speech. In either case, when the patient is given information about the pitch range and register adjustment for normal speech, it is easy to find a relaxed, efficient, and natural way of producing speech.

MYTH #2: THE CURE FOR GLOTTAL FRY IS A HIGHER PITCH

This last scenario, with the high pitched, light, but tight and "protected" quality in speech, is also quite common in young female singers, especially of college age. Very often, these young women have been told to "talk higher" by their teachers. It's easy to understand why their teachers told them that. A common speaking voice quality in this culture is the Kim Kardashian form of glottal fry that drives us all crazy. If you're not sure what I'm talking about, google "vocal fry": it's a hot topic in the popular press. Glottal fry, or vocal fry, has long been a favorite voice quality among young men (in my experience, less common among young male singers), but the new derivation is extremely common among young women.[8] Even singers with glorious singing voices may adapt this pervasive style of speech, and their teachers can't stand it. The old myths are at play when their teachers exhort them to "talk higher." The problem is that this form of glottal fry is not just a case of low pitch. Let's explore this.

What is Glottal Fry?

Glottal fry, also known as vocal fry, is a vocal production in which the irregularity of vocal fold vibrations results in the generation of a subharmonic, or what may be called "dicrotic vibration."[9] A complete discussion of this is beyond the scope of this article, but we can discuss the source of the confusion.

In any scholarly discussion of vocal registers, there is often a mention of "pulse register," in which the vibration of the vocal folds is so slow that the ear can discern the individual pulses of vibration. It does have a popping

or frying sound, and hence it was historically also called glottal fry (a "frying" sound produced at the glottis). Pulse register requires vibration at frequencies under 70 Hz, in order to be perceived as individual pulses rather than a continuous tone.[10] Both men and women can produce this.

Pulse register usually occurs at the ends of utterances, as pitch is dropped, and especially at the end of the airstream.[11] It is perfectly normal and not at all harmful when it is not sustained for any considerable length of time. In fact, there are well respected speech pathology textbooks that advocate the use of pulse register to promote more relaxed laryngeal musculature, from which to establish a more normal laryngeal configuration for phonation.[12] This can be used in cases of severe muscular hyperfunction. Pulse register can also be used in acoustic analysis to demonstrate the resonances of the vocal tract, in the absence of periodic vocal fold vibration that sets up harmonics.[13] These demonstrations are enlightening and not harmful. There are even schools of voice pedagogy that use pulse register as a warm-up. However, if pulse register is adapted as a habitual mode for phonation, some fatigue and tension can result. It's also not very loud, and therefore not efficient for typical speech.[14] Pure pulse register is not a common style of talking.

The more common voice quality that we refer to as glottal fry or vocal fry is one in which there is some irregularity in vocal fold vibration that creates a subharmonic, that is, an irregular vibration that is slower than the fundamental frequency of vibration. There are many possible mechanisms for this and many subtly different vocal qualities.[15] These have been called harsh voice, creaky voice, or rough voice, and many other clinician-specific nicknames, as well as glottal fry or vocal fry. Although we tend to use the terms interchangeably, the quality we commonly call "fry" is probably not pure pulse register.[16] Though it most commonly occurs at the ends of phrases, when it could be considered pulse register, it may also occur during stressed words in speech, at which time the fundamental frequency is not lower, but other mechanisms cause irregularity in vibration. Though not mentioned in the literature, in the clinic, during endoscopic exams, I have observed instances of increased ventricular fold approximation at the same moment as an episode of "fry." Exactly how this affects the vibratory characteristics of the vocal folds is not clear, but it does happen on stressed syllables, with no clear change in fundamental frequency. The perception, though, is of the addition of a very low-pitched component to phonation. It is understandable why singing teachers, hearing this quality, would exhort their students to talk higher.

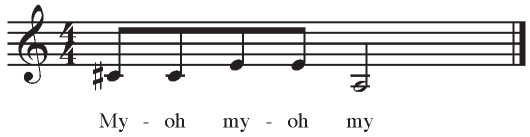
Truth #2: The cure for glottal fry is a well balanced phonatory system

What is actually needed is an optimal balance of subglottic pressure (air pressure from the lungs) and glottic resistance to that pressure, which is dependent on the desired pitch and loudness. In the clinic, individuals who are learning to reduce fry in their voice report that they listen for pitch that does not go too low, and they feel a more continuous airstream, with less resistance, "squeezing," or "holding back." Simply talking higher is often not successful without the additional airflow component. Singers learn this concept very quickly.

