Singing Terminology Usage: 
A Quantitative, Inter-Disciplinary Study 

by

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Abstract

Calls for a consistent terminology that can be used both intra-disciplinarily among voice teachers and inter-disciplinarily among the voice professionals who treat or teach classical singers have been heard for the better part of a century. Based on perceptions of inconsistent terminology use, voice pedagogues have produced glossaries containing favoured terms and their definitions, written articles prescribing specific pedagogic expressions and imagery, and in a few cases, published stand-alone dictionaries. This body of activity was rationalized as a “response to a pressing need to define and analyze those terms and expressions in common usage by the vocal profession from the early seventeenth century to the present, as well as those introduced into the lexicon by members of the various scientific disciplines concerned with the subject” (Reid 1983, xix). To date, the success of these attempts to systematize voice terminology among voice practitioners has never been quantified and they may or may not reflect the current objective reality of terminology use by voice teachers and by voice specialists in the fields of speech-language pathology and laryngology. This unique inter-disciplinary research uses survey methodology to ascertain a) whether currently practicing voice teachers use a common terminology,
and b) whether there is commonality of terminology use among voice teachers and voice practitioners in the fields of speech-language pathology and laryngology. Results of this research reveal that there is a higher level of consistent terminology use among voice teachers than what is presently assumed, and that there is a higher level of inter-disciplinary agreement about breathing for singing terminology than what is currently assumed. These results suggest that ongoing calls for systematization of singing terminology may no longer be warranted.
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CHAPTER 1: INTRODUCTION

The need for precise terminology that could be used to describe the voice and to teach singing began to be articulated in English-language North America as early as the start of the twentieth century. Initially motivated by the desire to “clarify the thinking and simplify the training practices in the voice studios of America” (Hobart 1951, 9), as new scientific understanding of the voice influenced traditional voice pedagogy concepts (Sataloff 1991, 4), entreaties for a “common ground of terminology” (Baldwin 1931) became increasingly driven by the need to facilitate inter-disciplinary communication and research. Hoping to meet this need, voice pedagogues¹ wrote stand-alone dictionaries, included glossaries in voice pedagogy textbooks², participated in voice research, and published explanatory chapters in their books. However, as the success of these attempts to systematize voice terminology has never been quantified, it is unknown whether current discussions concerning consistent terminology use in the field of voice pedagogy are relevant. This unique inter-disciplinary research uses survey methodology to ascertain a) whether there is intra-disciplinary commonality of terminology use and agreement about definitions among currently practicing voice teachers, and b) whether there is inter-disciplinary commonality of terminology use and agreement about definitions among voice teachers and voice practitioners in the fields of speech-language pathology and laryngology. Results of this research help to answer the question of whether current calls for intra-disciplinary voice terminology systematization are justified.

The research in question focuses on terminology associated with breathing for singing; a subject that is common to the three main disciplines that treat or teach singers, and yet a subject about which voice pedagogues assert that “great controversy still exists” (Chapman and Morris 2006, 39). The research was conducted via a survey that asked participants about their usage and understanding of breathing terminology. Bias in choosing which breathing for singing terms to include in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology was mitigated by using only those terms found in the four principal English-language voice pedagogy textbooks used in North American tertiary institutions.

¹ For the purposes of clarity and continuity in this paper, ‘voice pedagogue’ is defined as: a voice teacher who has “scientific knowledge of the vocal mechanism as well as how to apply current research and valid techniques to maximize the efficiency of the voice within the voice studio” (Gutshall 2006, 2). Contemporary voice pedagogues usually hold advanced degrees in voice performance and/or voice pedagogy and may have authored a voice pedagogy textbook.

² For the purposes of clarity and continuity in this paper, ‘voice pedagogy textbook’ is defined as: a book written specifically for use by voice teachers to inform their teaching practices and/or for use by voice pedagogy instructors in the classroom.
to teach voice pedagogy courses, as determined by a previous survey conducted by the researcher. The Inter-Disciplinary Survey on Common Usage of Breathing Terminology was distributed to voice teachers and to voice specialists in the fields of speech-language pathology and laryngology in winter and spring, 2014.

This research provides quantifiable data about current common practice among voice practitioners that will help to answer the larger question of whether there is a need to develop a uniform terminology. In future, the methodology developed for this research may serve as a template for gathering further quantitative inter-disciplinary data concerning terminology usage among voice practitioners. Additionally, this methodology may be applied to inter-disciplinary data-gathering in any number of diverse fields.
1.1 Literature Review

History of Calls for Uniform Voice Pedagogy Terminology in English-Language North America from 1900 to Present

Early Calls for Voice Pedagogy Terminology Systematization

One of the earliest English-language articles written on the subject of terminology use among voice teachers, The Basis of Precise Terminology for Singers by W. Warren Shaw in 1928, argues that the voice profession should adopt a terminology in which “one term, and only one is used to describe a certain motion” so that when the term is “seen or heard, the same idea is in the minds of all, at all times” (24). In his third voice pedagogy textbook, Shaw unequivocally states his intention to deal with “misleading terminology ... in a comprehensive manner [and present] the subject of vocal terminology in such a light as to clarify the hitherto obscure meanings of terms which are now in general use” (1930, 11). The third chapter of the same textbook contends that controversy in singing can occur because “terms which are used in vocal studios are so frequently void of any precise meaning” (48), leading to “deplorable confusion in the minds of the student body – and the teachers as well” (47). In the chapter “Terminology,” Shaw exposes the possible “false and misleading impressions” (107) that could be conveyed through the use of empirical terminology such as “placing or placement of the voice” (107), “relaxation,” “focusing” the voice (113), “spinning the tone” (114), “open and closed tones” (117), “attack of the glottis” (119), “support the tone,” and “sing on the breath” (122).

Another early twentieth-century voice teacher to express concern is Wilhelmina Baldwin who posits in her 1931 article for The Musician, “When You Talk About Singing – Another Plea for a Standardized Terminology So That All May Know Exactly What is Meant by the Use of Certain Expressions,” that a standardized terminology “would unify the voice teaching profession in an undreamed of manner,” and targets “inexact phrases” such as “placing the voice” and “attack of the tone.” The theme of problematic terminology use is also addressed by Leon Carson in his paper, “The Voice Teacher's Terminology – A Problem,” presented to the Music Teachers’ National Association Conference in Minneapolis in 1941. Carson states that “after centuries of singing and attempted advancement in the practice of instruction, vocal teachers have yet to establish a much-needed mutual basis of fundamental term-agreement” (301), and goes on to suggest that some of the terms in regular use are “useful and simple ... [and] could
consistently be preserved as a fundamental working unit” (306) while others are “misleading or too generalized to serve as a satisfying explanation to the singer ... [and] should be discarded and when necessary clarified equivalents substituted” (309). Just a few years later, John C. Wilcox, contends that voice teachers “should standardize [their] pedagogic vocabulary to facilitate mutual understanding and thus avoid controversies which stem from ambiguous terminology” (1) in his 1945 article, “Can We Reconcile Pedagogic Paradoxes?”

**Suggestions to Unify Terminology**

In 1948, the National Association of Teachers of Singing (NATS)-appointed Research Committee on Basic Fundamental Requirements for Teachers of Singing recommended a course in terminology should be created to equip “the prospective teacher with a basic vocabulary in physics, physiology, music, singing, and pedagogy” (Harris, 1). Just a few years later, Henry Hobart suggests “two ways which might lead to ultimate simplification and clarification of our vocal terminology” (9). The first is to determine which voice science findings have “value in studio practices” and the second is to allow the NATS Research Committee to “select a number of successful voice teachers ... and ask them to submit ... a concise statement as to what they consider the basic fundamentals of posture and breathing” (11). Hobart states that implementation of these two suggestions would “do much to ... bring standardization of voice studio terminology nearer to a practicable solution” (11). None of the above-mentioned recommendations were implemented by the voice pedagogy community.

In 1952, Victor Alexander Fields produced the first English-language glossary of singing terminology for the profession: *The Singer's Glossary: 450 Vocal Terms Defined*. Fields cites the following reasons for writing his text:

... the lack of a uniform professional language is responsible for much of the misleading and ambiguous literature that now exists in this field.

So-called differences of opinion as to the nature and practice of the art of singing often resolve themselves into differences of terminology.

... in order to transmit ideas based upon accurate impersonal observations, unprejudiced by opinion or subjective reactions, it is necessary to have access to a vocabulary that has been standardized as to derivation, meaning, and use (1).

In addition, Fields proposes a three-fold purpose for *The Singer's Glossary* in the Foreward:
First, it would be of immediate value to a teacher in making detailed explanations to pupils; second, it would provide useful tools of expression and communication for those who are investigating, demonstrating, or explaining some little known principle of acoustical or vocal science; finally, it would serve to crystallize the thinking of the layman and facilitate the comprehension and exchange of ideas relating to the singing voice among those hundreds of thousands of beginners, amateurs, professionals and teachers who are interested in the art of singing (1).

Reflecting the increasing influence of voice science on voice pedagogy, Fields refers more specifically to inter-disciplinary communication later in the Foreword:

... history and tradition often had to be brought up-to-date and correlated with modern science so that both layman and vocal scientist might learn to speak a common language with regard to those fundamental concepts that are now basic to the mastery of singing. The simplest possible definitions are given preference, consistent with scientific accuracy, so that those who are studying singing in vocal studios and conservatories may find them intelligible; so that professional operatic, radio, and concert singers, acoustical technicians, vocal psychologists, physicists, and physiologists may also find them acceptable” (2).

The Singer's Glossary proved not to be the final standardization of “derivation, meaning, and use” (1) of voice terminology that Fields intended it to be. In a speech to the 1953 NATS Convention, Wilmer T. Bartholomew addressed “the problems to be met by voice teachers in defining and harmonizing terms from such diverse fields as physics, anatomy, psychology, and aesthetics” (1) and proposed that a five-year research program (“undertaken most profitably only at a major university where the resources of a medical school, a music school, and other graduate schools were available”) (5) might provide “for the first time ... the basic groundwork on which to erect a terminology free from semantic confusion, and a voice pedagogy worthy of the name”(6). This research program was not implemented and voice researcher, Janwillem van den Berg joined with voice teacher William Vennard in 1959 to suggest a framework of approaches to take when “enough teachers of singing agree that the need for objective terminology is great enough for an organized effort to achieve it” (10). The three approaches are:

1. the gathering or creating of a “recording of graduated samples ... and the circulation of such recordings among the interested members of the profession”(10) so that there is a library of samples against which to match specific descriptive terminology,

2. “acoustic analysis of voice samples, until the harmonic structure of different recognizable voice productions is understood”(10), and
3. the use of X-Ray [primarily] to investigate “what changes in the adjustment of the vocal instrument are correlated with changes in tone quality”(10).

Having established their criteria, the authors go on to apply it to various examples of singing and “formulate a tentative vocabulary with some objective definitions”(15). They suggest that should their study be “continued with a wide variety of singers, the terminology with its criteria could be refined to a point of such usefulness as to be adopted by the profession”(15). The study was never expanded beyond the initial research and eight years later, Vennard published the fourth edition of his seminal textbook, *Singing – the Mechanism and the Technic* (1967). The textbook contains a comprehensive thirty-three page long Thesaurus that “takes the place of the usual glossary” (231) and contains “words in common usage ... expression[s] ... [and] a great many technical terms often used in books on the voice but not always defined” (231). Vennard references current voice research to validate terms wherever possible, gives credit “where an expression or a definition seems to belong to a particular author or to have originated with him,” and provides both definitions whenever “two contradictory uses of a word seem to have currency” (231). The breadth of Vennard's Thesaurus is impressive: over fifteen hundred terms and phrases organized into sections (such as: “general science,” “acoustics” (232), “physiology” (240), and “phonation” (248)) with an accompanying index linking terminology from the Thesaurus to paragraphs in the textbook. In fact, one voice pedagogue who reviewed the textbook called the Thesaurus “worth the price of the book” (Brown 1967, 6).

Just two years after the publication of Vennard's textbook and comprehensive Thesaurus, the American Academy of Teachers of Singing (AATS) published the booklet, *Terminology in the Field of Singing* ...

... to define with clarity the specific meaning and derivation of terms used in teaching singing, thus insuring a comprehensive, basic background of knowledge on the part of the teacher and, in turn, making it possible for the latter to project appropriate and flexible expressions of these terms to the student (AATS 1969, 5).

The authors divide approximately one hundred terms “limited to the field of Vocal Terminology” (5) into three categories with the goal of providing a “simple guide to terminological understanding”(5). They indicate terms to be avoided (such as mask and sounding board) and give succinct explanations.

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4 Described as “one of the most authoritative books ever written by a teacher of singing” (Brown 1967, 6) and “one of the first to clearly lay out the science in relation to vocal production” (Velarde 2013, 75), *Singing – the Mechanism and the Technic* was first published in 1949. The 1967 edition is the fourth (and final) edition.
of potentially misleading “Non-Scientific Terminology” (11) (such as **covered tone**, **focus**, and **middle voice**).

Despite the work of Fields, Vennard, and AATS to systematize singing voice terminology, voice pedagogues continued to call for more objective terminology and, in 1983 Cornelius L. Reid published *A Dictionary of Vocal Terminology: An Analysis* “in response to a pressing need to define and analyze those terms and expressions in common usage by the vocal profession from the early seventeenth century to the present, as well as those introduced into the lexicon by members of the various scientific disciplines concerned with the subject” (xix). Reflecting the ever-increasing inter-disciplinary collaboration between voice practitioners, two of the four objectives listed for Reid's dictionary focus specifically on inter-disciplinary communication:

1) foster a more perceptive insight into natural functioning and the principles which govern that process; 2) make those terms introduced by scientists more familiar and understandable to students, singers, and teachers of voice; 3) acquaint scientists with the significance and etymology of vocal terms from the perspective of the voice teacher; and 4) provide a basis upon which a standard terminology can evolve which will strike a balance between aesthetics and natural functioning (xxi).

In *A Dictionary of Vocal Terminology: An Analysis*, Reid assumed the “Herculean task of assembling, compiling, organizing, dissecting, defining, debating, supporting, refuting ... an enormous wellspring of terms drawn from a multitude of sources that have inundated the terrain since the birth of vocal pedagogy and scientific investigation of the vocal function” (Limonick 1984, 192) and yet, just two years after its publication, one of the world's leading voice scientists, Ingo Titze writes that “at almost every voice-related scientific meeting these days, a cry is being heard that we need standardization of terminology, diagnostic procedures, and methods of teaching and evaluation” (1985, 30).

In 1987, Kathleen Spillane Wilson undertook the task of standardizing one area of voice pedagogy terminology; that of breath support or breath management by means of a Delphi Study5 of selected American voice teachers who were NATS members. Wilson mailed a survey consisting of nine demographic questions and one open-ended question to 395 potential respondents. The open-ended question was a request to provide verbal and non-verbal directives “considered effective in teaching breath support to singers” (1989, 9). Ninety-three directives culled from over 300 responses to the open-ended question

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5 Delphi technique is a method of research that uses a series of questionnaires administered in multiple iterations to collect data from a panel of selected respondents about a subject within their domain of expertise. The aim of the Delphi method is to “achieve a convergence of opinion on a specific ... issue” (Hsu and Sandford 2007, 1).
were then presented randomly to the 134 subjects who responded to the initial survey with instructions to rank each directive from one to six according to its effectiveness. In a third survey, sent to the 102 voice teachers who responded to the second survey, participants were showed the group median response for each item and asked to re-rank each directive. The ninety-three directives were then ranked according to means obtained in the second and third survey, yielding the twenty directives considered by voice teachers to be the most effective when teaching “breath support or breath management” (10). The directive, “inhale deeply expanding the lower torso” was the “most frequently submitted directive of the original responses ... [thus it] might be assumed that this directive is used more often by singing teachers than any other directive” (16).

Late-Twentieth Century and Ongoing Calls for Both Intra- and Inter-Disciplinary Terminology Systematization

Despite Spillane Wilson's research and that of voice scientists and pedagogues⁶, calls for systematization of voice terminology, especially to facilitate inter-disciplinary communication, continue into the present-day. Richard Miller's highly influential textbook, *The Structure of Singing – System and Art in Vocal Technique* first published in 1986 (and re-issued in 1996), contends that “vocal pedagogy could probably take a major step forward if ... subjective terms were replaced with, or augmented by, more exact language” (58). In the Preface, Miller states that his personal research lead him to “the conviction that the best way to maintain “traditional” vocal technique is to use language which communicates concrete concepts regarding efficiency ... [and that] the transfer of information is possible only if a common language exists between writer and reader, teacher and student” (xv). In addition to glossaries for both non-musical and vocal terms, Miller specifically addresses register terminology and timbre terminology in separate sections of the textbook.

In a 1989 article, Titze concedes that while “attempts have been made to standardize terminology, ... often a simple definition is beyond our reach” (19). Further in the article, he explains the difficulties inherent in accurately and consistently describing the function of an organic and physical instrument, and concludes that “every effort should be made to define our personal usage of words ... [so] communications can become less frustrating and more productive” (20). In an article written that same year, Harm K. Schutte states that “much of the misunderstandings and conflicting points between voice physiolo-

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⁶ See Appendix 2: Samples of Research to Clarify Singing Terminology 1960-2010 for a comprehensive list of voice research that attempts to provide objective definitions for “specific physiological, acoustical, and aerodynamic aspects of the singing voice in the controlled environment of the voice research laboratory” (Stark 1999, xxii).
gists, ENT specialists, and singing teachers is caused by the use of terms which have a different meaning to different disciplines” (9).

In 1991, addressing not only the “so-called “subjective” terminology of the more traditional schools of voice teaching, but also the overly technical vocabulary and jargon of the scientific disciplines” (Yenne, 3), NATS President, Vernon Yenne, requests that his readers “try yet again to bridge the language gap that exists between the various disciplines dedicated to vocal function” (3). He posits that “such worthy efforts to relate to each other in a clear and concise vocal language [would result in] greater mutual respect and a more rapid advancement toward our common goals” (3).


... the language of the singing profession has, in the past, been creatively evolving but not always based on any physiological reality. Words to describe sound and its production have been passed on like a Chinese whisper: understood/misunderstood, passed on further, written down, reinterpreted, understood/misunderstood, and so on. With the scientific, anatomical, and multidisciplinary knowledge now at our disposal, I hope that the singing/teaching profession can agree to explore and use more common language so that our multidisciplinary colleagues can interact with us better in the future (xvii).

Written just two years after Chapman's textbook, Donald Gray Miller's textbook, *Resonance in Singing: Voice Building through Acoustic Feedback*, states that there are “three levels of objectivity in the correspondence between the behavior in singing voice production and the terms used to describe it” (iv). According to Miller, one set of terms represent those phenomena that can be measured (such as fundamental frequency, and lung pressure). Another set of terms such as cover, head voice, and belting are widely used and commonly accepted “in spite of the fact that there are no objectively intelligible definitions” for them (iv). The final set of terms described by Miller are the most complex and represent “concepts that imply more or less elaborate forms of integrated behavior: for example, “support” (or its alternative, “appoggio” …) mobilizes a host of muscles in intricate balance … [these terms] are too inclusive to submit to straightforward definition, and their complexity cannot be reduced by objective measurement” (iv). The aim of Miller's book “is to illuminate some of the important phenomena that are now … open to objective description, and to bring these phenomena within the reach of a commonly shared language” (v).
Despite the efforts of voice researchers to systematize voice terminology, the belief that “the larger world of singing remains within its tower of Babel, where intelligibility is at best approximate, and often entirely lacking” (D. Miller 2008, iv) continues to be widely held, and so the calls for terminology standardization are ongoing. One of the most recent is a 2014 AATS paper, “In Support of Fact-Based Voice Pedagogy and Terminology,” which addresses “some specific elements of the singing system in order to provide a clearer understanding of vocal function and encourage the standardization of terminology” (10). In the paper, terms are divided by function: cognition, breathing, phonation, resonation, registration, and articulation. Subheadings of these larger terms are thoroughly described and the conclusion reached that “fact-based pedagogy and terminology help to foster a common nomenclature and encourage technique that is consonant with the laws of nature” (13). The question remains however: given that these persistent calls for “the standardization of terminology” (AATS 2014, 10) are based on the perception of inconsistent terminology use and not on quantitative data, do they reflect the objective reality of current intra-disciplinary terminology use among voice teachers? Before beginning to answer this question, it is necessary to understand the development of each of the fields that treat or teach classical singers.
CHAPTER 2: BACKGROUND

Development of Fields of Voice Pedagogy, Speech-Language Pathology, and Laryngology

This section of the paper provides a brief history of the three main singing voice-related disciplines: voice pedagogy, speech-language pathology, and laryngology, and discusses the progression of inter-disciplinary collaboration and communication.

