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Journal of Singing, May/June 2025
 Volume 81, No. 5, pp. 505–509
<https://doi.org/10.53830/sing.00127>
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 National Association of Teachers of Singing

The American Academy of Teachers of Singing (AATS), founded in 1922, is comprised of internationally recognized singing voice experts. AATS periodically publishes position papers such as this one, an update of “In Support of Fact-Based Voice Pedagogy and Terminology” (2014). AATS recognizes the value of science-informed pedagogy, while acknowledging that facts evolve and urges a companion “Pedagogy-Informed Voice Science” in light of recent research in cognitive neuroscience. AATS encourages an integrated approach to voice pedagogy requiring both scientific research and voice practitioner insight. By fostering interdisciplinary collaboration, voice practitioners and researchers can mutually enhance both the validity and applicability of voice science.

**PEDAGOGY-INFORMED VOICE SCIENCE: AN ESSENTIAL
PARTNER TO SCIENCE-INFORMED PEDAGOGY**

By The American Academy of Teachers of Singing

The American Academy of Teachers of Singing (AATS) is a select group of internationally recognized voice teachers and singing voice experts founded in 1922 “with the express purpose of contributing to the singing profession in an advisory capacity.” To that end, AATS “works as a single body to offer guidance through the publication of position papers on a wide range of subjects,” and declares that, as a body, it “value(s) and celebrate(s) all styles of singing. We speak with ‘one voice’.”¹

This paper continues the desire of the American Academy of Teachers of Singing to “make contributions to the improvement of the practice of the profession from the standpoints of both teaching and ethics,” as stated in the Academy’s 2014 paper, “In Support of Fact-Based Voice Pedagogy and Terminology.”² That mission includes strengthening voice pedagogy by affirming the various legitimate sources of knowledge upon which the field is based, such as practitioner experience and cultural context, and welcoming credible, evolving additions to that pedagogic foundation.

This current paper is a supportive, balancing, companion piece to that earlier one, and should be considered within its context; we recommend revisiting the earlier paper as a prelude to this one. AATS continues to support voice science as a welcome and valuable partner in the process of developing an increasingly effective and coherent body of vocal pedagogic knowledge.

Our sister organization, the National Association of Teachers of Singing, conducted a science-informed pedagogy initiative—a process which lasted several years and created resources to enable teachers of voice and voice pedagogy to incorporate advances in voice science into their instruction.³ It culminated in a week-long summer course, the “Science-Informed Pedagogy Institute,” begun in 2023 and anticipated to be offered annually, and a website of regularly updated science-informed resources for pedagogy courses.⁴ AATS recommends the use of those resources to teachers at any level, but especially to those delivering pedagogy curricula.

The 2014 AATS paper welcomed voice science, while acknowledging that voice science is neither the first nor only source of valid pedagogic knowledge; successful historic pedagogy in multiple genres predates voice science by centuries. The wisdom of traditional pedagogy distilled from years of practitioner

experiences, combined with ongoing, currently emerging practitioner-gleaned and culturally informed knowledge, remain principal sources of the cumulative knowledge of voice culture. Yet AATS also noted the following as both the inspiration and rationale for their 2014 paper extolling the virtues of “fact-based” voice pedagogy:

As in all disciplines, however, the appearance of new data, discoveries, and insights can have a profound influence on the profession.⁵

Indeed, what a society considers “fact” can evolve as new information emerges and perspectives broaden. Recent research in cognitive neuroscience has offered a more wholistic view of how humans reason, revealing that scientific understanding is not solely based on objective facts but is parsed through human interpretation and emotion.⁶ Our interpretations reside within cultural contexts, so that facts can be perceived differently across cultures. Music is a reflection of culture; thus, when we speak about the concept of “fact” or “science,” it is imperative that pedagogical considerations and applications also reflect diverse perspectives.

This paper acknowledges the validity of these diverse perspectives and encourages their deliberate partnership with the explorations of voice science, seeking mutually affirming convergences between the disciplines to further advance our profession. The path forward is best served by partnership and mutual respect of the processes and knowledge characteristic of both voice science and voice pedagogy.