Another thing they learn is the difference between tone and noise. "Tone" is the result of periodic—that is, regularly repeated—vocal fold vibrations. Because there is a regular vibration at the fundamental frequency, a distinct pitch, or tone, can be discerned. "Noise" is the result of aperiodic vibration, that is, lacking any regularity. This gives the harsh, rough, or creaky quality. (Note that while vowels are characterized by tone, most consonants include a noise component. These are very transient and highly recognizable. The long-term noisiness of glottal fry is very different.) Most patients learn quickly that the noise in glottal fry is actually a behavior, rather than something that is happening to their voice without their control. So, learning to reduce glottal fry can be as simple as learning to "have tone, not noise." By listening, they learn to make the correct adjustments.

Optimal Pitch Range for Speech

There is a general consensus in the voice therapy literature that the optimal average speaking pitch is approximately a third or fourth higher than the lowest speaking or singing pitch, or, according to others, 25–30% of the way up from the bottom of the total pitch range. While early treatises on voice therapy may have advocated for finding a single optimal pitch, more modern therapy textbooks recognize that optimal pitch is truly a range of pitches.[17]



Example 1.

In my clinical experience, the optimal pitch range for any individual is from four to seven semitones, and I typically try to conform to the music interval of a major or minor third, or perfect fifth. (It's easier to practice with easily recognized pitch contours.) I have patients chant a simple nonsense phrase such as "my-oh—my-oh—my," on a pitch pattern such as mi-sol-do, going up and down by half-steps until we hit upon the pitches that feel the most homogeneous (without the need to switch registers) and most comfortable (Example 1). The most comfortable and best sounding tones are nearly always the same. Then we chant sentences and simple speech until those pitches become habitual in speech. They are produced with good relaxation, adequate airflow, and a balanced, TA-dominant production. They sound like normal, natural speech.

The pitch ranges I have discovered in clinical practice conform well to published data. Here are the ranges that seem to work well, by voice type:

Sopranos: B_3 to $F^{\#}_4$, $B^{\flat}_3$ to F_4, A_3 to E_4, $A^{\flat}_3$ to $E^{\flat}_4$
Mezzos: G_3 to D_4, $F^{\#}_3$ to $C^{\#}_4$, F_3 to C_4
Contraltos: F_3 to C_4, E_3 to B_3, $E^{\flat}_3$ to $B^{\flat}_4$
Tenors: D_3 to A_3, $C^{\#}_3$ to $G^{\#}_3$, C_3 to G_3
Baritones: B_2 to $F^{\#}_3$, $B^{\flat}_2$ to F_3, A_2 to E_3
Basses: down to F_2 to C_3

A few caveats are very important here. This is based on my clinical practice, not empirical research. Of course there is overlap between the voice types, and I don't worry if the most comfortable pitch range doesn't conform to the singing voice type. We work on the most comfortable speech, regardless of what the pitch range is. The least predictable speaking pitch ranges are with the tenors. (What a surprise!) Also, the comfortable range can change with many factors, including time of day, overall energy or fatigue, menstrual cycle, etc. Louder speech will, of course, be at a higher pitch range, and therefore must often be worked on separately. Teachers who need to project their voices at all times need to learn the best adjustment for a higher pitch range. On the other hand, individuals who work in cubicles, or are on the phone a great deal, need to learn quieter speech in the lowest part of their pitch range, without constantly dropping into glottal fry. These can all be challenging.

I do not expect singing teachers to teach vocal production for speech to their students. However, they should be aware that poor speech production can eventually lead to fatigue or inefficiencies in singing, and are therefore well advised to be aware of the speaking voice quality of their students. If they hear a pressed, strained, or heavy quality, or if they hear the dreaded, ubiquitous vocal fry, I would hope that they would not simply suggest to "talk higher." Rather, they should be aware that normal speech production is a relaxed, efficient, TA-dominant adjustment, near the bottom of the absolute pitch range, with the ability to inflect into a CT-dominant adjustment very easily. A little pulse register at the end of an utterance is expected, but the rest of the utterance should be produced with "tone," not "noise." By understanding the nature of normal speech production, teachers can avoiding giving unhelpful advice, and rather can help their students find a natural, comfortable speaking voice.

NOTES

1. I'm going to suggest a Related Mega-Myth here: *Belting is bad, because it's what nonclassical singers do, and therefore it is dangerous*. When I was an undergrad in the mid-seventies, that message was implied, if not explicitly taught. None of us actually believed it, but it was part of the culture. What's more, in a classically oriented program like most of the college programs then, we spent our energy cultivating a classical sound, and none of us actually knew how to belt, so when we tried, it wasn't easy or comfortable. Therefore, we bought into the myth, "Belting is dangerous." I do believe that NATS has come a long way in becoming more accepting of many styles of singing, and trying to embrace belting as a legitimate way of singing, but the class distinction may still be an undercurrent in our thinking. And it may play into the suspicion of lower register speaking voice.
2. Alison Behrman, *Speech and Voice Science* (San Diego, CA: Plural Publishing, 2007); Barbara M. Doscher, *The Functional Unity of the Singing Voice* (Metuchen, NJ & London: The Scarecrow Press, Inc., 1988); Scott McCoy, *Your Voice: An Inside View* (Princeton, NJ: Inside View Press, 2004); Johan Sundberg, *The Science of the Singing Voice* (Dekalb, IL: Northern Illinois University Press, 1987); Ingo R. Titze, *Principles of Voice Production* (Englewood Cliffs, NJ: Prentice Hall, 1994); Clifton Ware, *Basics of Vocal Pedagogy*