2.1 Voice Pedagogy

Early Development of Voice Training
Teaching singing began in Europe as early as the sixteenth century when the earliest known treatises containing references to teaching singing were written. Flemish composer and music teacher, Adrian Petit Coclico (1499-1562) published a treatise in 1552, and Neapolitan medical doctor, lutenist, and singer, Giovanni Camillo Maffei (1528-1573) published a treatise in 1562. Both treatises describe the optimal characteristics of the teacher of singing and address anatomical and physiological aspects of singing, from which the conclusion may be drawn that while there may not have been a formally recognized field of voice pedagogy, there were certainly voice teachers (MacClintock 1979). At the same time, a professional class of virtuoso singers and a repertoire of solo vocal music began to emerge (Stark 1999, xii). By the turn of the seventeenth century, treatises by prominent voice teachers (such as Giulio Caccini (1551-1618) whose Le Nuove Musiche was published in 1602) outlined each author's “method of singing, described current performance practices,” and included music for practice (Clements 2008, 5). Schools formed around important voice teachers and, as student singers were not permitted to practise alone, the course of study included daily lessons. Other important vocal trends that shaped the development of singing and of teaching singing in the seventeenth and eighteenth century are outlined by Clifton Ware in his 1998 voice pedagogy textbook, Basics of Vocal Pedagogy: The Foundations and Process of Singing: “(1) the continuing rise of the professional opera singer, especially the castrato; (2) the formation and spread of bel canto (beautiful singing), the Italian singing style founded on complete vocal control; (3) and the expert cultivation of vocal ornamentation (250).”

It should be noted that there is a recent addition to the field of communication science: vocology. Described as “a discipline that combines expertise from speech pathology, vocal music, theatre arts, and otolaryngology” (Titze and Verdolini Abbott 2012, 37), its first textbook, Vocology – The Science and Practice of Voice Habilitation was published in 2012. This research does not evaluate voice terminology usage among vocologists due to the comparative recentness of its emergence as a field and to the low number of dedicated practitioners in the field.
The Rise of Bel Canto

The eighteenth and early nineteenth centuries “witnessed the development of profound changes in singing” (Ware 1998, 250) including: “(1) the need for larger performing halls to accommodate increasingly larger and diverse audiences; (2) larger orchestras; (3) the gradual rise in concert pitch (as determined by the International Standard); and (4) the romantic ideal of expanded emotional expression” (Ware 1998, 251). Although the term bel canto originally referred to “the sixteenth and early seventeenth century practice of florid vocal ornamentation,” bel canto is more commonly associated with the vocal ideals (Clements 2008, 6) created by the profound changes outlined above, and its precepts influence voice practitioners to the current day.8

Arguably, none of the bel canto voice pedagogues was more influential than Spanish singer, author, and voice teacher, Manuel Garcia II9, described as

... one of those seminal historical figures whose career marked a watershed between the past and the future. An heir of the old Italian school of singing, at the same time he belonged to a generation of scientific minds who wished to look beyond the mere appearance of things to their underlying causes. In the process he developed theoretical ideas that were based on close empirical observation and leavened with uncanny intuition (Stark 1999, 3).

In the mid-1800s Garcia's observations10 based on viewing his own vocal folds using a laryngeal mirror11 helped to usher in an era of voice research that, coupled with research in other voice-related fields, would inform the field of voice pedagogy. R. Miller explains the effect this discovery had on the voice pedagogy field:

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9 Some of Garcia's (1805-1906) best-known voice pedagogue contemporaries include his student, Mathilde Marchesi (1821-1913), and the father-and-son duo, Francesco Lamperti (1811-1892) and Giovanni Battista Lamperti (1839-1910).
10 Garcia wrote several widely-read and influential voice training manuals, the best-known of which is Nouveau Traité de l'art du chant (New Treatise on the Art of Singing), written in 1856.
11 Alternately described as a “dental mirror” (Olaosun et al 2009, 29) or “not unlike a dentist's mirror” (Stark 1999, xxi), Garcia's translator Donald V. Paselke called the device a “laryngeal mirror” (Stark 1999, xxii). Many sources call Garcia's invention a laryngoscope, but this is not entirely accurate given that a) the first-known use of the term 'laryngoscope' is 1860, and b) Garcia's instrument is now commonly called a 'mirror laryngoscope' to differentiate it from the flexible fiber optic laryngoscope (Olaosun et al 2009, 30).
Before the second quarter of the century, many books on singing were written either from the subjective experience of the singing artist or from the viewpoint of the scientifically minded person, who explained the basic functions of the vocal mechanism. Beginning in the 1920s, authors applied the new findings of medical science, phonetics, speech research, and speech therapy to singing, in the hope of revolutionizing vocal technique. Since the 1940s, much of what has been written for singers and teachers offers explanations of the physical aspects of singing, designed to support precepts that have evolved from performance experience (1986, xx).

Development of Voice Pedagogy in North America

As discussed previously in this paper, one of the best-known of these mid-twentieth century textbooks is William Vennard's *Singing – the Mechanism and the Technic*. In it, Vennard emphasizes the importance of quantitative research to the field of voice pedagogy: “there are those teachers who feel that applying science to an art is quackery, but I believe that our only safeguard against the charlatan is general knowledge of the most accurate information available” (1967, iii). Another mid-century North American voice pedagogue who made considerable contributions to the field, is Douglas Stanley. In his three influential voice pedagogy textbooks, *The Science of Voice: An Application of the Laws of Acoustics, Anatomy, Physiology, and Psychology to the Problems of Vocal Technique* (1929); *The Voice: Its Production and Reproduction* (1933); and *Your Voice: Applied Science of Vocal Art, Singing, and Speaking* (1945), Stanley attempted to apply “updated scientific findings to vocal pedagogy” (Sell 2005, 36). A contemporary of both Stanley and Vennard, D. Ralph Appelman, may be best known for his studies on vowel shapes. Richard Miller describes Appelman's 1967 textbook, *The Science of Vocal Pedagogy: Theory and Application* as “ground-breaking” in that it attempts “to unite vocal pedagogy and scientific principles” (2006c, 213). A decade after Vennard, Berton Coffin unites “his knowledge of the phonetic properties of the singing voice with scholarly interest in historic vocalism” (R. Miller 2006c, 213), in his 1976 textbook *The Sounds of Singing: Vocal Techniques with Vowel Pitch Charts*. Released just a few years after Coffin's text, James C. McKinney's well-regarded 1982 textbook, *The Diagnosis and Correction of Vocal Faults: A Manual for Teachers of Singing and for Choir Directors* was revised and expanded in 1994 “with the intention of aiding voice instructors in not only identifying a vocal fault, but in correctly classifying [its] causality” (Velarde 2013, 33). Published in that same year, the second edition of Barbara Doscher's *The Functional Unity of the Singing Voice* uses current voice research to outline “the anatomy and physiology of the breathing and phonatory mechanisms and

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12 See R. Miller 2006 or Sel 2005 for a comprehensive overview of the pre-1900 history of voice pedagogy outside North America, and Velarde 2013 for an extensive treatment of the effects of scientific study on voice pedagogy in North America at the end of the twentieth century.
the acoustical laws necessary for an understanding of resonation, with the intention of establishing their functional unity” (Doscher 1994, ix). Finally, toward the end of the twentieth century, Oren Brown, “an indefatigable champion of scientifically based education for voice teachers” (Sataloff 2004, 431) released, Discover Your Voice: How to Develop Healthy Voice Habits, which synthesizes his “personal practices, thoughts, and techniques” (Sataloff 1996, vii) established over an extraordinary six-decades-long career.

Development of Professional Associations

In addition to the aforementioned books, at the turn of the century voice teachers began to form associations to share knowledge, develop codes of practice, and strengthen collaborative efforts. The New York Singing Teachers Association (NYSTA) for example, was founded in 1906. Currently, it is open to voice teachers and voice professionals world-wide, and offers an online curriculum devoted to increasing knowledge of voice pedagogy (Velarde 2013, 77). The American Academy of Teachers of Singing (AATS), founded in 1922, boasted a mailing list of 15,000 by 1924 when it published a Code of Ethics and Practice to “improve the ethical principles and practice of the [voice teaching] profession” (AATS 1924, 16). Currently, AATS contributes to the field of voice pedagogy primarily through the publication of position papers that “offer professional advice and guidance to those interested in singing, the teaching of singing, the business of singing, and the science of singing” (AATS 2015). The “largest professional association of teachers of singing in the world” (NATS 2015) is the National Association of Teachers of Singing (NATS), which was founded in 1940 with the following objectives:

1. To establish and maintain the highest standards of ethical principles and practices in the profession of teaching singing and vocal art.
2. To establish and maintain the highest possible standards of competence in said teaching profession; to encourage and conduct research; to disseminate information to the profession at large and to stimulate effective cooperation among vocal teachers for their mutual welfare, and advancement (Taylor 1958, 3).

NATS's mission statement has changed very little in the seven decades since it began and it now serves its 7000 members in nearly thirty countries through workshops, intern programs, master classes, conferences, student auditions, and several publications, including the Journal of Singing (NATS 2015)13.

Soon after the development of associations such as NATS, the lack of an academic training system for voice teachers began to be formally noted. A 1948 preliminary report submitted by the NATS Com-

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13 See Taylor 1958 and 1964 for a thorough history of the founding of NATS, and of its early years.
mittee on Basic Fundamental Requirements for Teachers of Singing outlines the need “to develop a comprehensive curriculum for the upcoming generation of teachers of singing to improve their knowledge and training” (Harris, 1) and a 1950 supplementary report from the Advisory Committee on Vocal Education outlines “proposed curriculum for the training of teachers of singing in universities and schools of music” (Harris, 7). Some undergraduate voice pedagogy courses were offered in North American tertiary institutions by the mid-twentieth century, yet contributors to *The NATS Bulletin* still noted the difficulty of finding institutions offering training in “anatomy and physiology of the vocal tract; of physics and acoustics of musical sound, of psychology, of vocal pedagogy and vocal repertory” (Fulton 1951, 9). More recently, The College Music Society's *Directory of Music Faculties in Colleges and Universities 2013-2014* shows that the majority of post-secondary schools in North America that offer an undergraduate degree in vocal study, also offer some form of voice pedagogy course. Less than a third of those universities offer a masters degree in voice pedagogy and (in the United States) fewer than ten graduate programs offer doctoral degrees in voice pedagogy (Meyer and Edwards 2014, 442). While graduate degrees that specialize in voice pedagogy are now offered by many post-secondary institutions in North America, they do not yet issue formal accreditation. One step toward industry certification was taken by Canada's Royal Conservatory of Music (RCM) in 2015. They introduced a system of accreditation for Canadian music teachers whereby “established teachers of all instruments, voice, and theory whose credentials demonstrate pedagogy training, playing proficiency, and teaching experience using the RCM curriculum” may be certified. (Royal Conservatory of Music 2015).
2.2 Speech-Language Pathology

The Roots of Speech-Language Pathology
The foundation for “a systematic study and care of speech, language, and voice disorders” was laid in Europe during the second half of the nineteenth century with the advent of the laryngeal mirror, the “cerebral localization of language functions,” and the publication in 1877 of Adolph Kussmaul's (1822-1902) “remarkably comprehensive textbook on disorders of speech and language” (Fritzell 1980, 85). Influenced by Kussmaul's work, German physician Hermann Gutzmann argued for the establishment of a separate academic stream for the medical specialty of speech, language, and voice disorders, calling the new specialty *Stimm- und Sprachheilkunde* or “voice and speech pathology.” The term 'phoniatrics' was first used by Gutzmann's students, Miloslav Seeman and Hugo Stern and introduced to the public by Stern in 1919 (Vrtička 2009, 311) at a meeting of the Austrian Otologic Association held in Vienna. Also working in Vienna at that time, physician Emil Froeschels “proposed and used the term 'logopädie' for the same purpose and in the same sense” as 'phoniatrics' (Fritzell 1980, 85). Five years later in 1924, Froeschels founded The International Association of Logopedics and Phoniatrics and the term 'phoniatrics' crystallized “as the official name of medical communicology” (Vrtička 2009, 311) and 'logopedics' came to signify “the pedagogical, psychological, and therapeutic aspects of the same field” (Fritzell 1980, 87).

From Speech Communication to Speech Pathology
As speech science was developing out of medical fields in Europe, in North America it was emerging from traditional precepts of rhetoric and public speaking (Cohen 1994, 28), and could be studied in English departments at tertiary institutions. In the early 1900s, most of the “training and rehabilitation of patients with disorders of the vocal system were performed by specialists in elocution, interpretation, and public speaking” (von Leden 1990, 99). However, around 1915, academics began to argue that the field was scientific (rather than humanistic) (Cohen 1994, 49) and thus, a different discipline to that of public speaking (Woolbert 1916). Unlike voice pedagogy, which did not see the introduction of in-field graduate degrees until the latter quarter of the twentieth century, the first North American graduate degree in the developing discipline of speech-language pathology was introduced at the University of Wisconsin in 1914. It was a Master's Degree in Public Speaking that was “divided into two options, one of which was destined to become the main body of Speech Communication; the other of which eventually developed into Communication Disorders” (Cohen 1994, 53) and was organized by Smiley
Blanton (1882-1966). In the early 1920s, a “notable center for training in speech pathology” was established by Carl Emil Seashore at the University of Iowa. It produced many of the American academics, such as Samuel Orton (1879-1948: *Reading, Writing, and Speech Problems in Children: A Presentation of Certain Types of Disorders in the Development of the Language Faculty*), John Fletcher (1873-1944: *The Problem of Stuttering: A Diagnosis and a Plan of Treatment*), and Charles Van Riper (1905-1994: *Speech Correction: Principles and Methods*) who would go on to write “influential textbooks that served to establish the field of speech pathology for the next generation of clinicians, both in the United States and abroad” (Duchan 2012b, 390). In 1925, twenty-five speech correctionists\(^\text{14}\) formed the American Academy of Speech Correction (AASC)\(^\text{15}\) whose membership was initially by invitation only (catering “to a few academics – ones who had a publishing record” (Duchan 2012b, 389)) but opened to practicing clinicians in 1942. This trajectory closely parallels that of the American Academy of Teachers of Singing (founded in 1922) and of the National Association of Teachers of Singing (founded in 1940). Like AATS and NATS, the AASC did not consider itself a certifying body; its primary goal was to “design diagnostic tools, concepts, and normative data for creating a more scientific base for research and practice in the field” (Duchan 2002). Eventually AASC would become the American Speech-Language-Hearing Association (ASHA): “the national professional, scientific, and credentialing association for 182,000 members and affiliates who are audiologists; speech-language pathologists; speech, language, and hearing scientists; audiology and speech-language pathology support personnel; and students” (ASHA 2015).

European speech doctors such as phoniatrist\(^\text{16}\) Emil Froeschels and otolaryngologist Friedrich S. Brodnitz emigrated to the United States of America to escape Nazi persecution in the years leading to World War 2 and provided a “complementary medical specialization” (Cooper and von Leden 1996, 17) to the

\(^{14}\) Early North American practitioners called themselves 'speech correctionists.' Of the twenty-five charter members, thirteen were affiliated with university departments (speech communication, speech correction, psychology, and English), three were physicians (otolaryngology, and psychiatry), nine were affiliated with school speech programs, and one was a graduate student (Duchan 2002).

\(^{15}\) A second group of speech correctionists, comprised of speech teachers from departments of English formed the National Association of Academic Teachers of Public Speaking in 1914. Now called the National Communication Association, this group seeks to advance “communication as the discipline that studies all forms, modes, media, and consequences of communication through humanistic, social scientific and aesthetic inquiry” (National Communication Association 2015).

\(^{16}\) ‘Phoniatrists’ are “specialists in European countries who are trained as physicians but not as surgeons” (Benninger and Murry 2008, 5) and ‘phoniatrics’ is defined as the “medical field for communication disorders, concerned with functions and diseases of voice, speech, language, hearing (especially in so far as hearing impairment has its effects on any of the areas previously mentioned), and swallowing” (Union of the European Phoniatricians 2010, 4). The International Association of Logopedics and Phoniatrics is the primary phoniatric association; its peer-reviewed journal, the *Folia Phoniatrica et Logopaedica*, was founded in 1947 by Richard Luchsinger (1900-1993), Seeman (1892-1975), and Jean Tarneaud (1888-1972). Unlike speech-language pathologists, phoniatrists are self-declared.
work already being done there by speech correctionists. By the 1940s, research and collaboration had led to “the accumulation of developmental norms and of standardized ways to test, measure, and evaluate various aspects of performance associated with speech and language development and disorders” (Duchan 2012b, 391) and laboratories and speech clinics began to populate university speech and psychology departments (Van Riper 1989, 72).

Influential contributors to the field of speech-language pathology include American voice researcher G. Paul Moore, an “innovator and pioneer in voice science and rehabilitation” who was “author and editor of many professional publications, books, films, and videos,” and “one of the first ambassadors for multidisciplinary collaboration between speech-language pathology and otolaryngology” (Brown et al 1997, 257). Finnish otolaryngologist and phoniatriist Aatto Sonninen's “fundamental studies on vocal fold length contributed essentially to the reconfirmation of the aerodynamic theory of voice production” (Wendler 2009, 1). In Holland, Janwillem van den Berg's research helped to affirm the theory of two primary voice registers (Stark 1999, 82) and the myoelastic-aerodynamic theory of voice production (van den Berg 1958, 227).

Development of Certification

In 1952, ASHA began a certification program for speech-language pathologists (a separate set of membership requirements was created for audiology (Lubinski and Hudson 2012, 60)) and in 2005, a requirement for mandatory professional development for maintenance of the certificate in speech-language pathology came into effect17 (ASHA 2015) such that present-day speech-language pathologists are “certified, licensed health care professional[s], ordinarily with either a master's degree (MA or MS) or doctorate (PhD)” (Sataloff 2006b, 279). Canada has similar requirements: speech-language pathologists are regulated provincially and represented nationally by Speech-Language and Audiology Canada (SAC), which produces the Canadian Journal of Speech-Language Pathology and Audiology (SAC 2015).

Voice specialty is not included in the professional training curriculum of speech-language pathologists (Wilder 2006, 226) and although ASHA and SAC have a “special-interest division in voice ... it is important to note that membership in any special division is not required. Nor does membership in a special division imply a certification status in that specialty ... any SLP could call himself a “voice specialist”,” (Wicklund 2010, 70) as there are currently no specialty certification requirements.

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17 See ASHA 2015 for a complete outline of requirements from inception of certification.
2.3 Laryngology

Medical History of Voice

Medical science is traced to the fifth century BC when Hippocrates (c. 460-375 BC), the “father of medicine” (Smith 2014) became “the first to separate medicine from philosophy, to observe and record the natural history of diseases and to transform medicine from a superstitious priestcraft into a logical science” (Guthrie 1940, 474). Hippocrates also “provided some of the earliest medical speculation on the workings of the voice” (Sataloff 1991, 2), observing that “voice quality, whether it be clear or hoarse, is one means by which a physical diagnosis may be reached” (Stemple et al 2000, 5). In the late fourth century BC, Aristotle was the first “writer to refer to the larynx as the organ from which the voice emanates” (Stemple et al 2000, 5) and five centuries later, Claudius Galenus (c. 131-201 AD), “described the larynx, recognized the importance of the brain controlling phonation, and, for the first time, distinguished between speech and voice” (Sataloff 1991, 2). Hailed as the “founder of laryngology and voice science” (Sataloff 1991, 2), Galenus “provided the first genuine portrayal of the structure and function of the larynx” (Cooper and von Leden 1996, 3) in his hundreds of treatises; a portrayal that remained unchallenged for more than fifteen centuries.