CATEGORIES OF KNOWLEDGE: DECLARATIVE AND PROCEDURAL

Since the 2014 AATS paper, further advances in learning theory have been added to the pedagogic conversation. Specifically, recent advances in motor learning and neuroscience have revealed that the ancient dichotomy between *declarative* (explicit) “know that” knowledge and *procedural* (implicit) “know how” knowledge is false.⁷ Yet both forms of knowledge continue to be separated for didactic reasons and as such, have value in voice pedagogy, but serve different purposes.

Declarative knowledge is knowledge of facts and principles. As such it is the standard domain of science, which endeavors to objectively measure or describe actual physical realities and processes. Procedural knowledge

is the knowledge of how to do an action and thus is essentially subjective and sensorial—what it feels (and sounds) like to do the thing, in this case, to sing. As such, it is challenging to measure, articulate, and bequeath, yet it is precisely this knowledge—the communication between brain and body—with which singers sing.

Simply put, procedural knowledge is actual obtainable skill. Novice singers hope to obtain ability and eventually, high-level skill, through procedural learning. Teachers use both kinds of knowledge in their pedagogy, typically by verbally parlaying their innate procedural knowledge to their students, whether through metaphorical language or by using declarative knowledge; that is, by explaining physical processes via principles of voice production.

A robust finding from motor learning research suggests that external targets—in the case of singing, intentional output targets—are generally more effective in organizing physical processes than specific mechanical instructions of the physiology involved.⁸ The output targets of singing are auditory (what it sounds like to the singer from inside) and somatosensory (what it feels like) to sing efficiently. While the external, radiated sounds can be measured and objectively reported (declared), how the singer motivates and experiences those phenomena internally is procedural. But given that how the singer motivates and experiences those phenomena is subjective, it is also elusive, and thus much more challenging to describe.

RECENT RESEARCH IN COGNITIVE SCIENCE

In the light of recent research in motor learning and the cognitive processing of procedural knowledge, one statement from the previous paper needs to be revisited and clarified. In the 2014 paper, the Academy recommended “avoiding terminology that is sensation-based” and advocated “for functional terminology that acknowledges the respective activities of phonation, resonance, and registration,” concluding that “fact-based voice pedagogy and terminology help foster a common nomenclature and encourage technique that is consonant with the laws of nature.”⁹

This well-intended advice was given both to encourage thorough preparation and understanding of vocal

production as well as to curb far-fetched, idiosyncratic imagery not clearly grounded in function, colorfully described by former AATS chair, the late Shirley Emmons, as “orange-grocery.”¹⁰ Similarly, an earlier advocate for fact-based pedagogy, William Vennard, wrote in the preface to his seminal text *Singing: the Mechanism and the Technician*: “the knowledge of literal fact is the only justifiable basis for the use of imagery and other indirect methods.”¹¹

The Academy remains committed to affirming the need of teachers to understand the physiologic, acoustic, aerodynamic, and cognitive principles governing the function of the singing voice as objectively and as well as possible. This affirmation, however, should be balanced with the realization that all human experience is subjective. Furthermore, all language is metaphorical; that is, it is representative of a thing, not the thing itself.

In motor behavior, the guiding, intentional signals of the brain to the body are procedural, sensorial, and subjective. Vennard’s caution concerning “the use of imagery and other indirect methods” might imply that there is such a thing as a *direct* method. There is not. We sing using stored procedural messaging, which cannot be directly transplanted, only elicited using language descriptive of output targets (sounds and sensations) and gradually accumulated and automatized via experience. In fact, the language of successful historic vocal pedagogy is largely populated with sensorial, procedural descriptives such as *head voice*, *chest voice*, *pharyngeal voice*, *covering*, *turning*, *whistle register*, and *support*, while the use of objective, quantitative, declarative language is minimal.

New research in motor learning shows that declarative terminology—while essential in informing us of quantitative physical realities and necessities of what actually happens, and when and where effects will happen—is less effective as terminology for motor intentions, (that is, directions to the body), unless translated into somatosensorial percepts, either overtly via description or internally via experience.¹²

Voice teachers, as frontline practitioners, operate within this practical context, one in which they seek to stimulate improved procedural skill and necessarily use whatever descriptive language is needed to motivate it. In agreement with Vennard, such language is best grounded in and informed by the declarative “knowledge

of literal fact,” but is essentially and inevitably metaphorical. It is most efficiently transmitted when clear, appropriate output targets are accomplished with the pleasure attendant to ease of production. To these ends we offer the following clarifying definitions:

Science-Informed Voice Pedagogy (Helding): “A type of hybrid voice pedagogy that unites science and art by researching current voice science, translating it, and combining it with extant historic voice knowledge. Defining characteristics of Science-Informed Voice Pedagogy are agency and choice; thus it is presented, not required, for use by voice teachers. . . . A conclusion to this definition is that what is known and considered true does not begin nor end with science, but rather, takes account of the full measure of human experience.”¹³

Pedagogy-Informed Voice Science: a type of voice science which recognizes the value of the experience-gleaned and culturally informed perspective of voice practitioners in its study designs and operates within a spirit of true interdisciplinarity, a hallmark of which is professional respect for different ways of knowing. Among the value that voice practitioners might add to such studies are: access to appropriately vetted subject pools; questions of special interest to voice trainers; observations from successful historic pedagogy that may warrant scientific examination; and expert panels of assessors for perceptual studies.

RATIONALE

Pedagogy-informed voice science, located within the context of unwavering support for science-informed pedagogy, is offered in the spirit of interdisciplinary collaboration and respect. This term is not meant to restrict or reject the rigorous protocols necessary for careful scientific experimentation; rather, it is meant to encourage voice practitioners (both habilitative and rehabilitative) from the voice teaching and speech clinical settings to offer their own education based, experience gleaned and culturally informed perspectives to the design processes of voice studies, and to inspire researchers to continue to consider these essential perspectives as potentially valid and helpful.

In order to encourage and support productive collaboration, the way forward could take several forms. A basic assumption is the encouragement and develop-

ment of curricula, such as the NATS Science-Informed Pedagogy Resources project cited above, which support voice teachers to become adequately science-informed. Voice teachers need not become scientists (nor scientists voice teachers) in order to contribute meaningfully to science-informed voice pedagogic conversations, curricula, and study designs.

There are many venues currently available for collegial exchange, as well as cooperative organizational initiatives.¹⁴ However, some voice teachers may well have the interest and opportunity to go further and become capable of engaging in scientific studies themselves, often in partnership with colleagues from the science disciplines. Such specialists can serve a valuable translational service between these disciplines.

CONCLUSION

A fully integrated approach to voice pedagogy requires both scientific research and practitioner insight. Seasoned voice pedagogues have valid experience-gleaned and culturally informed perspectives that can assist both the formation and execution of voice science investigations. By fostering interdisciplinary collaboration, voice practitioners and researchers can enhance the ecological validity and applicability of voice science while preserving the practical wisdom of traditional pedagogy. Advanced degree programs in voice pedagogy should equip educators with the necessary skills to engage with voice science research, either as informed consumers of that research or active collaborators. Moving forward, the profession must prioritize mutual respect between pedagogues and scientists, ensuring that voice pedagogy remains both evidence-based and artistically informed.

The American Academy of Teachers of Singing therefore encourages voice practitioners to foster respectful, collaborative relationships with voice researchers with a view to contributing their expertise and perspective to the scientific study of voice, and recommends that advanced degrees in voice pedagogy feature curricula that enable teachers to understand voice science studies and, where interest and opportunity allows, initiate and collaborate in voice science research projects. Similarly, the Academy invites our colleagues from the scientific and medical communities to continue to seek out col-

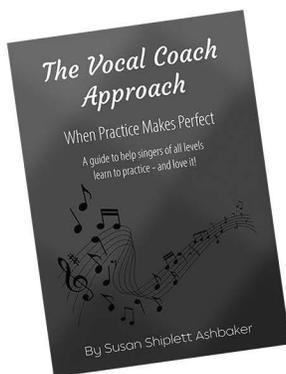
laborations with interested singing teachers of all genres whenever possible, for the mutual advancement of the interdisciplinary field of voice.