(Boston, MA: McGraw-Hill, 1997). I've cited just a few of the many good voice pedagogy texts. The books by Behrman and Titze are intended as textbooks for graduate students in speech pathology programs, so there is much greater depth. There is a very nice, simplified companion online tutorial to the Titze book, at the website for the National Center for Voice and Speech, which is headed by Dr. Titze. Go to www.ncvs.org/ncvs/tutorials; there are many useful tutorials there, a wonderful gift to all of us.

3. Titze, *Principles*, 188.
4. R. J. Baken, *Clinical Measurement of Speech and Voice* (Boston, MA: College Hill Press, 1987).
5. Titze, 183.
6. "Flutter" is my own term for this purpose. Others may use the term differently, especially in the recording industry.
7. Diplophonia, meaning "double voice," refers to a phenomenon in which two (or more) pitches are sounded simultaneously. It occurs when there is some asymmetry between the two vocal folds, so that the folds do not become "entrained" in the airstream. They vibrate aperiodically (irregularly), often at two different frequencies, or with very sudden and transient changes in frequency. The quality is fluttery, gurgly, or bubbly, with lack of a single, distinct pitch.
8. Lesley Wolk, Nassima B. Abdelli-Beruh, and Dianne Slavin, "Habitual Use of Vocal Fry in Young Adult Female Speakers," *Journal of Voice* 26, no. 3 (May 2012): e111–e116.
9. J. S. Rubin, Robert T. Sataloff, and Gwen S. Korovin, eds., *Diagnosis and Treatment of Voice Disorders,* 2nd ed. (Clifton Park, NY: Delmar Learning, 2003); Behrman; Titze; Wolk et al.
10. Titze, 254.
11. Daniel R. Boone and Stephen C. McFarlane, *The Voice and Voice Therapy*, 5th ed. (Englewood Cliffs, NJ: Prentice Hall, 1994).
12. Ibid.
13. Donald Gray Miller, *Resonance in Singing: Voice building through Acoustic Feedback* (Princeton, NJ: Inside View Press, 2008).
14. Raymond H. Colton and Janina K. Casper, *Understanding Voice Problems: A Physiological Perspective for Diagnosis and Treatment* (Baltimore, MD: Williams and Wilkins, 1990).
15. Ronald C. Scherer, "Laryngeal Function During Phonation," in Rubin, Sataloff, and Korovin.
16. Baken; Wolk; Titze.
17. Colton and Casper.

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Dr. Michael received a BA in music and psychology from Hamline University in St. Paul, MN, MA in Speech-Language Pathology, and PhD in Communication Disorders, with a specialization in voice science, from the University of Minnesota. She has been a voice and piano teacher for thirty years, and a speech-language pathologist since 1991. She is a frequent presenter at national and international conferences for voice and singing science, most especially the Annual Symposium: Care of the Professional Voice sponsored by the Voice Foundation, and the biannual International Conference on the Physiology and Acoustics of Singing. She also lectures regularly at colleges around Minnesota and Wisconsin, in the areas of voice science, vocal health, and voice treatment. Her educational goals are to make voice science accessible to singers, and to educate medical residents on voice disorders and the special needs of singers. She serves NATS locally as a collaborator and adjudicator, and nationally, making appearances in workshops and conferences in 1997, 2000, 2006, and in the 2009 Winter Workshop in Miami. She serves of the Scientific Advisory Board of NATS, and will give a presentation on voice disorders in singers at the National Conference in 2010 in Salt Lake City. Her areas of research and publication include perceptual characteristics of voice, acoustic measures of voice quality, and various aspects of normal and abnormal speech and singing production.

Dr. Michael maintains a lively private voice and piano studio, and is active in a variety of local teaching and music organizations. Her most recent project has been to revamp the singing critique forms for the Minnesota Federation of Music Clubs Junior Festivals. A soubrette soprano, she continues to sing in a variety of musical styles and venues.

Better than all measures
Of delightful sound,
Better than all treasures
That in books are found,
Thy skill to poet were, thou scorner of the ground!

Teach me half the gladness
That thy brain must know,
Such harmonious madness
From my lips would flow
The world should listen then—as I am listening now.

Percy Bysse Shelley,
from "To a Skylark"