Major movement forward in medicine was hampered during the medieval age in large part due to religious concerns surrounding “anatomical dissection and surgical operations” (Folz et al 2008, 3) whereas the renaissance was characterized by advances in medicine\(^\text{18}\) made possible “by systematic dissection studies of normal and pathologic anatomy” (Folz et al 2008, 2). These advances are seen in the writings of men such as Leonardo da Vinci (1452-1519), whose study of hydraulics likely influenced his understanding of the aerodynamic aspects of voice production, and who was the first to record studying voice production with an excised larynx (Cooper and von Leden 1996, 5). Considered the “creator of modern anatomy” (Cooper and von Leden 1996, 6), Flemish physician and scientist, Andreas Vesalius's (1514-1564) writings “clarified the laryngeal anatomy, ... presented the function of the epiglottis,” and corrected “many of the age-old errors of Galen [AKA Galenus]” (Stemple et al 2000, 8). In Rome, physician Bartolomeus Eustachius (c. 1510-1574) was one of the first to “accurately describe the structure, course, and relations of the eustachian tube (Stemple et al 2000, 8), and included anatomical illustrations of the larynx in his Anatomical Figures (Cooper and von Leden 1996, 6). Clinician and

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18 Some notable pre-Renaissance contributions to voice medicine came from Arabic scholars, especially Ibn Sina (Avicenna) of Bokhara (980-1037). See Cooper and von Leden 1996 for further discussion.
anatomist, Gabriele Falloppius (1523-1562) also included “extensive material on the muscles of the head and neck, including the larynx” in his text, *Anatomical Observations* (Cooper and von Leden 1996, 6), and was the first to use the name 'tympanum' (Guthrie 1940, 478). Hieronymus Fabricius (c.1535-1619, also known as Fabricus Ab Aquapendente), wrote three books about the larynx (Sataloff 1991, 3), one of which, *De Visione, Voce, et Auditu* (On Vision, Voice, and Hearing), “provides an extensive treatment of the larynx on the basis of comparative anatomy” (Cooper and von Leden 1996, 7).

**Early Development of Laryngology**

In the seventeenth to nineteenth centuries, “discoveries of anatomy, physiology, and pathology of the laryngeal mechanism continued” (Stemple et al 2000, 9) in Europe. Italian anatomist Giovanni Battista Morgagni (1682-1796) is credited as the “founder of pathological anatomy,” and investigated “the ventricular folds and laryngeal ventricles” (Cooper and von Leden 1996, 7). He was the first to relate dysphonia to abnormalities in the larynx (Sataloff 1991, 3). In France, anatomist Antoine Ferrein (1693-1796) described the vocal folds as “both a string and a wind instrument” (Cooper and von Leden 1996, 7) and coined the term 'vocal cords,' following extensive studies on excised human and animal larynges. Sometime later, Parisian physiologist, François Magendie (1783-1855) clarified the purpose of the epiglottis (Stemple et al 2000, 9) and observed the effects of laryngeal nerve activation (Cooper and von Leden 1996, 10). In Britain, Robert Willis (1800-1875) described the functions of the laryngeal cartilages and muscles in phonation (Stemple et al 2000, 9), while Frederick Ryland “clearly described the diseases of the larynx as they were understood before the use of the laryngeal mirror” (Stemple et al 2000, 9) in his 1838 *A Treatise on the Disease and Injuries of the Larynx and Trachea*.

**Contemporary Development of Laryngology**

Garcia's use of the laryngeal mirror in 1854 is widely recognized as the beginning of arts medicine (Sataloff 1991, 3) and of the modern era of laryngology (Stemple et al 2000, 9), and physician and author Ernst Krakowizer (1822-1875) who emigrated from Austria in 1848 is generally credited with introducing the laryngoscope to the United States by 1858 (In Memory of Ernst Krakowizer 1875). The laryngoscope was improved upon by the addition of artificial light in 1861 (Stemple et al 2000, 10-11) and stroboscopy, direct laryngoscopy, and ultra-high speed photography all developed over the six decades from 1878 to 1937. In the early part of that time period, indirect laryngoscopy advanced with the development of surgical instruments that allowed surgeons to “cut, scarify, cauterize and remove laryn-
geal tissue with indirect visualization” (Jahn and Blitzer 1996, 183) and the specialty of otolaryngology began to develop from a combination of “otology, which was basically practiced by surgeons, and laryngology, whose practitioners were doctors of internal medicine, or “physicians”” (Folz et al 2008, 7).

In 1896 (about a decade earlier than similar movements in voice pedagogy and three decades earlier than in speech-language pathology), otolaryngologist Hal Foster invited 500 physicians from the Southern and Western states to a meeting to organize an “Ophthalmological, Otological, Laryngological Association” (Papel and Goldstein 1996, 1), which would eventually become the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS). One of the society's first mandates was to form committees dedicated to improving graduate education and these committees led to the creation of the first medical specialty boards: ophthalmology in 1913 and otolaryngology in 1924.

Although voice research continued over the next few decades with the work of prominent mid-century otolaryngologists such as Friedrich Brodnitz and Wilbur James Gould, laryngology as an otolaryngology sub-specialization did not develop until the early 1980s. The American Laryngological Association (ALA) states that since specialized post-residency training began in the United States in 1992, there are currently more than twenty laryngology fellowships available (ALA 2015). These fellowships, however, are largely unavailable to Canadian graduates and the Canadian Society of Otolaryngology-Head & Neck Surgery advertises only one full-time laryngology fellowship in Canada (ENT Canada 2015). In addition, even within a laryngology fellowship, care of the professional voice is only one of five of the recommended areas of emphases: 1. Neurolaryngology, 2. Professional voice care, 3. Neoplastic and non-neoplastic diseases of the larynx, 4. Swallowing disorders, and 5. Disorders of the upper airway (ALA 2015). Given the relative scarcity of laryngology fellowships and the scope of subject-matter within the fellowships, it is not surprising that most physicians specializing in laryngology today did not receive laryngology fellowship training (Sataloff 2006b, 278), and even fewer received specific training in care of the singing voice.

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20 The creation of these two specialty boards in turn contributed to the “creation of the American Board of Medical Specialties in the 1930s” (Papel and Goldstein 1996, 2).

21 Internal restructuring occurred in 1974 when the Academy separated into the American Academy of Otolaryngology and the American Academy of Ophthalmology. 1981 saw further restructuring when the American Council of Otolaryngology merged with the AAO-HNS (then known as the American Academy of Otolaryngology) (Papel and Goldstein 1996, 2).

22 That fellowship is with Dr. J. Anderson at St. Michael's Hospital / University of Toronto.
2.4 Inter-Disciplinary Collaboration and Communication

Until the mid-twentieth century inter-disciplinary voice collaboration in North America was largely limited to voice pedagogues (such as Douglas Stanley, William Vennard, Clifton Ware, and Richard Miller) consulting and collaborating with medical voice researchers to write their textbooks. In 1969, conscious that “science knew little about the human voice, and medical care was woefully inadequate ... [and realizing] that these problems could be solved only through interdisciplinary collaboration among professionals,” Dr. Wilbur James Gould founded The Voice Foundation and through it, organized the first major international symposium on care of the professional voice in New York in 1970 (Sataloff 1994, 97). Since that time, “laryngologists, voice scientists, physicists, computer scientists, speech-language pathologists, singing teachers, acting teachers, voice coaches, singers, actors, and other professionals have met at The Voice Foundation's week-long annual Symposium on Care of the Professional Voice ... [and] the resultant interdisciplinary understanding and cooperation have produced great advances and even greater promise for future understanding” (Sataloff 1991, 3-4). The Voice Foundation's 45th Annual Care of the Professional Voice Symposium was held in Philadelphia in 2015 and featured “advanced programming presented by leading professionals in the voice care field ... [attended by] voice professionals from all over the world ... [who gathered to] network with colleagues, see product demonstrations, learn cutting-edge techniques, and earn continuing education credits” (Voice Foundation, 2015).

In addition to fostering inter-disciplinary collaboration and providing forums for the distribution of research findings, The Voice Foundation gave impetus to inter-disciplinary journals (the most prominent of which is the internationally distributed, peer-reviewed Journal of Voice (Sataloff 1991, 4)) and inspired the creation of organizations dedicated to the care of the voice throughout the world. The Canadian Voice Care Foundation (CVCF), founded in 1989 is one of these organizations and, like The Voice Foundation, it hosts international voice symposia, workshops and masterclasses, and distributes a bi-annual newsletter entitled Voice Talk (CVCF 2014).

The inter-disciplinary teams of voice professionals now commonly found at voice clinics in major centres throughout North America began in the mid-twentieth century when Hans von Leden and G. Paul Moore “established the first formal, academically based, interdisciplinary voice clinic in the United States at Northwestern University in 1954” (Velarde 2013, 37). In 1981, Robert Sataloff included both
a voice teacher and speech-language pathologist in his medical practice. In that same year, Sataloff authored one of the first articles articulating the science and art of clinical care of professional voice users and emphasizing the close cooperation required “among laryngologist, speech pathologist and voice teacher” for optimal treatment of professional singers (251). Sataloff shows the progression of inter-disciplinary care in his 1991 textbook, *Professional Voice: The Science and Art of Clinical Care*: “ideally, the clinical voice laboratory team should include a laryngologist, speech-language pathologist, singing teacher, nurse, and voice scientist” (102). Just such a clinic opened that same year in Nashville, TN with a voice care team consisting of four otolaryngologists (including the center founder, Robert Ossoff, MD, DMD), a voice researcher and singing voice specialist (Thomas Cleveland, PhD), six speech-language pathologists (three of whom specialize in the singing voice), and two nurses. The Vanderbilt Voice Center at Vanderbilt University is the largest of its kind in the world (Vanderbilt Voice Center 2015) and was the first to be established in an academic setting. The Vanderbilt Voice Center became a model for other voice care centers, such as Toronto's The Voice Clinic and the ENT Clinic at St. Michael's Hospital, both of which have academic associations with University of Toronto departments, including voice pedagogy at the University of Toronto's Faculty of Music.

While voice pedagogues have noted a lack of common intra-disciplinary terminology for nearly a century, increased collaboration between voice teachers and voice specialists in the medical and clinical fields places higher priority on developing a common terminology that can be used both intra-disciplinarily and inter-disciplinarily. Voice practitioners deplore the “gap that has persisted between the artistic and scientific communities” (McCoy 2008, i) and call attention to the work that still needs to be accomplished to close that gap. Is it possible that one of the outcomes of the increased and ongoing inter-disciplinary collaboration and communication is that there is a smaller gap than is currently assumed? Using survey methodology, this research assesses current levels of inter-disciplinary agreement about breathing for singing terminology and provides quantitative data to show whether contemporary calls for a standardized terminology are warranted.
CHAPTER 3: METHODOLOGY

3.1 Introduction

This research focuses on the terminology used to describe one of the most important topics in classical singing: breathing for singing. However, this is a topic about which voice pedagogues maintain there is ambiguity. In his widely-respected voice pedagogy text, *The Diagnosis and Correction of Vocal Faults: A Manual for Teachers of Singing and for Choir Directors*, James McKinney notes:

... there is little agreement among teachers concerning the names of different breathing methods. For example, there is no widely-accepted name for the method of breathing previously advocated in the section on breathing for singing, even though it is in common use; it has been referred to as diaphragmatic, costal, pancostal, intercostal, rib, belly, and diaphragmatic-intercostal breathing by various authors, and this is not an exhaustive list (1994, 56)!

**Breath support**, is an often-used though frequently disputed breathing for singing term. It has advocates in world-famous opera singers such as soprano Birgit Nilsson (1918-2005) who compares **support** to the roots of a flower which must be “as low as possible” in order to be effective (Hines 2006, 197). Tenor Placido Domingo (b. 1941) claims that “if a note is properly supported,” everything in the abdomen from the ribs down will be so taut that a singer could be hit in the stomach while singing and “it wouldn't change the tone” (Hines 2006, 104). Contrarily, prominent voice specialists such as laryngologist Friedrich Brodnitz and internationally respected voice teacher Marlena Kleinman Malas maintain that the use of the term **breath support** is detrimental to singing technique and vocal health. In a master class observed by the researcher, Malas stated that she does not use the phrase **breath support** because it contributes to unwanted tension in the singing process (Malas 2012). Expressing similar concerns, Brodnitz warns that “the term support suggests that the voice is a kind of physical object which has to be lifted from below by a supporting force [and that] ... the constant use of this term by singing teachers induces in many of their students the abdominal muscular rigidity that is one source of hyperfunctional voice disorders” (1967, 327). Does this example of inconsistent term use accurately represent current practice among voice practitioners? Using survey methodology, the researcher collected quantitative data about breathing terminology use among voice teachers and among voice specialists in the fields of speech-language pathology and laryngology and assessed current levels of intra- and inter-disciplinary agreement about term use and understanding.
Online surveys are useful and effective research tools in part because they provide high quality data for relatively low cost while offering robust and varied design options (Barrios et al 2011; Fan and Yan 2010; Fricker and Schonlau 2002; Kaplowitz et al 2004; LaRose and Tsai 2014; and Morris et al 2004). Further, as outlined by Joel R. Evans and Anil Mathur in “The Value of Online Surveys,” (2005) this research tool offers flexibility, speed, convenience, ease of data entry and analysis, control of answer order, and required completion of answers and 'go to' capabilities within the survey format. Studies show that online surveys can facilitate data-gathering “when it is impractical or financially unfeasible to access certain populations” (Andrews et al 2003, 186). In the case of this study, the online survey proved to be the ideal research tool to recruit the over five-hundred voice practitioners from three disciplines throughout North America who responded to the survey. One final benefit of online surveys is that the standardized questions and answer choices garner uniform responses that are easily collated and analyzed using software such as IBM SPSS Statistics Software.

While survey methodology offers the most efficient means of collecting quantitative data about the common usage of breathing terminology, it does have potential weaknesses, as outlined by researchers such as Evans and Mathur. The researcher mitigated the possibility of the sample population perceiving the survey as junk mail (and not responding, leading to lower response rates) by sending the survey either from recognized and respected associations (such as the College Music Society) directly to their membership, or from the researcher's institutional email address (shannon.coates@utoronto.ca), and by requesting that practitioners forward the Inter-Disciplinary Survey on Common Usage of Breathing Terminology to their colleagues. Although there is potential for sample population skewing due to uneven access to the Internet (Evans and Mathur 2005, Fan and Yan 2010, Orr 2005), current research by the International Telecommunications Union, indicates that as of 2012, eighty-one percent of Americans and eighty-seven percent of Canadians use the Internet. Additionally, as the intended sample population of this survey are all professionals, it is highly improbable that potential participants would not have access to the Internet. Potential problems due to confusing survey construction and/or unclear answering instructions (Evans and Mathur 2005, Orr 2005) were mitigated through consultation with Dr. Olesya Falenchuk and Dr. Monique Herbert, survey data specialists from the University of Toronto's Ontario Institute for Studies in Education, and through implementation of several pilot surveys with various testing groups.

To mitigate low response rates due to potential concerns about privacy and data security (Evans and Mathur 2005; Morris, Fenton, and Mercer 2004; Orr 2005), the researcher used survey software devel-
oped by the University of Toronto's Ontario Institute for Studies in Education that ensures responses are not linked to emails. Although participants were required to submit an email address prior to taking the Inter-Disciplinary Survey on Common Usage of Breathing Terminology, this was a precautionary measure that prohibited multiple responses from one participant. The email address provided by participants was not linked to responses and was removed from the system once the survey was closed. Demographic information was limited to discipline, and state/province and country of practice or studio, thereby preserving the identity of respondents. The University of Toronto's Ethics Board deemed the Inter-Disciplinary Survey on Common Usage of Breathing Terminology very low risk to participants, which was clearly stated in the survey introduction.
3.2 Sample and Distribution

The intended sample population of the Inter-Disciplinary Survey on Common Usage of Breathing Terminology was voice teachers who teach classical singers in North America, and speech-language pathologists and laryngologists who specialize in the treatment of classical singers in North America. To distribute to the largest sample possible, the survey was sent directly (via email) to approximately 7,500 voice teachers, 500 speech-language pathologists, and 1,250 laryngologists, without regard for whether they specialized in treating or teaching classical singers.

The Inter-Disciplinary Survey on Common Usage of Breathing Terminology was distributed in waves beginning 1 February, 2014 and ending 1 April, 2014 using both targeted distribution and snowball sampling methodologies. Targeted distribution methodology is a research subject recruitment method whereby the survey is sent directly to appropriate sample population members. Snowball sampling is a research subject recruitment method primarily used in social science research wherein initial sample populations are asked to provide contact information of members of their families, social groups, or business circles to which the survey might then be distributed directly. Originally developed to provide a larger sample of a specific kind of population, or to facilitate the study of interpersonal relationships (Handcock and Gile 2011), in recent decades, snowball sampling methodology has been successfully adapted for recruiting hard-to-reach, hidden, marginalized, or ethically sensitive populations, such as opiate addicts or populations in conflict environments (Cohen and Arieli 2011, Eland-Goossensen et al 1997, Gyarmathy et al 2014, Kahan and Al-Tamimi 2009, Sadler et al 2010, Sheu et al 2009, Vervaeke et al 2007). Current technology allows for further methodology adaptation in that sample populations may forward online surveys to their colleagues and social networks via email or social networking sites. Targeted sample population members were requested to forward the Inter-Disciplinary Survey on Common Usage of Breathing Terminology to their colleagues who fit the sample population parameters, and many indicated that they would do so.

Targeted distribution occurred in the following specific ways:

1. **Targeted Distribution - Association Memberships:** The researcher contacted professional associations from each of the three disciplines that treat or teach singers and requested that the Inter-Disciplinary Survey on Common Usage of Breathing Terminology be distributed to their members via
direct email and by posting it on their websites\textsuperscript{23}. Not all voice teachers who belong to professional associations teach classical singers, and relatively few speech-language pathologists and laryngologists specialize in treating the classical singing voice, so this distribution method covered a larger population than the sample population. One distribution challenge proved to be isolating the target sample population within the medical field: a subset of laryngologists (which is already a subset of otolaryngologists) who specialize in professional voice users. An even greater challenge was posed by the restrictive policies held by the laryngology associations in that they would not send research surveys to their members. Nevertheless, the distribution numbers were quite large overall: approximately 7,500 voice teachers, 500 speech-language pathologists, and 1,250 laryngologists. There is membership overlap among professional voice associations\textsuperscript{24}, and some of the target sample population may have received the Inter-Disciplinary Survey on Common Usage of Breathing Terminology from several sources.

Emails were sent to members of the following organizations who list voice teachers among their members:

- College Music Society: direct email with cover letter and survey link to over 6,000 members
- National Association of Teachers of Singing, Ontario Chapter: survey introduction and link emailed as part of newsletter to over 100 members (and posted on association website: natsontario.org)
- National Association of Teachers of Singing: survey introduction and link emailed as part of newsletter to over 7,500 members (and posted on association website: nats.org)

Emails were sent to members from the following speech-language pathology associations:

- American Speech and Hearing Association Voice Listserv: direct email with cover letter and survey link (with request that speech-language pathologists who work with classical singers respond) to over 500 contacts

\textsuperscript{23} See Appendix 3: Professional Associations Contacted and Responses

\textsuperscript{24} The researcher, for example, is a member of four professional associations related to teaching singing: The Voice Foundation, the College Music Society, the National Association of Teachers of Singing (and its Ontario Chapter), and the Ontario Registered Music Teachers Association.
• Canadian Voice Interest Group: direct email with cover letter and survey link (with request that speech-language pathologists who work with classical singers respond) to eighty-eight contacts

No emails were permitted to be sent to members of laryngology associations.

2. **Targeted Distribution - Researcher-Developed Contact Lists:** The researcher thoroughly examined professional association website membership lists\(^{25}\) and Google search lists to develop suitable contacts to whom direct emails could be sent, especially within the laryngology and speech-language pathology fields. Newly found contact names were matched against previously gathered contact information to avoid duplication and then vetted using search engines to determine whether speech-language pathologists' and laryngologists' research interests or treatment services include the singing voice. Laryngology and speech language pathology contacts were considered suitable sample population if they listed either 'professional voice user' or 'singing voice' as either a research interest or a treatment population. The researcher then used search engines to attempt to find their email address. This method of developing contacts yielded an additional 253 voice pedagogy contacts, 254 speech-language pathology contacts, and 1278 laryngology contacts\(^{26}\).

3. **Targeted Distribution - Social Media Contacts:** Social networking sites such as Facebook, LinkedIn, and Twitter offer large sample populations through a virtual snowball sampling method. While there may be selection bias inherent in the virtual snowball sampling method, a recent study shows that virtual response rates to online surveys may be higher than in traditional snowball technique (Baltar and Brunet 2012) and that surveys conducted specifically through social networking sites collect the same level of meaningful data as traditional “pen and paper” surveys do (Wolfe et al 2014). This increase in response rate may be because researcher identity disclosure leads to lower perceived risks (Casaló et al 2011, Fang et al 2012) and/or because of an increased willingness to participate due to the relationship between the researcher and the potential respondent (Fang et al 2014, Kietzmann et al 2011, Xu et al 2012). The researcher used virtual snowball sampling methodology to reach a larger sample population to gain the broader statistical power that comes with that larger sample population.