NOTES

1. The American Academy of Teachers of Singing, "Who are we?" accessed February 11, 2025, <https://www.americanacademyofteachersofsinging.org/>.
2. NATS Visits AATS, "In Support Of Fact-Based Voice Pedagogy and Terminology," *Journal of Singing* 71, no. 1 (September/October 2014): 9.
3. See "A Brief History of the NATS Science-Informed Voice Pedagogy Initiative," accessed January 29, 2025, https://www.nats.org/_Library/Science_Informed_Voice_Pedagogy_Resource/A_Brief_History_of_the_NATS_Science-Informed_Voice_Pedagogy_Initiative.pdf.
4. See "The NATS Science-Informed Pedagogy Institute," accessed January 29, 2025, https://www.nats.org/Science-Informed_Pedagogy_Institute.html; The NATS Science-Informed Voice Pedagogy Resources, accessed January 29, 2025, https://www.nats.org/cgi/page.cgi/Science-Informed_Voice_Pedagogy_Resources.html.
5. NATS Visits AATS, "In Support of Fact-Based Voice Pedagogy," 10.
6. See Antoine Bechara, Hanna Damasio, Antonio R. Damasio, "Emotion, Decision Making and the Orbitofrontal Cortex," *Cerebral Cortex*, 10 no. 3 (March 2000): 295–307; Daniel Kahneman, *Thinking, Fast and Slow* (Farrar, Straus and Giroux, 2011).
7. See António Damásio, "The Somatic Marker Hypothesis and the Possible Functions of the Prefrontal Cortex," *Philosophical Transactions of the Royal Society of London, Series B: Biological Sciences* 351, no. 1346 (1996): 1413–1420; and Damásio, *Descartes' Error: Emotion, Reason, and the Human Brain* (Putnam, 1994).
8. Gabriele Wulf, "Attentional Focus and Motor Learning: A Review of 15 Years," *International Review of Sport and Exercise Psychology* 6, no. 1 (2013): 77–104.
9. NATS Visits AATS, "In Support Of Fact-Based Voice Pedagogy."
10. This anecdote is shared by Emmons' former doctoral student, Dr. Karen Leigh-Post, Professor of Music, Applied Voice, and Voice Science and Pedagogy, Lawrence University Conservatory of Music.
11. William Vennard, *Singing: the Mechanism and the Technic* (Carl Fischer, 1967): iii.

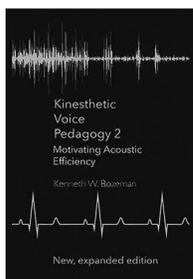
12. See Wulf, "Attentional Focus," and Rebecca Lewthwaite, "Optimizing Performance Through Intrinsic Motivation and Attention for Learning: The OPTIMAL Theory of Motor Learning," *Psychonomic Bulletin & Review* 23 (2016): 1382–1414.
13. Lynn Holding, *The Art of Vocology: Practicing Science-Informed Voice Pedagogy* (Rowman & Littlefield) forthcoming; used by permission.
14. The following is a partial list of the many venues currently available for collegial exchange, as well as cooperative organizational initiatives:
 - The Voice Foundation's Annual Symposium "Care of The Professional Voice," whose workshops feature PowerPoints for theoretical framing. See "The Voice Foundation Annual Symposium," accessed January 29, 2025, <https://voicefoundation.org/annual-symposium/register/>.
 - The National Center for Voice and Speech conferences. See "NCVS conferences," accessed January 29, 2025, <https://pages.ncvs.org/2025-conference>.
 - The biennial NATS National Conference. See "NATS Conferences + Workshops," accessed January 29, 2025, <https://www.nats.org/programs.html>.
 - PAVA, whose conference structure has added pedagogy-friendly proposal and presentation formats, such as PedTalks, ToolTalks, Microworkshops, and Special Topical Panels. See "Pan American Vocology Association," accessed January 29, 2025, https://pavavocology.org/?fbclid=IwAR0uCeJqId0xv5oU-s0u0R_-sZ9eCdlbs1rJan9EVfXHK2wq53nj5yBZZYc.
 - The NATS Voice Science Advisory Committee, which vets and encourages voice science presentations. See "NATS National Committee Assignments and Appointments," accessed January 29, 2025, <https://www.nats.org/Committee-Assignments.html>.
 - The Van Lawrence Fellowship, jointly sponsored by NATS and the Voice Foundation. See "Van L. Lawrence Fellowship," accessed January 29, 2025, <https://www.nats.org/van-lawrence-fellowship.html>.

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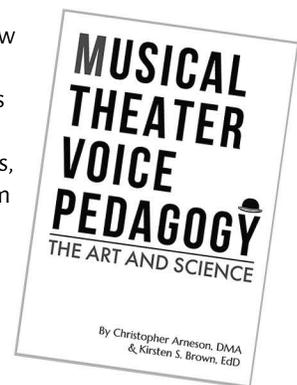
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