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\(^{25}\) Faculty Lists for The Voice Foundation's Annual Symposium, for example, are available online and contain contact information, including email addresses.

\(^{26}\) See Appendix 4: Researcher-Developed Distribution List and Appendix 5: Distribution Count from Researcher-Developed Distribution List
The following social networks were used to distribute the Inter-Disciplinary Survey on Common Usage of Breathing Terminology:

a) Facebook: Facebook is an online social network that can be used to recruit research participants in a variety of ways: 1) targeted paid advertising, 2) Facebook groups with participants that are in the targeted sample population, 3) Facebook pages developed by the researcher(s), and 4) Facebook wall postings (Barratt et al 2015, Bauermeister et al 2012, Ramo et al 2014). The researcher posted the survey link to her personal Facebook page and specifically invited over 400 voice teachers and speech-language pathologists to participate in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology. The researcher also posted the survey link to several voice pedagogy Facebook groups such as: “Professional Voice Teachers,” “Sharing Forum for Music Teachers,” and “Voice Teachers Community.” These groups have between 250 and 2500 members.

b) Twitter: Twitter is an online social network that offers a method of survey participant recruitment based on personal and professional networking. The researcher posted the survey link to her professional Twitter feed (@voicepedagogy), which has approximately 600 followers, most of whom are singers, voice teachers, and speech-language pathologists who work with singers.

c) LinkedIn: LinkedIn is a professional social network and the researcher posted the survey link to her LinkedIn page wall, and to several voice pedagogy and speech-language pathology discussion pages, such as “Ontario Registered Music Teachers Association” (voice pedagogy) and “American Speech-Language-Hearing Association” (speech-language pathology). Each group on LinkedIn has 500 members or more\(^{27}\).

All targeted sample population members were requested to forward the Inter-Disciplinary Survey on Common Usage of Breathing Terminology to any of their contacts who might be interested in or appropriate for the survey, thus implementing snowball sampling methodology.

\(^{27}\) It is unknown how many participants were recruited via social media, however one respondent emailed the researcher directly on 28 February 2014 stating that they found the “request for survey participants on LinkedIn and took the survey.”
3.3 Survey Design and Development

The Inter-Disciplinary Survey on Common Usage of Breathing Terminology is a one-time, cross-sectional on-line questionnaire using the University of Toronto's Ontario Institute for Studies in Education's (OISE) in-house developed, administered, and supported web application for producing online surveys: Survey Wizard. Some of the benefits of Survey Wizard (as outlined on OISE's site) include:

- Surveys may be authored to any computer with Internet access
- Results are secure, centrally collected, and ready for analysis
- Results are downloadable
- On-going support via the Educations Commons Client Care Portal
- Minimum or no cost to University of Toronto researchers

The Inter-Disciplinary Survey on Common Usage of Breathing Terminology is mostly composed of single-option variable (i.e. respondents may choose one response only from a list of options), closed-ended, response scale (i.e. Likert) questions that provide quantitative data. Some short text field questions give the option to elaborate on responses to closed-ended questions. All texts referenced in the survey, and the survey itself were written in English. The Inter-Disciplinary Survey on Common Usage of Breathing Terminology contains breathing for singing terms and definitions of those terms, and asks respondents to indicate whether they use the terms and their level of agreement with provided term definitions. To remove bias in choosing which terms and definitions to include in the survey, a Voice Pedagogy Textbooks Survey was conducted prior to the Inter-Disciplinary Survey on Common Usage of Breathing Terminology. Only the breathing for singing terms and definitions found in the four voice pedagogy textbooks most predominantly used in North American tertiary institutions (as determined by the Voice Pedagogy Textbooks Survey conducted by the researcher28) were included.

The Inter-Disciplinary Survey on Common Usage of Breathing Terminology has three main sections: 1. Information Pages, 2. Survey Body, and 3. Demographic Questions.

1. Information Pages: The Inter-Disciplinary Survey on Common Usage of Breathing Terminology's information pages contain a description of the survey, of the intended participants, of risk and confidentiality, and of data storage protocol. As advised by OISE, contact information for both the researcher

28 See Appendix 6: Voice Pedagogy Textbook Survey
and the researcher's supervisor are listed for use by participants should they have any questions or concerns about the survey, or should they wish to provide additional feedback. A summarized version of the information pages formed the body of the introduction email sent in the targeted distribution\textsuperscript{29}. The first page of the survey proper contains information about the quotations, definitions, and terminology in the survey, about mandatory questions, about how to navigate within the survey, and contains the initial survey question: a yes/no question designed to isolate only those practitioners that teach or treat classical singers. Respondents who choose the provided answer “No – I do not treat or teach classical singers. I wish to exit the survey.” are taken to the final page of the survey. Respondents who choose the provided answer “Yes – I treat or teach classical singers. By clicking here to begin the survey I signal that I have read and understood the Survey Information Page and I give my free and informed consent.” are taken to the next page of the survey, and are deemed to have given their consent.

2. Survey Body: The survey body has three sections:

   Section 1: The first section of the survey body contains questions about the six breathing for singing terms: \textit{appoggio, breath control, breath management, breath support, muscular antagonism,} and \textit{suspension}. The first question about each new term is a filter (or contingency) question that asks whether respondents use the term and filters out those who are not familiar with the presented term:

   Respondents who indicate they are not familiar with the term presented are not required to answer questions about that term and are taken to the next term in the survey. Respondents who state they are familiar with the term indicate how often they use the term in their practice or stu-

\textsuperscript{29} See Appendix 7: Survey Introductions
dio, and then are asked which definitions or statements most closely represent their understanding of the term.

**Section 2:** The second section of the survey body asks respondents about the frequency of their use of terms that describe various ways of breathing for singing (such as *abdominal breathing*, *clavicular breathing*, *deep breathing*, etc.).

**Section 3:** The third section of the survey body asks respondents about levels of distinction between terms that may be used interchangeably, such as *airflow* and *breath pressure*.

**3. Demographic Questions:** In the first draft of the Inter-Disciplinary Survey on Common Usage of Breathing Terminology, the researcher requested demographic data such as: education, further breakdown of primary vocation (i.e. voice teacher at an independent voice studio versus voice teacher at a tertiary institution, or speech-language pathologist with an academic appointment versus speech-language pathologist at a clinic), number of years practising or teaching, gender, age, and singing experience. As the initial number of questions totalled nearly sixty, it was determined that such a lengthy survey was too cumbersome and time-consuming for the intended sample. The final length of the Inter-Disciplinary Survey on Common Usage of Breathing Terminology was twenty-four questions\(^\text{30}\), and demographic data collection was limited to: country and province or state in which respondents practise or teach, and primary vocation\(^\text{31}\).

**Survey Content:** Recognizing the potential for bias when choosing which terms should be included in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology, the researcher developed an index of nearly sixty voice pedagogy textbooks written between 1985 and 2010\(^\text{32}\). Given that the textbooks used in voice pedagogy courses at tertiary institutions are most likely to have the widest distribution among voice teachers, it follows that those textbooks would also contain the terms most familiar to, and commonly used by them. Therefore, it was decided that in order to avoid bias, only the terms that appear in English-language voice pedagogy textbooks that are most frequently used at tertiary institutions in North America would be included in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology. This exhaustive index includes texts that do not have wide distribution

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\(^{30}\) See Appendix 8: Interdisciplinary Survey on Common Usage of Breathing Terminology

\(^{31}\) See Appendix 9: Excluded Demographic Questions

\(^{32}\) See Appendix 10: Textbook Review 1985-2010
(for example: Kate DeVore and Starr Cookman's 2009 *The Voice Book*) but to avoid the bias that would have occurred had the researcher chosen to use the texts she thought were most popular, the researcher created the Voice Pedagogy Texts Survey. The Voice Pedagogy Texts Survey was distributed via email to voice pedagogy instructors at North American tertiary institutions and asked respondents to provide information about the number and level (undergraduate, masters, or doctoral) of voice pedagogy courses offered at their institution, the course(s) semester duration, how many years the course(s) have been offered, the class size(s), and how long the instructor had been teaching the course(s). Most importantly, voice pedagogy instructors were asked to indicate which of the index of fifty-six English-language voice pedagogy texts written between 1985 and 2010 were required or recommended texts for their institution's voice pedagogy course(s). Participants were also given the opportunity to list voice pedagogy texts not provided in the survey. The survey closed in May 2013 with a total of 202 completed responses and showed that the four most widely-used English-language voice pedagogy textbooks at North American tertiary institutions are (in descending order of popularity):


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33 See Appendix 6: Voice Pedagogy Textbook Survey

34 See Appendix 10: Textbook Review 1985-2010

35 See Appendix 6: Voice Pedagogy Textbook Survey

36 Both the 2004 and 2012 editions of McCoy's *Your Voice: An Inside View* were offered in the survey. However, only the 2012 edition was available for purchase at the time the survey was sent, therefore, participants who indicated that they used the 2004 edition of *Your Voice: An Inside View* were included with the participants who indicated that they used the 2012 edition.

37 The “revised and expanded” edition of McKinney's *The Diagnosis and Correction of Vocal Faults* was published in 1994 by Genevox Music Group and was re-issued in 2005 by Waveland Press.

38 R. Miller's *The Structure of Singing* was originally published 1986 and re-issued by Wadsworth Group/Thomson Learning in 1996.
Fifty terms related to breathing for singing were identified in the four texts and the researcher uncovered definitions for (or statements about) thirty-eight of those terms from the pedagogy textbooks. The twelve terms that did not have a definition (or a statement about them) in any of the four texts were excluded from the master list. The term list was further refined by including only those terms that occur in at least three of the four texts.

Those twenty-six terms (in alphabetical order) are:

- Abdominal / Belly Breathing (20 occurrences: 4/4 texts)
- Air Flow (65 occurrences: 4/4 texts)
- Appoggio (40 occurrences: 3/4 texts)
- Balanced Tension (17 occurrences: 3/4 texts)
- Breath Control (38 occurrences: 4/4 texts)
- Breath Energy (42 occurrences: 3/4 texts)
- Breath Management (62 occurrences: 3/4 texts)
- Breath / Air Pressure (102 occurrences: 4/4 texts)
- Breath Support (83 occurrences: 4/4 texts)
- Breathing for Singing (55 occurrences: 4/4 texts)
- Breathing Imagery (15 occurrences: 3/4 texts)
- Breathing Mechanism (18 occurrences: 3/4 texts)
- Breathing Method / Technique (20 occurrences: 3/4 texts)
- Clavicular / Upper Chest / High / Upper Torso Breathing (31 occurrences: 4/4 texts)
- Deep / Low / Low Torso Breathing (12 occurrences: 4/4 texts)
- Diaphragm (90 occurrences: 4/4 texts)
- Dynamic Equilibrium / Dynamic Muscle Equilibrium (22 occurrences: 4/4 texts)
- Exhalation (180 occurrences: 4/4 texts)
- Inhalation (123 occurrences: 4/4 texts)
- Muscular Antagonism (27 occurrences: 3/4 texts)
- Noble Posture (14 occurrences: 4/4 texts)
- Respiration (29 occurrences: 4/4 texts)
- Respiratory System / Actuator (34 occurrences: 4/4 texts)
- Support (129 occurrences: 4/4 texts)
- Suspension (18 occurrences: 3/4 texts)
- Thoracic / Middle Torso / Rib Breathing (27 occurrences: 4/4 texts)

The term list was further refined by removing words with undisputed definitions:

- Breathing for Singing
- Breathing Imagery
- Breathing Mechanism
- Breathing Method / Technique

See Appendix 11: Fifty Breathing Terms Found in Voice Pedagogy Textbooks
See Appendix 12: Survey Terms (with Definitions and Statements from Textbooks)
• Diaphragm
• Exhalation
• Inhalation
• Noble Posture
• Respiration
• Respiratory System (Actuator)

Additional terms were removed if they could be represented by one term:

- **muscular antagonism** was chosen to represent **dynamic (muscle) equilibrium** and **balanced tension** as it occurred in the texts more frequently than the other two terms
- **support** and **breath support** were merged to **breath support**

The remaining terms were grouped into three categories based on their function:

1. Terms that are associated with breathing for singing and that represent a specific breathing process or concept:
   - Appoggio
   - Breath Control
   - Breath Management
   - Breath Support
   - Muscular Antagonism
   - Suspension

2. Terms that are related to the movement of air during phonation:
   - Air Flow
   - Breath Energy
   - Breath Pressure

3. Terms that describe a way of breathing that is based on where movement in the body occurs while breathing:
   - upper body terms: Clavicular Breathing / High Breathing / Upper Chest Breathing / Upper Torso Breathing
   - middle body terms: Middle Torso Breathing / Rib Breathing / Thoracic Breathing /
   - lower body terms: Abdominal Breathing / Belly Breathing / Deep Breathing / Low Breathing / Low Torso Breathing

Definitions of the six breathing for singing terms were chosen from among those found in the four principal texts. Whenever possible, a definition from each text was used but in cases where only one definition was available for a given term (for example, **breath support**), statements about the term were used as well. In cases where definitions from several texts were closely aligned, the most succinct definition was used. For example, McKinney describes **breath support** as “a dynamic relationship between the

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40 See Appendix 12: Survey Terms (with Definitions and Statements from Textbooks)
breathing-in muscles and the breathing-out muscles, the purpose of which is to supply adequate breath pressure to the vocal folds for the sustaining of any desired pitch or dynamic level. When a person establishes the correct posture, breathes in properly, and then suspends the breath, a balanced tension is set up between the muscles of inhalation and the muscles of exhalation” (53), while McCoy defines breath support as “the dynamic relationship between the muscles of inspiration and expiration that are used to control pressure in the air supplied to the larynx” (88). Due to its relative brevity, McCoy's definition was used in the survey. Decisions about which of several similar definitions would be used in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology were solely based on ensuring economy of time and therefore completion for participants and do not represent a value judgment or recommendation by the researcher. In the case of the term suspension, five distinct definitions from two texts were found so all five definitions were included in the survey. To avoid both influencing respondent choices assumption of researcher bias, authors of the definitions were not named in the survey.

In the development stage, several pilot surveys were sent to small groups of practitioners who specialize in treating or teaching the classical singing voice between 28 November 2013 and 4 January 2014. Specifically, an initial draft of the Inter-Disciplinary Survey on Common Usage of Breathing Terminology was sent to seven voice teachers and five speech-language pathologists on 28 November 2013 and their suggested revisions were implemented. The revisions included editing for greater clarity, consolidation of questions, clarification of how terms were chosen, and insertion of contingency questions at the beginning of each section. A final draft of the survey was sent to sixteen voice teachers (including the seven who received the initial drafts), to the five speech-language pathologists who received the initial drafts, and to three laryngologists on 4 January, 2014. Feedback received from the final pilot study indicated that in most cases, the Inter-Disciplinary Survey on Common Usage of Breathing Terminology took approximately twenty minutes to complete.

The final draft of the Inter-Disciplinary Survey on Common Usage of Breathing Terminology was developed with input from Data Analysis and Research Design Consultants at the University of Toronto's Ontario Institute for Studies in Education, and was successfully vetted by the College Music Society's Survey Committee on 17 January, 2014, and approved by the University of Toronto Ethics Board on 24 January 2014 as presenting very low risk to participants.
3.4 Data Collection and Analysis

Survey data was collected electronically and automatically stored securely online by the University of Toronto's Ontario Institute for Studies in Education's in-house software, Survey Wizard. The data was downloaded from Survey Wizard to the researcher's password-protected computer for collation and will be stored indefinitely for possible use in future research.

The researcher designed the survey to collect a broad range of data that explored breathing for singing terminology use from several different points of view. Only data pertaining directly to intra- and inter-disciplinary agreement about term usage and definitions was analyzed. Data excluded from analysis includes responses to questions about terms that may be used synonymously (such as balanced breathing, which may be used synonymously with appoggio) or interchangeably (such as air flow, breath energy, and breath pressure). IBM SPSS Statistics Software (purchased through the University of Toronto's Information Commons) was used to download, select, and analyze survey data. 588 respondents began the Inter-Disciplinary Survey on Common Usage of Breathing Terminology. Data was not collected from the ten percent who indicated that they do not treat or teach the classical singing voice. All collected data was analyzed in consultation with Dr. Monique Herbert, Research Design and Analysis Consultant from the University of Toronto's Ontario Institute for Studies in Education.

In the demographics section, participants were asked to indicate their primary vocation:

24. *What is your primary vocation?

Please select one of the following:
- Voice Teacher
- Speech-Language Pathologist
- Otolaryngologist
- Other (please elaborate below)

Other: ____________________________________________________________

Data from respondents who chose 'Other' but who did not elaborate in the provided text box was filtered out using frequency analysis, as data is not useful for analysis in this research unless it is linked
to one of the three disciplines whose practitioners treat or teach the singing voice: laryngologists, speech-language pathologists, and voice teachers. Some respondents chose 'Other' when asked their primary vocation and clarified their choice in the text box provided\textsuperscript{41}. Those who listed one of the three primary vocations in the text box were changed from 'Other' to the discipline they listed in the text box. Examples of respondents moved from 'Other' to 'Voice Pedagogy' include those who wrote the following explanatory texts:

- “I teach singing part time”
- “Performing singer who also teaches voice”
- “Choral director and Private Voice Teacher”

This frequency analysis resulted in 392 sets of data.

Sort and split analysis using the 'Primary Vocation' variable was used to sort respondents according to their field. This resulted in data from twenty laryngologists, sixty-one speech-language pathologists, and 311 voice teachers. The discrepancy in respondent numbers per discipline may be attributed to two main factors: 1) compared to the field of voice pedagogy, there are relatively few practitioners who specialize in the classical singing voice in both the speech-language pathology and laryngology fields, and 2) as previously stated, the researcher had limited access to these practitioners (especially laryngologists) as their professional associations would not send the Inter-Disciplinary Survey on Common Usage of Breathing Terminology directly to their members\textsuperscript{42}.

\textsuperscript{41} See Appendix 13: Primary Vocation Inclusions and Exclusions

\textsuperscript{42} See Appendix 3: Professional Associations Contacted and Responses
3.5 Expected Outcomes

This research was designed to answer the following questions: What is the level of intra- and inter-disciplinary agreement about usage and definitions of breathing for singing terminology among practitioners who treat or teach classical singers? Are current calls to develop a common intra- and inter-disciplinary terminology justified?

Given that the terms and meanings used in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology are all found in widely-used voice pedagogy textbooks, the researcher expects that the breathing for singing terms will be familiar to and used by the majority (if not all) of voice pedagogy respondents, despite perceptions to the contrary. Regardless of whether all voice teachers use the same terminology and despite the fact that breathing for singing is addressed in every voice pedagogy textbook surveyed by the author43 and that definitions of terms are provided in most voice pedagogy textbooks, the researcher is undecided as to whether the data will show that the majority of voice pedagogy respondents agree about the definitions of each term. While it seems probable that voice teachers will agree about term use, defining those terms may be more complex and may not show the same level of agreement as term use does. High intra-disciplinary agreement about both term use and their definitions may point to a greater level of intra-disciplinary agreement about breathing terminology than is currently assumed. Could this mean, then, that current calls to develop a common intra-disciplinary terminology are not warranted?

Although the subject of breathing for singing is consistently addressed in voice pedagogy textbooks the same cannot be said for laryngology and speech-language pathology textbooks44. The researcher expects, therefore, that the terms commonly used by voice teachers are not the same ones commonly used by practitioners in the other two disciplines, even those practitioners who specialize in the singing voice. Additionally, experience with and exposure to practitioners from all three disciplines in clinics, at inter-disciplinary conferences, and in educational institutions leads the researcher to hypothesize that there will be low inter-disciplinary agreement about usage of the majority of survey terms, about definitions of breathing terms, and about terms used to describe methods of breathing for singing. If the data supports this hypothesis, then it is probable that current calls for the development of a common in-

43 Each of the nearly sixty voice pedagogy textbooks reviewed by the researcher in preparation for the current thesis included a chapter about breathing for singing. See Appendix 10: Textbook Review 1985-2010

44 References to singing are rare in laryngology and speech-language pathology texts and there are no chapters dedicated to breathing for singing. See Appendix 10: Textbook Review 1985-2010
ter-disciplinary terminology to facilitate inter-disciplinary communication and collaboration, may be warranted.

Given that laryngologists primarily diagnose while speech-language pathologists and voice teachers deal more with function, there may be a higher level of agreement about term usage and definitions between voice pedagogy and speech-language pathology practitioners than exists between voice pedagogy and laryngology practitioners.

In the end, this research provides quantitative data to show the level of intra- and inter-disciplinary agreement about usage and definitions of breathing for singing terminology, and helps to answer the question of whether current calls for both intra- and inter-disciplinary terminology systematization are justified. Additionally, the methodology of this research may serve as a template for gathering quantitative data concerning other terms, not only within the singing voice community, but within other communities or disciplines attempting to assess the level of consistent terminology use of their practitioners.
CHAPTER 4: RESULTS

This chapter contains the results of the Inter-Disciplinary Survey on Common Usage of Breathing Terminology. Survey participants were questioned about eighteen terms: six terms associated with breathing for singing (“breathing for singing terms”) and twelve terms that describe ways of breathing for singing (“breathing for singing descriptor terms”). Participants were asked to indicate their frequency of use for all eighteen terms and to indicate how closely each of thirteen definitions of the six breathing for singing terms resembles their own definition of each term.

4.1 Breathing for Singing Terms: Frequency of Use, Usage, and Definitions

This section examines the data about the six breathing for singing terms, their intra- and inter-disciplinary frequency of use, and levels of agreement about their definitions.

The six breathing for singing terms are:

A. appoggio
B. breath control
C. breath management
D. breath support
E. muscular antagonism
F. suspension

A. Appoggio

Few (or no) respondents from the three disciplines surveyed use the breathing for singing term appoggio frequently, and at least some practitioners from each discipline are not familiar with it45. The

45 Note: respondents who indicate that they are unfamiliar with the presented term do not answer subsequent questions about that term and are moved automatically to the next term in the Survey.
data indicates that there is high intra-disciplinary agreement among voice teachers about the usage of the breathing for singing term *appoggio*, as most\(^{46}\) of the voice pedagogy respondents use it (although the majority only do so occasionally). Most laryngology respondents and the majority of speech-language pathology respondents do not use the term *appoggio*, which indicates low inter-disciplinary agreement about use of the term.

While one-third of laryngologists are undecided, the majority of speech-language pathologists and voice teachers agree that this definition of *appoggio*\(^{47}\) mostly resembles their own. The data shows that there is intra-disciplinary agreement among voice teachers about the definition of this term and that while most speech-language pathologists and voice teachers mean “the establishment of dynamic balance between the inspiratory, phonatory, and resonatory systems in singing” when they use the breathing for singing term *appoggio*, agreement about its definition is not fully inter-disciplinary.

### 4.3 Summary Totals - Appoggio:

<table>
<thead>
<tr>
<th>TERM / DEFINITION</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appoggio</td>
<td>AGREEMENT: 85% use term</td>
<td>NO AGREEMENT: 2/3 use term</td>
</tr>
<tr>
<td>Appoggio – Definition</td>
<td>AGREEMENT: 89% use definition</td>
<td>NO AGREEMENT: 2/3 use definition</td>
</tr>
</tbody>
</table>

\(^{46}\) For the purposes of clarity and continuity in this paper, the term 'majority' indicates fifty-one to seventy-four percent of the total number and the term 'most' indicates seventy-five to ninety-nine percent of the total number.

\(^{47}\) Note: respondent numbers in Chart 4.2 Appoggio – Definition, reflect the number of respondents who are familiar with the breathing for singing term *appoggio*.
B. Breath Control

The majority of laryngology respondents and half of speech-language pathology respondents use the breathing for singing term **breath control** frequently, while the majority of voice pedagogy respondents use it only occasionally. Although the term is familiar to and is used by most respondents from all three disciplines, there are a few voice pedagogy and speech-language pathology respondents who choose not to use it. The data indicates that there is both intra-disciplinary (among voice teachers and among voice practitioners in the other two disciplines) and inter-disciplinary agreement about the breathing for singing term **breath control**.

Definition 1 of the breathing for singing term **breath control** mostly resembles the definition held by the majority of voice pedagogy respondents, indicating that there is high intra-disciplinary agreement among voice teachers about this definition. An additional twelve percent of voice pedagogy respondents indicate that this definition of **breath control** somewhat resembles their own, thus most voice teachers define **breath control** as “concerned with delaying both the collapse of the ribs and the reversion of the diaphragm to its dome-shaped position.” This definition mostly resembles the definition held by the majority of speech-language pathology respondents and somewhat resembles the definition held by an additional thirty-one percent of speech-language pathology respondents, meaning that most
speech-language pathologists also define the breathing for singing term **breath control** as “concerned with delaying both the collapse of the ribs and the reversion of the diaphragm to its dome-shaped position.” Most voice teachers and speech-language pathologists mean the same thing when they use the term **breath control**. The data suggests that while there is intra-disciplinary agreement in the fields of voice pedagogy and speech-language pathology, there is not full inter-disciplinary agreement about this definition of the breathing for singing term **breath control**.

According to the data, Definition 2 of the breathing for singing term **breath control** resembles the definition of the term held by the majority of respondents from each discipline. This suggests that there is both intra- and inter-disciplinary agreement about this definition of the breathing for singing term **breath control**. The majority of voice practitioners from the three disciplines who treat or teach the classical singing voice mean “a dynamic relationship between the breath and the vocal cords which determines how long you can sing on one breath” when they use the term **breath control**. Definition 2 resembles the definition of **breath control** held by more laryngologists than Definition 1 does (“concerned with delaying both the collapse of the ribs and the reversion of the diaphragm to its dome-shaped position”), but it resembles the definition of **breath control** held by less voice pedagogy respondents than Definition 1 does. In other words, when a laryngologist uses the breathing for singing term **breath control**, they are more likely to mean “a dynamic relationship between the breath and the vocal cords which determines how long you can sing on one breath” than to mean “concerned with delaying both the collapse of the ribs and the reversion of the diaphragm to its dome-shaped position,” whereas voice teachers are more likely to mean the reverse. Speech-language pathologists use these two definitions of the breathing for singing term **breath control** almost equally.
4.7 Summary Totals – Breath Control:

<table>
<thead>
<tr>
<th>TERM / DEFINITION</th>
<th>Intra-Disciplinary (Voice Pedagogy)</th>
<th>Inter-Disciplinary</th>
<th>Agreement re Usage</th>
<th>Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breath Control</td>
<td>AGREEMENT: 92% use term</td>
<td>AGREEMENT: 3/3 use term</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breath Control – Definition 1</td>
<td>AGREEMENT: 92% use definition</td>
<td>NO AGREEMENT: 2/3 use definition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breath Control – Definition 2</td>
<td>AGREEMENT: 73% use definition</td>
<td>AGREEMENT: 3/3 use definition</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C. Breath Management

There are practitioners from each discipline who do not use the breathing for singing term breath management, yet the majority of respondents from all three disciplines use the term whether frequently or occasionally, suggesting that this term is commonly used both intra- and inter-disciplinarily. The majority of voice pedagogy respondents use breath management frequently and more voice teachers use it than do practitioners from the other two disciplines.
The data indicates that this definition of the breathing for singing term *breath management* mostly resembles the definition held by the majority of practitioners from all three disciplines. This suggests that there is both intra- and inter-disciplinary agreement about the definition of this term and that practitioners from all three disciplines that treat or teach the classical singing voice mean “a learned technique of breath control for singing which permits efficient handling of the breath cycle” when they use the breathing for singing term *breath management*. As with usage, voice pedagogy respondents have the highest level of agreement overall about this definition of *breath management*.

4.10 Summary Totals – Breath Management:

<table>
<thead>
<tr>
<th>TERM / DEFINITION</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breath Management</td>
<td>AGREEMENT: 90% use term</td>
<td>AGREEMENT: 3/3 use term</td>
</tr>
<tr>
<td>Breath Management - Definition</td>
<td>AGREEMENT: 94% use definition</td>
<td>AGREEMENT: 3/3 use definition</td>
</tr>
</tbody>
</table>

D. Breath Support

Ninety-two percent or more of practitioners from all three disciplines use the breathing for singing term *breath support*, and the majority of them use it frequently. Voice teachers use *breath support* less than practitioners in the other two disciplines do but on the whole, the term is commonly used both intra-disciplinarily (all three disciplines) and inter-disciplinarily.

Note: respondent numbers in Chart 4.9 Breath Management – Definition, reflect the number of respondents who are familiar with the breathing for singing term *breath management*. 

---

48 Note: respondent numbers in Chart 4.9 Breath Management – Definition, reflect the number of respondents who are familiar with the breathing for singing term *breath management*. 

---
The data reveals that this definition of the breathing for singing term breath support mostly resembles the definition held by most of the respondents in all three disciplines, suggesting that there is both intra- and inter-disciplinary agreement about it. Most practitioners from the three disciplines that treat or teach the singing voice mean “the dynamic relationship between the muscles of inspiration and expiration that are used to control pressure in the air supplied to the larynx” while singing when they use the breathing for singing term breath support.

4.13 Summary Totals – Breath Support:

<table>
<thead>
<tr>
<th>TERM / DEFINITION</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breath Support</td>
<td>AGREEMENT: 92% use term</td>
<td>AGREEMENT: 3/3 use term</td>
</tr>
<tr>
<td>Breath Support – Definition</td>
<td>AGREEMENT: 93% use definition</td>
<td>AGREEMENT: 3/3 use definition</td>
</tr>
</tbody>
</table>

E. Muscular Antagonism
While the majority of surveyed laryngologists and speech-language pathologists never use the breathing for singing term **muscular antagonism**, the majority of voice pedagogy respondents do use it. There is intra-disciplinary agreement among voice teachers about usage of **muscular antagonism** but that agreement is relatively low; only twenty-three percent use the term frequently. Although **muscular antagonism** is used by fewer voice teachers than the other four breathing for singing terms presented thus far, it is similar to the term **appoggio** in that the majority of voice teachers use it while the majority of voice practitioners in the other two disciplines never use it. As **muscular antagonism** is used by very few speech-language pathologists and laryngologists, it should be considered a breathing for singing term that does not have inter-disciplinary agreement and, like the term **appoggio**, may warrant greater inter-disciplinary circulation and explanation.

[Chart 4.15: Muscular Antagonism - Statement 1]

The data^49^ indicates that the majority of voice pedagogy respondents agree that the proper application of “**muscular antagonism** … in breathing for singing … [results] in increased control of breath pressure and air flow;” a high level of intra-disciplinary agreement. Given that the majority of laryngology respondents either disagree with or are undecided about this statement, and that there is no majority agreement among speech-language pathology respondents, there is no inter-disciplinary agreement about this statement.

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^49^ Note: respondent numbers in Charts 4.15, 4.16, and 4.17 Muscular Antagonism – Statements, reflect the number of respondents who are familiar with the breathing for singing term **muscular antagonism**.
Of the three statements about the breathing for singing term muscular antagonism, Statement 2 has the lowest level of agreement, the highest level of disagreement, and the highest number of undecided responses almost uniformly across the disciplines. The majority of practitioners from each discipline are undecided about or do not agree that “in the early stages of a musical phrase, muscular antagonism is used to limit the amount of pressure in the well-filled lungs,” thus there is low intra- and inter-disciplinary agreement about this statement.

The data indicates that while most voice pedagogy respondents agree that “abdominal muscular antagonism … feels both firm and supple,” the majority of speech-language pathology and laryngology respondents are undecided about or disagree with Statement 3. There is intra-disciplinary agreement about this statement among voice teachers, but no inter-disciplinary agreement. The majority of voice teachers agree that the proper application of “muscular antagonism … in breathing for singing … [results] in increased control of breath pressure and air flow,” and that “abdominal muscular antagonism … feels both firm and supple.”
4.18 Summary Totals – Muscular Antagonism:

<table>
<thead>
<tr>
<th>TERM / DEFINITION</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Muscular Antagonism</td>
<td>AGREEMENT: 62% use term</td>
<td>NO AGREEMENT: 2/3 do not use term</td>
</tr>
<tr>
<td>Muscular Antagonism – Statement 1</td>
<td>AGREEMENT: 74% agree with statement</td>
<td>NO AGREEMENT</td>
</tr>
<tr>
<td>Muscular Antagonism – Statement 2</td>
<td>NO AGREEMENT</td>
<td>NO AGREEMENT</td>
</tr>
<tr>
<td>Muscular Antagonism – Statement 3</td>
<td>AGREEMENT: 76% agree with statement</td>
<td>NO AGREEMENT</td>
</tr>
</tbody>
</table>

F. Suspension

There is intra-disciplinary agreement among voice teachers about use of the breathing for singing term **suspension**, but that agreement is relatively low; only sixty-four percent of voice teachers use the term and two-thirds of those who use the term do so only occasionally. Furthermore, most laryngology respondents and the majority of speech-language pathology respondents never use the term **suspension**, many of them due to unfamiliarity with the term. Similar to the breathing for singing terms **appoggio** and **muscular antagonism**, the low level of inter-disciplinary agreement about **suspension** may indicate that it warrants greater inter-disciplinary circulation and explanation.
The data reveals that the majority of respondents from all three disciplines are undecided about or do not agree that the breathing for singing term *suspension* means the “setting up controls period” of breathing for singing. Of the five definitions offered, Definition 1 has the highest level of undecided practitioners in each discipline; it is not commonly used either intra- or inter-disciplinarily. When a voice professional uses the breathing for singing term *suspension*, it is improbable that they mean the “setting up controls period” of breathing for singing.

Of the five definitions of the breathing for singing term *suspension*, the data shows that the highest number of practitioners from each discipline think that Definition 2 does not resemble their own definition of the term. Although Definition 2 resembles the definition of *suspension* held by the majority of speech-language pathology respondents, it is not commonly used intra-disciplinarily among voice teachers nor is it used inter-disciplinarily. When laryngologists and voice teachers use the breathing for singing term *suspension*, it is improbable that they mean the “feeling of holding back the breath,” but it is probable that speech-language pathologists do.

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50. Note: respondent numbers in Charts 4.20-4.24 Suspension – Definitions, reflect the number of respondents who are familiar with the breathing for singing term *suspension*.
While the majority of laryngology respondents are undecided about Definition 3 of the breathing for singing term **suspension**, the data denotes that the majority of speech-language pathology and of voice pedagogy respondents think that this definition of **suspension** resembles their own. Although Definition 3 is not used by all practitioners from all three disciplines, it is probable that when a voice teacher or speech-language pathologist uses the breathing for singing term **suspension**, they understand that “the purpose of this moment of suspension is to prepare the breath support mechanism for the phonation which follows.”

The data indicates that the majority of speech-language pathology respondents feel that Definition 4 of the breathing for singing term **suspension** resembles their own and that less than half of voice pedagogy respondents feel the same. Given that the majority of laryngology respondents are either undecided about this definition or think that it does not resemble their own, this definition of the breathing for singing term **suspension** is not commonly used either intra- or inter-disciplinarily. It is improbable that laryngologists and voice teachers mean: the point at which “recoil forces overcome the muscular forces of rib-cage expansion, and the process reverses direction” when they use the term **suspension**, but speech-language pathologists probably do.
Although none of the definitions of the breathing for singing term *suspension* have full inter-disciplinary agreement, a “balanced pressure … between inhalation and exhalation” comes the closest to doing so. This definition mostly resembles the definition of *suspension* held by the majority of speech-language pathology and voice pedagogy respondents. Given that this definition resembles the definition of *suspension* held by the majority of voice teachers, there is intra-disciplinary agreement about this definition and it is probable that when a voice teacher uses the term *suspension* they mean a “balanced pressure … between inhalation and exhalation.”

### 4.25 Summary Totals - Suspension:

<table>
<thead>
<tr>
<th>TERM / DEFINITION</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspension</td>
<td>AGREEMENT: 64% use term NO AGREEMENT: 2/3 do not use term</td>
<td></td>
</tr>
<tr>
<td>Suspension – Definition 1</td>
<td>NO AGREEMENT</td>
<td>NO AGREEMENT</td>
</tr>
<tr>
<td>Suspension – Definition 2</td>
<td>NO AGREEMENT</td>
<td>NO AGREEMENT: 1/3 use definition</td>
</tr>
<tr>
<td>Suspension – Definition 3</td>
<td>AGREEMENT: 70% use definition NO AGREEMENT: 2/3 use definition</td>
<td></td>
</tr>
<tr>
<td>Suspension – Definition 4</td>
<td>NO AGREEMENT</td>
<td>NO AGREEMENT: 1/3 use definition</td>
</tr>
<tr>
<td>Suspension – Definition 5</td>
<td>AGREEMENT: 73% use definition NO AGREEMENT: 2/3 use definition</td>
<td></td>
</tr>
</tbody>
</table>

According to the data, the majority of voice teachers use all six breathing for singing terms offered in the Inter-Disciplinary Survey on Common Breathing Terminology and the majority of voice teachers agree about the definition of these terms. These results lead to three conclusions:

1) that there may be greater intra-disciplinary agreement among voice teachers about breathing for singing terminology than previously assumed, that if these findings are representative of intra-disciplinary terminology use as a whole, then current calls to develop a common intra-disciplinary terminology may not be justified, and

2) that those voice practitioners who reject the use of one (or more) of these terms may be outliers and not representative of current practice.

The data indicates that the breathing for singing terms that show the highest commonality of inter-disciplinary usage are *breath control, breath management*, and *breath support*, and that these terms also have the highest inter-disciplinary agreement about definitions. The reverse is also true: the breathing for singing terms that show the lowest commonality of inter-disciplinary usage (appoggio, muscular
antagonism, and suspension) also show the lowest inter-disciplinary agreement about their definitions. Given that there is only inter-disciplinary agreement about usage and definitions of three of the six breathing for singing terms offered in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology, it is possible that current calls for inter-disciplinary standardization of terminology may be justified.
4.2 Breathing for Singing Descriptor Terms: Frequency of Use

This section examines the data about the intra- and inter-disciplinary usage of twelve breathing for singing descriptor terms.

The twelve breathing for singing descriptor terms are:

A. abdominal breathing  
B. belly breathing  
C. clavicular breathing  
D. deep breathing  
E. high breathing  
F. low breathing  
G. low torso breathing  
H. middle torso breathing  
I. rib breathing  
J. thoracic breathing  
K. upper chest breathing  
L. upper torso breathing

A. Abdominal Breathing

The data indicates that most practitioners from all three disciplines use the breathing for singing descriptor term **abdominal breathing** to describe the way of breathing for singing in which the lower body moves, and that most speech-language pathologists do so frequently. **Abdominal breathing** is commonly used both intra-disciplinarily (by voice teachers) and inter-disciplinarily.

4.27 Summary Totals – Abdominal Breathing:

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal Breathing</td>
<td>AGREEMENT: 84% use term</td>
<td>AGREEMENT: 3/3 use term</td>
</tr>
</tbody>
</table>
B. Belly Breathing

The majority of respondents from each discipline use the breathing for singing descriptor term belly breathing to describe the way of breathing for singing in which the lower body moves, and speech-language pathology respondents (most of whom use the term) are more likely to use belly breathing than respondents from the other two disciplines. The lower body breathing for singing descriptor term belly breathing is commonly used both intra-disciplinarily (by voice teachers) and inter-disciplinarily.

4.29 Summary Totals – Belly Breathing:

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belly Breathing</td>
<td>AGREEMENT: 55% use term</td>
<td>AGREEMENT: 3/3 use term</td>
</tr>
</tbody>
</table>

C. Clavicular Breathing

The data shows that the majority of respondents from each discipline use the breathing for singing descriptor term clavicular breathing to describe the way of breathing for singing in which the upper body moves, and that speech-language pathology respondents, most of whom use the term, are more likely to use it than practitioners from the other two disciplines are. The upper body breathing for singing descriptor term clavicular breathing is used intra-disciplinarily by voice teachers, and is commonly used inter-disciplinarily.
4.31 Summary Totals – Clavicular Breathing:

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clavicular Breathing</td>
<td>AGREEMENT: 65% use term</td>
<td>AGREEMENT: 3/3 use term</td>
</tr>
</tbody>
</table>

D. Deep Breathing

According to the data, there is high inter-disciplinary agreement about frequency of use of the lower body breathing for singing descriptor term **deep breathing**, and most practitioners from each discipline use the term to describe the way of breathing for singing in which the lower body moves. **Deep breathing** is commonly used both intra-disciplinarily (by voice teachers) and inter-disciplinarily.

4.33 Summary Totals – Deep Breathing:

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep Breathing</td>
<td>AGREEMENT: 87% use term</td>
<td>AGREEMENT: 3/3 use term</td>
</tr>
</tbody>
</table>

E. High Breathing

<table>
<thead>
<tr>
<th>4.34 High Breathing - Usage</th>
<th>laryngology (20 respondents)</th>
<th>speech-language pathology (61 respondents)</th>
<th>voice pedagogy (311 respondents)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>50%</td>
<td>25%</td>
<td>10% 5%</td>
</tr>
<tr>
<td>3%</td>
<td>39%</td>
<td>39%</td>
<td>13% 5%</td>
</tr>
<tr>
<td>1%</td>
<td>22%</td>
<td>42%</td>
<td>30% 5%</td>
</tr>
</tbody>
</table>

- unfamiliar
- never use
- occasionally use
- frequently use
- no response
The data indicates that there is low inter-disciplinary agreement about both frequency of use and overall usage of the upper body breathing for singing descriptor term **high breathing**. While **high breathing** is used intra-disciplinarily by the majority of voice teachers surveyed, it is not commonly used by voice practitioners in the other two disciplines surveyed, and it is not used frequently by the majority of practitioners in any of the three disciplines surveyed.

4.35 Summary Totals – High Breathing:

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Breathing</td>
<td>AGREEMENT: 72% use term</td>
<td>NO AGREEMENT: 2/3 use term</td>
</tr>
</tbody>
</table>

F. Low Breathing

The data reveals low inter-disciplinary agreement about frequency of use and about overall usage of the lower body breathing for singing descriptor term **low breathing**: half of laryngology respondents never use the term but most voice pedagogy respondents do and the majority do so frequently. While **low breathing** is commonly used intra-disciplinarily by voice teachers to describe the way of breathing for singing in which the lower body moves, it is not commonly used inter-disciplinarily.

4.37 Summary Totals – Low Breathing:

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Breathing</td>
<td>AGREEMENT: 91% use term</td>
<td>NO AGREEMENT: 2/3 use term</td>
</tr>
</tbody>
</table>
G. Low Torso Breathing

According to the data, the majority of speech-language pathologists and laryngologists, and nearly half of voice teachers do not use **low torso breathing** to describe the way of breathing for singing in which the lower body moves. There is inter-disciplinary agreement about **low torso breathing** as it is not commonly used either intra-disciplinarily or inter-disciplinarily.

4.39 Summary Totals – Low Torso Breathing:

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Torso Breathing</td>
<td>NO AGREEMENT</td>
<td>NO AGREEMENT: 2/3 do not use term</td>
</tr>
</tbody>
</table>

H. Middle Torso Breathing

The data indicates that the majority of practitioners from each discipline never use **middle torso breathing** to describe the way of breathing for singing in which the middle body moves. This term is not commonly used either intra-disciplinarily (by any of the three disciplines) or inter-disciplinarily.

4.41 Summary Totals – Middle Torso Breathing:

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Middle Torso Breathing</td>
<td>AGREEMENT: 56% do not use term</td>
<td>AGREEMENT: 3/3 do not use term</td>
</tr>
</tbody>
</table>
I. Rib Breathing

According to the data, the majority of both laryngology and speech-language pathology respondents are unfamiliar with or never use the middle body breathing for singing descriptor term rib breathing, while the majority of voice teachers do use it. There is intra-disciplinary agreement among voice teachers about the usage of rib breathing and there is inter-disciplinary agreement about usage among speech-language pathologists and laryngologists. There is not, however, inter-disciplinary agreement about usage of the breathing for singing descriptor term, rib breathing.

4.43 Summary Totals – Rib Breathing:

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rib Breathing</td>
<td>AGREEMENT: 67% use term</td>
<td>NO AGREEMENT: 2/3 do not use term</td>
</tr>
</tbody>
</table>

J. Thoracic Breathing

The data suggests that there is low agreement about frequency of use of the middle body breathing for singing descriptor term thoracic breathing among practitioners in all three disciplines. While the majority of voice pedagogy respondents never use thoracic breathing, half of laryngology respondents
do. Furthermore, the majority of speech-language pathology respondents use thoracic breathing. **Thoracic breathing** is not used either intra-disciplinarily among voice teachers, nor is it commonly used inter-disciplinarily.

### 4.45 Summary Totals – Thoracic Breathing:

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thoracic Breathing</td>
<td>AGREEMENT: 54% do not use term</td>
<td>NO AGREEMENT</td>
</tr>
</tbody>
</table>

## K. Upper Chest Breathing

The data indicates that the majority of speech-language pathology and of voice pedagogy respondents use the upper body breathing for singing descriptor term **upper chest breathing**, but that laryngology respondents are evenly divided between those who do use it and those who do not. There is intra-disciplinary agreement about usage of **upper chest breathing** among voice teachers, but there is not inter-disciplinary agreement.

### 4.47 Summary Totals – Upper Chest Breathing:

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Chest Breathing</td>
<td>AGREEMENT: 57% use term</td>
<td>NO AGREEMENT: 2/3 use term</td>
</tr>
</tbody>
</table>
L. Upper Torso Breathing

The majority of practitioners in each discipline never use the upper body breathing for singing descriptor term upper torso breathing, therefore, it is not commonly used either intra- or inter-disciplinarily to describe the way of breathing for singing in which the upper body moves.

4.49 Summary Totals – Upper Torso Breathing:

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Torso Breathing</td>
<td>AGREEMENT: 62% do not use term</td>
<td>AGREEMENT: 3/3 do not use term</td>
</tr>
</tbody>
</table>

Summary

According to the data, there is intra-disciplinary agreement among voice teachers about usage of eleven of the twelve breathing for singing descriptor terms offered in the Intra-Disciplinary Survey on Common Usage of Breathing Terms. Eight of those terms are used by the majority of voice pedagogy respondents (abdominal breathing, belly breathing, clavicular breathing, deep breathing, high breathing, low breathing, rib breathing, and upper chest breathing) and three of those terms are used by most voice pedagogy respondents (abdominal breathing, deep breathing, and low breathing). The majority of voice pedagogy respondents do not use three terms (middle torso breathing, thoracic breathing, and upper torso breathing) and there is no intra-disciplinary agreement about the remaining term (low torso breathing). There is inter-disciplinary agreement about usage of six of the breathing for singing descriptor terms offered in the Intra-Disciplinary Survey on Common Usage of Breathing Terms: four are used by the majority of practitioners in each discipline (abdominal breathing, belly breathing, clavicular breathing, and deep breathing) and two are not used by the majority of practitioners in each discipline (middle torso breathing and upper torso breathing). The following section (4.3 Breathing for Singing Descriptors: Primary Terms) examines the breathing for singing descriptor terms data in greater detail.
4.3 Breathing for Singing Descriptor Terms: Primary Terms

Breathing for singing descriptor terms may be further categorized into terms that represent the same way of breathing for singing. Ware states that “there are three principal ways people can breathe” (1998, 84) and McKinney clarifies that these ways of breathing are “identified by the portions of the anatomy involved” (1994, 56). Breathing for singing during which the upper body, including the shoulders move is called either clavicular breathing (McKinney, R. Miller, McCoy), high breathing (or high chest breathing, R. Miller), upper chest breathing (McKinney, McCoy), or upper torso breathing (or high torso breathing, Ware). Breathing for singing during which the chest and middle of the body move is called either middle torso breathing (Ware), rib breathing (McKinney), or thoracic breathing (McCoy). Breathing for singing during which the lower torso, including the abdominal wall moves is called either abdominal breathing (McCoy), belly breathing (McKinney, R. Miller, McCoy), deep breathing (Ware, R. Miller), low breathing (R. Miller), or low torso breathing (Ware).

The following section shows which of the breathing for singing descriptor terms is most likely to be used intra-disciplinarily (by voice teachers) and inter-disciplinarily to describe each of the three principal ways of breathing for singing.

A. Upper Body Terms

All four authors of the primary voice pedagogy textbooks used to teach collegiate-level voice pedagogy courses in North America provide descriptions of the ways of breathing that are “identified by the portions of the anatomy involved” (McKinney 1994, 56). McCoy, using the breathing for singing descriptor term clavicular breathing, explains the way of breathing for singing in which the upper body moves in this way:

Inhalation is caused by a pronounced elevation of the upper chest, which is induced by lifting the shoulders and clavicles – hence, the name clavicular breathing. These same structures drop during exhalation. Muscularly, inhalation is induced by a contraction of the diaphragm, accompanied by contraction of any of the various muscles that lift the upper chest and shoulders, such as the levator scapulae, scaleni, and trapezius. Exhalation generally relies on the natural elastic recoil of the lungs and diaphragm, assisted by the weight of gravity pushing down upon the ribcage (2012, 89).
The four breathing for singing terms used by voice pedagogues to describe the way of breathing for singing described above were listed alphabetically with the other breathing for singing descriptor terms in the Inter-Disciplinary Survey on Common Breathing for Singing Terminology.

**4.50 Primary Breathing Descriptor Terms - Upper Body**

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clavicular Breathing</td>
<td>AGREEMENT: 65% use term</td>
<td>AGREEMENT: 3/3 use term</td>
</tr>
<tr>
<td>High Breathing</td>
<td>AGREEMENT: 72% use term</td>
<td>NO AGREEMENT: 2/3 use term</td>
</tr>
<tr>
<td>Upper Chest Breathing</td>
<td>AGREEMENT: 57% use term</td>
<td>NO AGREEMENT: 2/3 use term</td>
</tr>
<tr>
<td>Upper Torso Breathing</td>
<td>AGREEMENT: 62% do not use term</td>
<td>AGREEMENT: 3/3 do not use term</td>
</tr>
</tbody>
</table>

The data indicates that the majority of voice teachers use three of the four upper body breathing for singing descriptor terms offered in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology: clavicular breathing, high breathing, and upper chest breathing, and that the majority of voice teachers do not use upper torso breathing. Although there is no upper body breathing for singing descriptor term that is used by most of the voice pedagogy respondents and none that is used frequently by the majority of voice pedagogy respondents, this usage pattern suggests that there is intra-disciplinary agreement among voice teachers about these descriptor terms.
In terms of intra-disciplinary usage, the data reveals that the majority of respondents from all three disciplines surveyed use clavicular breathing and do not use upper torso breathing to describe the way of breathing for singing in which the upper body moves. Laryngologists and speech-language pathologists are more likely than voice teachers to use the upper body breathing for singing descriptor term clavicular breathing, and speech-language pathologists are the most likely to use it. The majority of practitioners from all three disciplines surveyed do not use the upper body breathing for singing descriptor term upper torso breathing.

Possible explanations for upper body breathing for singing descriptor term usage patterns include the fact that clavicular breathing is an anatomy-based term thus its use by voice specialists in the fields of speech-language pathology and laryngology may be the result of their medical training. Additionally, use of clavicular breathing to describe breathing for singing in which the upper body moves may be a reflection of the fact that speech-language pathologists and laryngologists work primarily with injured voices and use terms that are more medically diagnostic in nature. The breathing for singing descriptor term high breathing is less anatomical than clavicular breathing; its use by more voice teachers than by practitioners in the other two disciplines may reflect the less anatomical approach typically used by voice teachers to describe singing processes. Given that the majority of practitioners from all three fields use clavicular breathing and do not use upper torso breathing, it may be said that there is inter-disciplinary agreement about upper body breathing for singing descriptor terms.

B. Middle Body Terms

Using the term thoracic breathing, McCoy describes the way of breathing for singing in which the middle body moves in this way:

Thoracic breathing relies on contraction of the diaphragm and external intercostal muscles during the inhalation process. The resulting expansion is felt in the lower ribcage, generally centered at the base of the sternum, but perhaps extending down to the epigastrium … Exhalation is caused by the release of the diaphragm and the contraction of the internal intercostal muscles. Movement of the ribs during thoracic breathing differs greatly from that seen in the clavicular breath. Instead of the entire chest heaving up and down, intercostal contraction is used to increase the circumference of the thorax, particularly in the regions from ribs six through twelve; upper portions of the chest might move little or not at all (2012, 89-90).
The data shows that the majority of voice teachers use one of the three middle body breathing for singing descriptor terms offered in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology: **rib breathing**, and that the majority of voice teachers do not use either **middle torso breathing** or **thoracic breathing**. Although there is no middle body breathing for singing descriptor term that is used by most of the voice pedagogy respondents and none that is used frequently by the majority of voice pedagogy respondents, the usage pattern suggests that there is intra-disciplinary agreement among voice teachers about the terms used to describe breathing for singing in which the middle of the body moves.

In contrast to voice teacher usage patterns, the data indicates that the majority of speech-language pathology and laryngology respondents do not use the upper body breathing for singing descriptor term
rib breathing, perhaps due to it being a somewhat less anatomical than their preferred term, thoracic breathing. Although the majority of voice pedagogy respondents do not use thoracic breathing, half of laryngology respondents and the majority of speech-language pathology respondents do. As outlined above, one possible reason for this usage pattern is that thoracic breathing may be a more anatomically accurate term than either rib breathing or middle torso breathing are. The only upper body breathing for singing descriptor term about which there is inter-disciplinary agreement is middle torso breathing, which is not used by the majority of practitioners from each discipline surveyed. Given that there is not inter-disciplinary agreement about which breathing for singing descriptor terms should be used to describe breathing for singing in which the middle body moves, and given the importance that this kind of breathing has in voice pedagogy (according to McCoy, “thoracic breathing offers excellent opportunities for the regulation of air pressure through muscular antagonism” (2012, 90)), it is possible that this is an area of breathing for singing terminology that would benefit from greater inter-disciplinary terminology standardization.

C. Lower Body Terms

McCoy calls the way of breathing for singing in which the lower body moves abdominal breathing and states that when singers use it they

... rely solely on diaphragmatic contraction for inhalation. The contraction, however, is accompanied by simultaneous relaxation of one or more pairs of abdominal muscles. As the diaphragm descends, if must displace the incompressible abdominal viscera; relaxation of abdominal muscles allows this displacement to occur. The result is an obvious outward movement of the abdominal wall ... Singers who employ a strong abdominal component in their breathing are seen to expand in all the different ways cited [in a previous paragraph] ... Exhalation in abdominal breathing is caused by contraction of abdominal muscles pulling in against the viscera, which in turn press the diaphragm back to its resting position (2012, 90).
When describing the way of breathing for singing in which the lower body moves, the data indicates that the majority of voice pedagogy respondents use four of the five lower body breathing for singing descriptor terms offered in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology: **abdominal breathing, belly breathing, deep breathing, and low breathing**. Of these four breathing for singing descriptor terms, **belly breathing** is used by the lowest number of voice pedagogy respond-

<table>
<thead>
<tr>
<th>TERM</th>
<th>Intra-Disciplinary (Voice Pedagogy) Agreement re Usage</th>
<th>Inter-Disciplinary Agreement re Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal Breathing</td>
<td>AGREEMENT: 84% use term</td>
<td>AGREEMENT: 3/3 use term</td>
</tr>
<tr>
<td>Belly Breathing</td>
<td>AGREEMENT: 55% use term</td>
<td>AGREEMENT: 3/3 use term</td>
</tr>
<tr>
<td>Deep Breathing</td>
<td>AGREEMENT: 87% use term</td>
<td>AGREEMENT: 3/3 use term</td>
</tr>
<tr>
<td>Low Breathing</td>
<td>AGREEMENT: 91% use term</td>
<td>NO AGREEMENT: 2/3 use term</td>
</tr>
<tr>
<td>Low Torso Breathing</td>
<td>NO AGREEMENT</td>
<td>NO AGREEMENT: 2/3 do not use term</td>
</tr>
</tbody>
</table>
ents. The final lower body breathing for singing descriptor term, low torso breathing is used by just under half of voice pedagogy respondents and never used by just under half, which means that there is no intra-disciplinary agreement about this term. The voice teachers' pattern of use of lower body breathing for singing descriptor terms shows that this is not an area of breathing for singing terminology that requires further standardization.

The data denotes relatively high inter-disciplinary agreement about lower body breathing for singing descriptor terms; the majority of practitioners from each discipline use three of the five terms offered in the Intra-Disciplinary Survey on Common Usage of Breathing Terminology: abdominal breathing, belly breathing, and deep breathing. Although voice teachers are divided about its usage, the majority of laryngologists and speech-language pathologists do not use the lower body breathing for singing descriptor term, low torso breathing. The final term, low breathing, is used by most voice teachers, with the majority doing so frequently. Furthermore, the data shows that while the majority of speech-language pathology respondents use low breathing, the majority of laryngology respondents never do. These usage patterns suggest that there may not be further inter-disciplinary standardization required in this area of breathing for singing terminology.
CHAPTER 5: DISCUSSION

Voice pedagogues have noted a lack of intra-disciplinary common terminology for nearly a century. As inter-disciplinary collaboration and communication increased to more effectively treat and teach singers, calls to develop a precise inter-disciplinary terminology were added to those asking for intra-disciplinary terminology systemization. Current intra-disciplinary proposals to standardize language cite the need for a “fact-based voice pedagogy and terminology [to] help foster a common nomenclature and encourage technique that is consonant with the laws of nature” (AATS 2014, 13), while the “emergence of multidisciplinary education in voice” (Chapman 2006, 258) is cited as the reason for the need to develop a common inter-disciplinary terminology. The quantitative data gathered in this research helps answer the question of whether current calls for both inter-disciplinary and intra-disciplinary terminology systemization are warranted.

5.1 Conclusions

A. Intra-Disciplinary (Voice Teachers)

The data collected through this research reveals that the majority of voice teachers use all six of the breathing for singing terms offered in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology and furthermore, that the majority of voice teachers agree about the definition of all six breathing for singing terms. Those six breathing for singing terms are: appoggio, breath control, breath management, breath support, muscular antagonism, and suspension. Of the six breathing for singing terms offered in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology, the following four are used by most voice pedagogy respondents: appoggio, breath control, breath management, and breath support. These results suggest that there is higher intra-disciplinary agreement than is currently assumed about breathing for singing terminology and usage; a conclusion that is contrary to many of the subjective statements made by voice pedagogues concerning the variability of terminology use among voice teachers.

While the breathing for singing term appoggio is used by most voice pedagogy respondents, it is used frequently by only one third and is unfamiliar to six percent of voice pedagogy respondents. This usage pattern does not seem to reflect the anecdotal prevalence of appoggio in classical voice instruction.
Voice pedagogy historian, James Stark, describes appoggio as “a total system of coordinated physical adjustments that leads to a very special kind of singing” (1999, 119) and defines it as “a complex coordination of all the muscles of singing ... rooted in the equilibrium between breath pressure and controlled phonation ... [whose] usefulness as a pedagogical concept has long been an important factor in the history of vocal pedagogy” (120). Perhaps the fact that appoggio does not have a direct correlation to an easily definable English term or to an objectively measurable singing process accounts for the relatively high level of unfamiliarity voice teachers have with the term, and for their reluctance to use it.

Another breathing for singing term whose usage pattern does not seem to reflect its importance to classical voice instruction, is muscular antagonism. According to McCoy, for example, the use of muscular antagonism during classical singing results in “increased control of breath pressure and air flow” (2012, 78). In addition, McCoy advises that it may be “used to help control pitch and loudness in singing and to stabilize the position of the larynx” (2012, 78). R. Miller states that “breathing involves muscle antagonism (and synergism)” (1986, 39) and in one case equates muscular antagonism with appoggio: “abdominal muscle antagonism (appoggio) feels both firm and supple; power and energy are not static conditions” (1986, 41).

As is the case with the breathing for singing terms appoggio and muscular antagonism, suspension’s prominence in voice pedagogy texts is not reflected in its usage patterns among voice teachers. McKinney's The Diagnosis and Correction of Vocal Faults: A Manual for Teachers of Singing and For Choir Directors states that “when properly done, suspension insures an almost effortless inception of vocal tone” (1994, 50). However, while the term is used by the majority of voice pedagogy respondents, it is used frequently by only a quarter of them.

The breathing for singing terms appoggio, muscular antagonism, and suspension are used by the majority of voice pedagogy respondents so they may not warrant efforts to further standardize them within the voice teacher population. However, the majority of voice teachers do not use these terms frequently and this reluctance to use them may suggest that greater intra-disciplinary education about these terms is justified, especially given their importance to classical voice instruction.

Despite prominent voice pedagogues cautioning that “the instruction to “support the voice” can be one of the more confusing directions a singer hears” (AATS 2014, 11), the data indicates that most voice

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teachers use the breathing for singing term **breath support**, and that the majority do so frequently. Furthermore, most voice teachers agree that **breath support** means “the dynamic relationship between the muscles of inspiration and expiration that are used to control pressure in the air supplied to the larynx” while singing. Inclusion of the term ‘dynamic’ in the definition - with its suggestion of energy, movement, and vitality - may help to alleviate concerns about its use leading to singers “overtightening the abdominal and intercostal muscles which, in turn, over-pressurizes the breath” (AATS 2014, 11).

The data reveals that most voice teachers use the breathing for singing term **breath control**. Interestingly, more voice pedagogy respondents define **breath control** as “concerned with delaying both the collapse of the ribs and the reversion of the diaphragm to its dome-shaped position” than as “a dynamic relationship between the breath and the vocal cords which determines how long you can sing on one breath.” While the survey results indicate that further intra-disciplinary standardization around this term is unnecessary, voice teachers may consider adopting the second, more vital definition of **breath control** to avoid rigidity or tension that may be introduced to the singing process by use of concepts of 'delay' and 'position-holding' that may be inferred from the first definition. The possibility of introducing unwanted tension to the singing process may account for the fact that less than half of voice teachers use **breath control** frequently.

Finally, the breathing for singing term **breath management**, is often used interchangeably with **breath support** and **breath control**, as seen in R. Miller's textbooks in particular. **Breath management** may be considered more semantically neutral than **breath control** or **breath support**, which may explain why almost as many voice teachers use it as use the breathing for singing terms **breath control** and **breath support**, and why more voice teachers use it frequently than use **breath control** frequently. Intra-disciplinary standardization about this term is not warranted as most voice teachers use the term, and the majority do so frequently. However, voice teachers who have concerns that the terms **breath control** or **breath support** may be problematic for singers may wish to consider using the breathing for singing term **breath management** instead. One comment from a voice teacher participant stated succinctly that, “both the terms control and support illicit overly muscular tension in most of my students. Management is more elastic and cerebral.”

Four upper body breathing for singing descriptor terms were offered in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology. The data reveals that the majority of voice pedagogy respondents never use **upper torso breathing** and that the majority do use the other three upper body
breathing for singing descriptor terms: clavicular breathing, high breathing, and upper chest breathing. The term that is used by the largest number of voice pedagogy respondents is also the most descriptive (and least anatomically specific) of the four upper body breathing for singing descriptor terms: high breathing. This usage pattern indicates that there is intra-disciplinary agreement among voice teachers about terms used to describe the way of breathing for singing in which the upper body moves and that there is likely no need for further intra-disciplinary standardization in this area of breathing for singing terminology.

In the case of middle body breathing for singing descriptor terms, the majority of voice teacher respondents do not use the two terms middle torso breathing or thoracic breathing and, although a majority of voice teachers use the breathing for singing descriptor term rib breathing, only twenty-nine percent do so frequently. Although this usage pattern may indicate the need for greater intra-disciplinary standardization about this area of breathing for singing terminology, it is possible that the way of breathing for singing in which the middle body moves is either not employed very often by singers, or is not described often in the voice studio. If that is the case, voice teachers would have little need to use a term to describe this way of breathing for singing.

Finally, the data indicates that the majority of voice pedagogy respondents use four terms to describe the way of breathing for singing in which the lower part of the body moves: abdominal breathing, belly breathing, deep breathing, and low breathing. Of these four terms, most voice teachers use abdominal breathing, deep breathing, and low breathing, while the more descriptive and less anatomical breathing for singing descriptor term, low breathing is used by the most voice teachers. There is no intra-disciplinary agreement about a fifth lower body breathing for singing term, low torso breathing, and the results are evenly split: less than half of voice pedagogy respondents never use the term and less than half do use the term. This usage pattern indicates that there is intra-disciplinary standardization among voice teachers in this area of breathing for singing.

Interestingly, this usage pattern is partially consistent with the results of Spillane Wilson's 1989 research, in that the directive that voice teachers found most useful when teaching breath support or breath management was “to inhale deeply, expanding the lower torso” (16). The reference to the descriptive term 'deep' or 'deeply' is consistent with current usage. However, the data indicates that the term 'lower torso' is not used frequently among currently practicing voice teachers. This may reveal a change in term usage in the two and a half decades since Spillane Wilson's research was conducted.
In *The Diagnosis and Correction of Vocal Faults: A Manual for Teachers of Singing and for Choir Directors*, McKinney asserts that “there is little agreement among teachers concerning the names of different breathing methods” (1994, 56) and in the opening chapter of *Your Voice: An Inside View*, McCoy despairs that “a single, universally accepted vocabulary describing singing is as elusive as a single, universally accepted method of breath management” (2012, 2). However, this research suggests that the majority of voice teachers agree about usage of at least one breathing for singing descriptor term to describe each of the three ways of breathing for singing, and that when given the choice, the majority of voice teachers will tend to use the most descriptive (and least anatomical) term. Some voice teachers make this choice consciously, as evidenced by the comments of one voice teacher who contacted the researcher directly: “I tend to use more descriptive wording when talking to students about the inhalation/exhalation process as it relates to singing.” Later in the correspondence, this voice teacher explains that “with some students I use more technical, anatomical terms and with some I don't. It depends on the student's learning process and the point that (s)he is at in his/her studies.”

In conclusion, this research data indicates that there may be greater intra-disciplinary commonality of usage and understanding of breathing for singing terms than previously assumed. Determining conclusive reasons for this level of standardization in terminology usage and understanding is neither within the purview, nor the intention of this research. However it is not unreasonable to posit that commonality of usage and understanding may be the result of vigorous efforts over the decades on the part of such notable voice pedagogues as William Vennard and Cornelius Reid. Given that there is intra-disciplinary commonality of usage, one possible explanation for the “strongly divergent instruction regarding breathing” (McCoy 2012, 92) that voice pedagogues assert singers experience when changing voice teachers is that some voice teachers use terms frequently and others use them only occasionally. As this research investigates only breathing for singing terminology, it is not possible to predict what agreement may exist among voice teachers about other terms regularly used in the teaching of singing. However, should this data prove reflective of the practice of voice teachers as a whole, voice teaching may have greater terminology standardization than what is currently assumed, not only about breathing for singing terminology but about other singing terms as well. If this were to be the case, then current calls for a common intra-disciplinary terminology may be warranted only for a few specific terms but not justified when applied to voice pedagogy terminology as a whole.
### B. Inter-Disciplinary (Laryngologists, Speech-Language Pathologists, Voice Teachers)

#### 5.1 Breathing for Singing Terms – Inter-Disciplinary Breakdown

<table>
<thead>
<tr>
<th></th>
<th>Frequent Use</th>
<th>Overall Use</th>
<th>Never Use / Unfamiliar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>appoggio</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0 Laryngology</td>
<td>20% Laryngology</td>
<td>80% Laryngology</td>
</tr>
<tr>
<td></td>
<td>5% Speech-Language</td>
<td>47% Speech-Language Pathology</td>
<td>52% Speech-Language</td>
</tr>
<tr>
<td></td>
<td><strong>31% Voice Pedagogy</strong></td>
<td><strong>85% Voice Pedagogy</strong></td>
<td>15% Voice Pedagogy</td>
</tr>
</tbody>
</table>

|                |                     |                              |                          |
| **breath control** | 70% Laryngology   | 100% Laryngology             | 0 Laryngology            |
|                | 50% Speech-Language | 90% Speech-Language Pathology| 10% Speech-Language      |
|                | Pathology           |                              | 8% Speech-Language Pathology |
|                | 40% Voice Pedagogy  | 92% Voice Pedagogy           |                          |

|                |                     |                              |                          |
| **breath management** | 25% Laryngology   | 70% Laryngology              | 30% Laryngology          |
|                | 41% Speech-Language | 81% Speech-Language Pathology| 20% Speech-Language      |
|                | Pathology           |                              | 10% Speech-Language Pathology |
|                | **51% Voice Pedagogy** | **90% Voice Pedagogy**     |                          |

|                |                     |                              |                          |
| **breath support** | 75% Laryngology   | 100% Laryngology             | 0 Laryngology            |
|                | 64% Speech-Language | 93% Speech-Language Pathology| 7% Speech-Language       |
|                | Pathology           |                              | 8% Speech-Language Pathology |
|                | 51% Voice Pedagogy  | 82% Voice Pedagogy           |                          |

|                |                     |                              |                          |
| **muscular antagonism** | 0 Laryngology   | 20% Laryngology              | 80% Laryngology          |
|                | 7% Speech-Language  | 35% Speech-Language Pathology| 65% Speech-Language      |
|                | Pathology           |                              | 55% Speech-Language Pathology |
|                | **23% Voice Pedagogy** | **62% Voice Pedagogy**     | 38% Voice Pedagogy       |

52 Note: the largest percentage of common usage appears in bold.
The data gathered through this research indicates that, as expected, inter-disciplinary agreement about breathing for singing terminology is lower than intra-disciplinary agreement among voice teachers. Of the six breathing for singing terms offered in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology, three are used by the majority of practitioners from all three disciplines and show inter-disciplinary agreement about their definitions. The three terms and their definitions are:

1) **breath control** - “a dynamic relationship between the breath and the vocal cords which determines how long you can sing on one breath,“

2) **breath management** - “a learned technique of breath control for singing which permits efficient handling of the breath cycle,“ and

3) **breath support** - “the dynamic relationship between the muscles of inspiration and expiration that are used to control pressure in the air supplied to the larynx” while singing.

The breathing for singing term **breath control** is used by one hundred percent of laryngology respondents, and while it is used frequently by half of speech-language pathology respondents and by the majority of laryngology respondents, the majority of voice pedagogy respondents use **breath control** only occasionally. In addition, the data indicates that voice teachers use **breath control** less frequently overall than laryngologists and speech-language pathologists do. Some speech-language pathology and voice pedagogy respondents indicated that they never use the term and some voice teachers felt strongly enough about this choice that they wrote directly to the researcher to explain: “I avoid Pressure, Control etc ... I try (although it is not easy) to use positive (or what I feel is positive) terminology.” While there is inter-disciplinary agreement overall about usage of **breath control**, the difference in inter-disciplinary usage patterns suggests that this is a term with higher endorsement from speech-language pathologists and laryngologists than from voice teachers. Inter-disciplinary difference about **breath control** is also seen in the levels of agreement about its two definitions. Definition 1:

<table>
<thead>
<tr>
<th>term</th>
<th>Frequent Use</th>
<th>Overall Use</th>
<th>Never Use / Unfamiliar</th>
</tr>
</thead>
<tbody>
<tr>
<td>suspension</td>
<td>0 Laryngology</td>
<td>15% Laryngology</td>
<td>85% Laryngology</td>
</tr>
<tr>
<td></td>
<td>4% Speech-Language Pathology</td>
<td>41% Speech-Language Pathology</td>
<td>59% Speech-Language Pathology</td>
</tr>
<tr>
<td>25% Voice Pedagogy</td>
<td>64% Voice Pedagogy</td>
<td></td>
<td>36% Voice Pedagogy</td>
</tr>
</tbody>
</table>
“concerned with delaying both the collapse of the ribs and the reversion of the diaphragm to its dome-shaped position” resonated more strongly with voice pedagogy respondents than it did with laryngology and speech-language pathology respondents. Definition 2: “a dynamic relationship between the breath and the vocal cords which determines how long you can sing on one breath” resonated more strongly with laryngology and speech-language pathology respondents than it did with voice pedagogy respondents. This difference in agreement about the definition of the term breath control suggests that voice teachers think of breath control as more torso-oriented than larynx-oriented, or that they associate certain physical thoracic sensations with the process of breath control. Laryngologists and speech-language pathologists may be more inclined to focus on vocal fold function so the definition that includes a reference to 'vocal cords' may resonate more strongly with them. Additionally, Definition 2 references a definable outcome: “how long you can sing on one breath,” which may be more appealing to speech-language pathologists and laryngologists whose medical and clinical training involves evaluating and quantifying outcomes of procedures and therapies, including stamina and duration. The inter-disciplinary difference in agreement levels about definitions of the breathing for singing term breath control, reveals that practitioners from each discipline may understand the term in slightly different ways.

The breathing for singing term breath management is used by more voice pedagogy respondents than by respondents from the other two disciplines that treat the classical singing voice. It is possible that this usage pattern reflects the fact that the term is a comparatively recent addition to voice pedagogy terminology and has not yet had the chance to permeate into other disciplines. In addition, it is possible that voice teachers consider another dimension of breath management when they use it; that of managing the musical phrase. As clinical voice practitioners do not usually focus on the musical aspects of phonation, this may not be a dimension that they consider. Another reflection about the term breath management, is that the breathing for singing term breath control is used in its definition (“a learned technique of breath control for singing which permits efficient handling of the breath cycle”). This raises two questions: Do voice practitioners who favour the more larynx-oriented definition of breath control also consider breath management to occur at the glottis? And do the respondents who favour the more body-oriented definition of breath control then extrapolate that to mean that breath management occurs predominantly in the body?

As with the term breath control, breath support is familiar to every respondent from all three disciplines. The data shows that breath management is not as well understood by speech-language patholo-
gists and laryngologists as **breath control** and **breath support** are, which may indicate that voice

teachers unnecessarily complicate inter-disciplinary communication by using the term **breath manage-

ment**. Another consideration may be that due to the fact that **breath management** may have a more

neutral semantic impact than **breath support** and **breath control**, perhaps this should be an area of fo-

cus for greater inter-disciplinary education, encouraging practitioners from all three disciplines to con-

sider changing their terminology usage.

One breathing for singing term for which a case may be made for greater inter-disciplinary standardiza-

tion, is **appoggio**. The data shows that **appoggio** is used by most voice teachers but is unfamiliar to, or

never used by the majority of both speech-language pathologists and laryngologists. Additionally, while

the majority of both speech-language pathology and voice pedagogy respondents feel that the definition

“the establishment of dynamic balance between the inspiratory, phonatory, and resonatory systems in

singing” mostly or somewhat agrees with their own definition of **appoggio**, only forty-two percent of

laryngology respondents do. Described by R. Miller as “an amazingly uniform concept of breath man-

agement ... which has dominated serious twentieth-century vocalism” (1986, 23), the breathing for

singing term **appoggio** holds an important place in the voice pedagogy field. Given this importance,

further inter-disciplinary standardization around the term **appoggio** may be justified. Alternatively,

voice pedagogues may consider implementing an English equivalent of **appoggio** that could be used

and understood more easily by voice practitioners in other disciplines. There may be voice pedagogues

who would argue that the English equivalent of **appoggio** is **breath support**, however R. Miller cau-

tions against this: “**appoggio** cannot narrowly be defined as “breath support,” as is sometimes thought,

because **appoggio** includes resonance factors as well as breath management” (1986, 23). McCoy seems

to offer the term **balanced breathing** as an option: “a breath that is a combination of the best attributes

of thoracic and abdominal breathing ... often referred to as balanced breathing or through the Italian

term **appoggio**” (2012, 91). **Appoggio** is an important concept in the instruction of classical singers but

its importance is not reflected in its usage patterns. Solutions for standardization of **appoggio** may in-

clude greater inter-disciplinary education about the term or adoption of an English term such as **bal-

anced breathing** that is more easily understood inter-disciplinarily.

The breathing for singing term, **muscular antagonism** is used by more voice pedagogy respondents

than by respondents from the other two disciplines. This may reflect a deeper need to understand and

apply principles of breathing for singing among singers and voice teachers than among those who treat

them. Of the three statements about **muscular antagonism** offered in the Inter-Disciplinary Survey on
Common Usage of Breathing Terminology, “abdominal muscular antagonism ... feels both firm and supple” has the highest agreement among voice pedagogy respondents. This statement refers to the sensation of **muscular antagonism** and is body-oriented which may appeal more to voice teachers. Although none of the three statements about **muscular antagonism** have high agreement among speech-language pathology and laryngology respondents, Statement 1, which refers to **muscular antagonism** increasing “control of breath pressure and air flow” has the highest agreement. Interestingly, this is the statement that speaks to the instigation of phonation and that has a more active sensibility due to the inclusion of the phrase 'air flow.' The statement that has the lowest agreement from all practitioners refers to how **muscular antagonism** “is used to limit the amount of pressure in the well-filled lungs;” a statement of equilibrium that may denote passivity.

Similar to **muscular antagonism**, the breathing for singing term **suspension** has low usage from all respondents but especially among speech-language pathology and laryngology respondents. While the majority of laryngology respondents do not agree with any of the five definitions of **suspension**, the definition: “balanced pressure ... between inhalation and exhalation” comes the closest.

Data related to common term and definition usage reveals a pattern wherein laryngologists and speech-language pathologists tend to view breathing for singing processes as being laryngeally-oriented and with a focus on phonation. In contrast, voice teachers seem to think of breathing for singing processes in terms of the sensations they produce in the body as a whole. It may be surmised that because most voice teachers are singers themselves, they rely on a physical and sensory relationship to the vocal instrument. Therefore, in the voice teachers population, singing is viewed through the lens of physical sensation, which leads to a more body- and sensation- oriented understanding of voice pedagogy terminology. By comparison, few laryngologists or speech-language pathologists are trained singers so their understanding of singing processes are not as sensation- or body-oriented. It is reasonable to assert that they may be more focussed at the point of phonation – the larynx. One way to bridge this inter-disciplinary gap in terminology understanding may be for speech-language pathologists and laryngologists who have an interest in specializing in the singing voice to take a course of singing lessons as part of their training or extra-curricular activities.

In summation, voice pedagogues may be justified in calling for greater levels of inter-disciplinary terminology standardization in this area of breathing for singing terms, but primarily for the three breathing for singing terms **appoggio**, **muscular antagonism**, and **suspension**. One must consider whether
the data shows that these terms are important enough to voice pedagogy that voice specialists in the fields that treat classical singers should be better educated about them. Are there alternative measures that may be taken to ensure optimal inter-disciplinary communication? The data indicates that the greatest difference in usage patterns occurs between voice pedagogy and laryngology respondents. Speech-language pathologist usage patterns more closely align with laryngologist usage patterns in four out of the six breathing for singing terms: appoggio, breath support, muscular antagonism, and suspension, and more closely align with voice teacher usage patterns in the other two breathing for singing terms: breath control and breath management. Voice pedagogy and laryngology respondents' usage patterns do not align.

5.2 Breathing for Singing Descriptor Terms – Upper Body – Inter-Disciplinary Breakdown

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<thead>
<tr>
<th></th>
<th>Frequent Use</th>
<th>Overall Use</th>
<th>Never Use / Unfamiliar</th>
</tr>
</thead>
<tbody>
<tr>
<td>clavicular breathing</td>
<td>15% Laryngology</td>
<td>55% Laryngology</td>
<td>40% Laryngology</td>
</tr>
<tr>
<td></td>
<td><strong>52% Speech-Language Pathology</strong></td>
<td><strong>85% Speech-Language Pathology</strong></td>
<td>13% Speech-Language Pathology</td>
</tr>
<tr>
<td></td>
<td>19% Voice Pedagogy</td>
<td>65% Voice Pedagogy</td>
<td>31% Voice Pedagogy</td>
</tr>
<tr>
<td>high breathing</td>
<td>10% Laryngology</td>
<td>35% Laryngology</td>
<td>60% Laryngology</td>
</tr>
<tr>
<td></td>
<td>13% Speech-Language Pathology</td>
<td>52% Speech-Language Pathology</td>
<td>42% Speech-Language Pathology</td>
</tr>
<tr>
<td></td>
<td><strong>30% Voice Pedagogy</strong></td>
<td><strong>72% Voice Pedagogy</strong></td>
<td>23% Voice Pedagogy</td>
</tr>
<tr>
<td>upper chest breathing</td>
<td><strong>20% Laryngology</strong></td>
<td>50% Laryngology</td>
<td>50% Laryngology</td>
</tr>
<tr>
<td></td>
<td>18% Voice Pedagogy</td>
<td>70% Speech-Language Pathology</td>
<td>27% Speech-Language Pathology</td>
</tr>
<tr>
<td></td>
<td>16% Speech-Language Pathology</td>
<td>57% Voice Pedagogy</td>
<td>40% Voice Pedagogy</td>
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</tbody>
</table>
The inter-disciplinary data indicates that the majority of practitioners in each discipline use the upper body breathing for singing descriptor term clavicular breathing, and that the majority of practitioners from each discipline are unfamiliar with or never use upper torso breathing. The remaining two upper body breathing for singing descriptor terms offered in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology, high breathing and upper chest breathing, have low inter-disciplinary agreement about usage. Clavicular breathing is likely the most anatomically formal upper body breathing for singing descriptor term offered in the survey and while it is used by the majority of practitioners from each discipline, most speech-language pathologists prefer to use this term. Although the usage pattern is not as high, laryngology respondents also prefer to use this more clinical term over the other terms offered. Voice pedagogy respondents show preference for the less clinical, more descriptive upper body breathing for singing descriptive term, high breathing.

5.3 Breathing for Singing Descriptor Terms – Middle Body – Inter-Disciplinary Breakdown

<table>
<thead>
<tr>
<th></th>
<th>Frequent Use</th>
<th>Overall Use</th>
<th>Never Use / Unfamiliar</th>
</tr>
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<tbody>
<tr>
<td>middle torso breathing</td>
<td>0 Laryngology</td>
<td>25% Laryngology</td>
<td>65% Laryngology</td>
</tr>
<tr>
<td></td>
<td>3% Speech-Language Pathology</td>
<td>34% Speech-Language Pathology</td>
<td>59% Speech-Language Pathology</td>
</tr>
<tr>
<td></td>
<td>11% Voice Pedagogy</td>
<td>40% Voice Pedagogy</td>
<td>56% Voice Pedagogy</td>
</tr>
<tr>
<td>rib breathing</td>
<td>10% Laryngology</td>
<td>35% Laryngology</td>
<td>65% Laryngology</td>
</tr>
<tr>
<td></td>
<td>9% Speech-Language Pathology</td>
<td>41% Speech-Language Pathology</td>
<td>54% Speech-Language Pathology</td>
</tr>
<tr>
<td></td>
<td>29% Voice Pedagogy</td>
<td>67% Voice Pedagogy</td>
<td>30% Voice Pedagogy</td>
</tr>
</tbody>
</table>
According to the data, there is inter-disciplinary agreement about just one of the middle body breathing for singing descriptor terms: middle torso breathing, in that the majority of practitioners from all three disciplines are unfamiliar with or never use it. Of the other two middle body breathing for singing descriptors terms, the majority of voice pedagogy respondents use rib breathing while the majority of laryngology and speech-language pathology respondents do not. The reverse is true of the term thoracic breathing: the majority of voice pedagogy respondents do not use the term and half or more of laryngology and speech-language pathology respondents do. As with upper body breathing for singing descriptor terms, laryngology and speech-language pathology respondents are more likely to use the more formal anatomical term (in this case, thoracic breathing) while voice pedagogy respondents are more likely to use the less formal term (in this case, rib breathing). No middle body breathing for singing descriptor terms are used frequently by a majority of practitioners from any of the three disciplines.

5.4 Breathing for Singing Descriptor Terms – Lower Body – Inter-Disciplinary Breakdown

<table>
<thead>
<tr>
<th></th>
<th>Frequent Use</th>
<th>Overall Use</th>
<th>Never Use / Unfamiliar</th>
</tr>
</thead>
<tbody>
<tr>
<td>abdominal breathing</td>
<td>50% Laryngology</td>
<td>85% Laryngology</td>
<td>15% Laryngology</td>
</tr>
<tr>
<td></td>
<td>79% Speech-Language Pathology</td>
<td>96% Speech-Language Pathology</td>
<td>2% Speech-Language Pathology</td>
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<tr>
<td></td>
<td>47% Voice Pedagogy</td>
<td>84% Voice Pedagogy</td>
<td>13% Voice Pedagogy</td>
</tr>
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<td>belly breathing</td>
<td>25% Laryngology</td>
<td>60% Laryngology</td>
<td>40% Laryngology</td>
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<tr>
<td></td>
<td>49% Speech-Language Pathology</td>
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<td>18% Speech-Language Pathology</td>
</tr>
<tr>
<td></td>
<td>19% Voice Pedagogy</td>
<td>55% Voice Pedagogy</td>
<td>41% Voice Pedagogy</td>
</tr>
<tr>
<td>Lower Body Breathing Term</td>
<td>Frequent Use</td>
<td>Overall Use</td>
<td>Never Use / Unfamiliar</td>
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<tr>
<td>--------------------------</td>
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<td>-------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>deep breathing</td>
<td>45% Laryngology</td>
<td>90% Laryngology</td>
<td>10% Laryngology</td>
</tr>
<tr>
<td></td>
<td>41% Speech-Language Pathology</td>
<td>89% Speech-Language Pathology</td>
<td>7% Speech-Language Pathology</td>
</tr>
<tr>
<td></td>
<td><strong>55% Voice Pedagogy</strong></td>
<td>87% Voice Pedagogy</td>
<td>10% Voice Pedagogy</td>
</tr>
<tr>
<td>low breathing</td>
<td>10% Laryngology</td>
<td>35% Laryngology</td>
<td>60% Laryngology</td>
</tr>
<tr>
<td></td>
<td>28% Speech-Language Pathology</td>
<td>62% Speech-Language Pathology</td>
<td>33% Speech-Language Pathology</td>
</tr>
<tr>
<td></td>
<td><strong>66% Voice Pedagogy</strong></td>
<td><strong>91% Voice Pedagogy</strong></td>
<td>8% Voice Pedagogy</td>
</tr>
<tr>
<td>low torso breathing</td>
<td>0 Laryngology</td>
<td>25% Laryngology</td>
<td>70% Laryngology</td>
</tr>
<tr>
<td></td>
<td><strong>15% Speech-Language Pathology</strong></td>
<td>41% Speech-Language Pathology</td>
<td>54% Speech-Language Pathology</td>
</tr>
<tr>
<td></td>
<td><strong>15% Voice Pedagogy</strong></td>
<td><strong>48% Voice Pedagogy</strong></td>
<td>48% Voice Pedagogy</td>
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</table>

The data indicates that a majority of practitioners in each discipline uses three of the five lower body breathing for singing descriptor terms offered in the Intra-Disciplinary Survey on Common Usage of Breathing Terminology: *abdominal breathing, belly breathing, and deep breathing*. *Abdominal breathing* is closest to being used frequently by the majority of practitioners in each discipline; it is used frequently by a majority of speech-language pathology respondents, by half of laryngology respondents, and by just under half of voice pedagogy respondents. The other lower body breathing for singing descriptor terms have inconsistent inter-disciplinary frequent usage patterns. Although both *deep breathing* and *low breathing* are used frequently by a majority of voice pedagogy respondents, *deep breathing* is used frequently by less than half of laryngology respondents and of speech-language pathology respondents. Furthermore, the majority of laryngology respondents never use *low breathing*. The breathing for singing descriptor term *low torso breathing* shows the least level of use in that the majority of speech-language pathology and laryngology respondents do not use the term, and voice pedagogy respondents are evenly divided between never using the term and using it. As is the case for upper and middle body descriptor terms, voice teachers prefer to use the more descriptive and less anatomical term, which in this case is *low breathing*. Speech-language pathology and laryngology respondents prefer the more anatomically specific lower body breathing for singing descriptor term, ab-
dominal breathing. The data shows that practitioners from all three disciplines are predisposed to avoid any breathing for singing descriptor terms that contain the word torso.

In summary, all three fields seem to have accepted a breathing for singing descriptor term for each way of breathing for singing. Voice teachers are more likely to use descriptive, less anatomical terms, while speech-language pathologists and laryngologists are more likely to use more anatomically specific terms. Middle body breathing for singing descriptor terms show the lowest level of inter-disciplinary agreement, which may be a reflection of the fact that practitioners see less of this kind of breathing for singing in the singing population, negating the need to describe it. Breathing for singing in which the upper body moves “has few advocates among voice professionals, even though this is the breathing method often seen in the general population and is extremely common among beginning singers” (McCoy 2012, 89), and it is the kind of breathing for singing that is seen quite often in studios and clinics. It is reasonable that one or more of the terms used to describe this way of breathing for singing show high usage patterns. Similarly, breathing for singing in which the lower body moves is seen often in the classical singer; if executed correctly, “the diaphragm fully descends for a relaxed and complete breath” (Ware 1998, 85). The usage patterns for this manner of breathing for singing likely reflect the usage of the singing population.

The quantitative data gathered through this research suggests that the breathing for singing terminology used by currently practicing voice teachers is more commonly used intra-disciplinarily than the calls to develop intra-disciplinary terminology would indicate. Further, the data suggests that currently practicing voice teachers are relatively uniform in their use of terminology and in their understanding of that terminology. As expected, inter-disciplinary agreement about breathing for singing terminology is lower than intra-disciplinary agreement is, but the data indicates that it is not as low as voice pedagogues suggest. Is it possible that the voice pedagogues who conclude that the development of an intra-disciplinary common terminology is necessary may be drawing on past experiences and outdated historical references?

There are larger differences in usage patterns between voice pedagogy respondents and laryngology respondents than there are between voice pedagogy respondents and speech-language pathology respondents. One factor that may explain these usage differences could be that speech-language pathologists who specialize in treating the voice may have a singing voice background. Examples of this are the
speech-language pathology participants who clarified their answers to the primary vocation demographic question with:

- a current SLP and ex voice professor,

- a singing teacher w/ MA in Speech Pathology who also practices as singing voice rehab specialist; in addition I have a PhD in Voice Science and teach in a Communications Disorders Dept at a University,

- also a singing teacher / voice teacher (x5),

- have a professional degree in Voice Performance as well as PhD in SLP, and

- both a voice teacher and speech language pathologist.

Perhaps this area of difference could be addressed specifically by, as one of the participating physicians suggested “a mini-course [to residents and fellows] after the study for anyone that wants to learn about these terms.” Sataloff seems to concur with this suggestion, and even takes it a step further as, in his eloquent argument for physicians to pursue interdisciplinary opportunities for education and creativity and to “recognize the importance of the study of the arts in making us not only better doctors, but better people as well” (1991, 409), he recommends that physicians who specialize in treating the singing voice should endeavour to study singing to (among other things) “acquire terminology experience, and understanding that cannot be achieved in other ways” (409). Perhaps some of the understanding that Sataloff refers to would be a more sensation- or body-based awareness of breathing for singing processes.

Two speech-language pathology respondents contacted the researcher directly to inquire as to why the term **costo-diaphragmatic breathing** was not included in the Inter-Disciplinary Survey on Common Usage of Breathing Terminology. Interestingly, this term is not found in any of the four most-used voice pedagogy textbooks from which the breathing for singing terms were drawn for the survey. The term **diaphragmatic-intercostal breathing** is found once in McKinney's voice pedagogy textbook in a list of possible names used throughout voice pedagogy history to describe “good breathing technique” (1994, 56). When combined with other terms to create “diaphragmatic-intercostal-upper abdominal breathing” (the “most descriptive name for the advocated method”), the term is dismissed by McKinney as “unwieldy” (56). The term **diaphragmatic-costal breathing** is found once in Ware's voice pedagogy
textbook; in the glossary where it is defined as “combined involvement of the abdominal muscles, diaphragm, and intercostal (rib) muscles in breathing” (1998, 277). McCoy alludes to the concept of diaphragmatic-intercostal breathing in that he describes appoggio as “a breath that is a combination of the best attributes of thoracic and abdominal breathing” (2012, 91), although he never uses the term itself. R. Miller, too, refers to the concept of diaphragmatic-intercostal breathing in one of his descriptions of breathing for singing, without using the actual term: “thoracic, diaphragmatic, and abdominal aspects of respiration must be coordinated (dynamic muscle equilibrium)” (1986, 23). The scarcity of voice pedagogy references to costo-diaphragmatic breathing indicates that, although the term may be important to speech-language pathologists who specialize in singing voice, it is not used by voice teachers. This points to the fact that there may be additional descriptive and mechanistic terms about which voice teachers are unaware and about which they could have greater education in order to facilitate inter-disciplinary communication.

Nearly twenty respondents (representing all three disciplines surveyed) contacted the researcher directly to communicate that the survey had caused them to consider their use of terminology in a new light. One voice teacher specified that it helped them to “refine the terms [they] use and how and why.” Some participants were introduced to new terminology such as the voice teacher who confided that they were “unfamiliar with “appoggio”” and asked for resources that they could access to fill in this gap in their pedagogical knowledge. A speech-language pathologist commented that the term suspension was completely new to them and inquired whether it was related to the “inhalatory posture” endorsed by the “bel canto school?” This was an unexpected side outcome of the survey and, in the case of the speech-language pathology respondent revealed some pre-existing knowledge of singing terminology.

What is the level of intra- and inter-disciplinary agreement about usage and definitions of breathing for singing terminology among practitioners who treat or teach classical singers? The level of intra-disciplinary agreement about usage and definitions of breathing for singing terminology among voice teachers who responded to this survey is higher than what is currently assumed by voice pedagogues. Additionally, the level of inter-disciplinary agreement about usage and definitions of breathing for singing terminology among voice practitioners from the three disciplines that responded to this survey is also higher than what is currently assumed. These results suggest that voice pedagogues may no longer be justified in asking whether it is “surprising that our friends in the medical and scientific community are often impatient and somewhat intolerant of the variety and discrepancies of our vocabulary” (Yenne 1991, 10). Are current calls to develop a common intra- and inter-disciplinary terminology justified? If
the data collected from this survey reflects current practice as a whole then, while there may be areas of inter-disciplinary terminology use that could be used and understood more uniformly, current calls to develop a common intra-disciplinary terminology may not be warranted. In 1998, McKinney opined the following about terminology use: “the real problem lies in knowing what the terms mean, and in getting teachers to agree on what they mean. Where teacher and student both understand what they mean, such terms can be an effective means of communication; however, care does need to be exercised concerning their standardization” (31). This research suggests that these cautionary words may no longer fully apply.
5.2 Limitations

One limitation of this study is the low representation in the sample population from the disciplines of speech-language pathology and laryngology. While it is not difficult to recruit appropriate voice teacher participants (those who teach classical voice in North America), the population of speech-language pathologists who specialize in treating classical voice is quite low compared to the population of voice teachers who teach classical singers. This problem is compounded in the field of laryngology, which is itself a sub-specialty of otolaryngology. Firstly, there is a very low population of laryngologists who choose to specialize in the treatment of classical singers and secondly, direct access to potential laryngology respondents is restricted by their professional associations. The low number of laryngology respondents (especially in comparison to the number of voice pedagogy respondents) lessens the significance of the data from this discipline.

Another limitation is that the voice teacher population who responded to the Inter-Disciplinary Survey on Common Usage of Breathing Terminology may not be representative of the entire voice teacher population. As outlined previously in this paper, voice teachers are not required to belong to a professional association in order to obtain or maintain teaching credentials. However, the survey was sent to membership lists of acknowledged voice teacher associations such as the National Association of Teachers of Singing and the College Music Society\textsuperscript{53}. Voice teachers who are members of professional associations may have a greater amount of pedagogical education than those who are not members. This could mean that the voice teachers who responded to the survey have had similar pedagogical influences throughout their training and careers, and thus may have a more standardized terminology than those voice teachers who do not belong to professional associations. If this is the case, conclusions drawn from data provided by voice pedagogy respondents may not wholly reflect current practice of the entire voice teacher population.

Speech-language pathologists and voice teachers contacted the researcher directly to inquire about the difference between terms that describe ways of breathing for singing that are not endorsed clinically or in the studio, but that are certainly used. For example, the way of breathing for singing in which the upper body moves\textsuperscript{54} is not condoned among voice practitioners and voice pedagogy and speech-language pathology respondents contacted the researcher directly to state that they were concerned that by

\textsuperscript{53} See Appendix 3: Professional Associations Contacted and Responses

\textsuperscript{54} See description in 5.3 Breathing for Singing Descriptor Terms: Primary Terms A. Upper Body Terms
indicating that they use certain terms to describe that way of breathing for singing, they were somehow endorsing it. One voice teacher suggested that the questions could be edited to ask which terms are used “but not necessarily endorsed,” and a speech-language pathologist asserted that “there is a distinction between what is identified and what is taught.” Another speech-language pathologist stated it succinctly: “clavicular breathing is not endorsed clinically but is definitely part of our terminology in dealing with patients.” It is possible that some respondents chose to indicate that they do not use a term presented in the survey when, in fact, they simply do not endorse it. If this is the case, then some of the usage patterns revealed by the data may not fully reflect current usage, especially of terms such as clavicular breathing or high breathing, which represent an inefficient way of breathing for singing.
5.3 Future Research

The researcher considered collecting qualitative data through targeted interviews with prominent members of each discipline, but ultimately chose to collect quantitative data from a large sample population via online survey. Future research could use qualitative research methodology to support and bring deeper understanding to the quantitative data collected by this research. In addition to qualitative research, further quantitative research would be useful to help determine the level of intra- and inter-disciplinary agreement about other singing terminology as it relates to multidisciplinary voice care, and may bring greater clarity to the reasons for these levels of agreement.

The current research had low participation from speech-language pathologists and from laryngologists in particular; future inter-disciplinary research should focus on increasing the sample populations from those disciplines for more complete data sets. In addition, future researchers should ensure recruitment of a larger base of independent voice studio teachers for a non-homogenous sample population. It may also be advisable to include more demographic questions in future surveys to provide useful information regarding regional and national inter-disciplinary agreement or disagreement, and further describe the groups of professionals who teach or treat classical singers. Other subtleties of data could also be ascertained through demographic data. As one voice teacher respondent who contacted the researcher directly suggested, “it might have been interesting to have a demographic question regarding the nature of the students being taught, allowing correlation of responses according to student level.” Another suggested that “it would be interesting to know WHERE your respondents gleaned their notions of support/appoggio (e.g., teachers (which nationality?), institutions (private or school instruction), and a list of classic voice texts which respondents may have encountered (beyond the four that you mention . . . e.g., Vennard, Husler, Coffin . . .).” As this voice teacher suggests, it would be informative to know the voice pedagogy heritage, the teaching and/or clinical experience, and singing experience of voice practitioners so that terminology usage patterns could be analyzed according to influences, geography, and educational background.

Future research could explore reasons for low agreement about certain definitions. **Muscular antagonism**, for example, is understood by clinical voice practitioners as being related more to “control of breath pressure and air flow,” than to a physical sensation. Would clinical voice practitioners be more inclined to agree that **muscular antagonism** “feels both firm and supple” following a course of singing lessons? And, in contrast, do voice teachers subscribe to sensation-based definitions because of their
singing experience? Additionally, are those voice teachers who have studied anatomy-based voice pedagogy more inclined to describe **muscular antagonism** in a less sensation-based way?

Another direction of future research could be the exploration of low agreement patterns about certain definitions of terms, such as **appoggio** and **suspension**. Do these patterns occur because voice practitioners do not understand a particular term? Or because voice practitioners do not subscribe to the provided definition?

One further area for future research may be a study of the terminology that is well-known to and used by speech-language pathologists and/or laryngologists, but not known to or used by voice teachers. The previously-mentioned **costo-diaphragmatic breathing**, which is used by speech-language pathologists, is one example of such terminology.

The current research methodology offers a template that may be used by future researchers to gather quantitative data concerning inter-disciplinary terminology usage and understanding. Additionally, this research uses quantitative data to show that there is greater intra- and inter-disciplinary standardization about breathing for singing terminology among these respondents than is currently assumed by voice professionals. While these results indicate that current calls for systematization of singing terminology may not be warranted, they do not negate the importance of voice practitioners continuing to make, in the words of Titze, “every effort ... to define our personal usage of words. Beginning sentences with “By ______ I mean” and using, as much as possible, more agreed-upon words in the definition” (1994, 49). All voice practitioners may benefit from using the “more agreed-upon words” that are revealed by this research.
Works Cited


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Malas, Marlena Kleinman. 2012. Master Class presented at Walter Hall, Faculty of Music, University of Toronto, 19 March.


Appendix 1: Brief Biographies of Persons Referenced in this Paper

APPELMAN, D. RALPH (1908-1993): Appelman, “a renowned singer” (Sell 2005, 37) who had a long and distinguished career as a voice teacher and pedagogue, established and directed an Institute for Vocal Research at Indiana University where he was a faculty member from 1951 to 1978. Appelman was an active member of NATS, the Music Educators National Conference, and the American Association of Acoustic Phonetics, and published numerous research articles in these organization’s journals (Indiana University Bloomington Faculty Council 1995).

ARISTOTLE (c. 384-322 BC): Aristotle was trained as a physician but is “best known as a philosopher.” Among other voice-related observations, Aristotle carefully noted the effects of puberty, aging, sex differences, and castration on the voice, as well as the effects of intoxication and desiccation on speech (Cooper and von Leden 1996, ).

Baldwin, Wilhelmina: A “faculty member of the Haywood Institute of Universal Song, a choral director and teacher of music pedagogics ... [as well as a] choir-singer, soloist and lecture recitalist” (Baldwin 1931), Baldwin taught “classes in Universal Song” (Watt 1922, 24) and “voice culture and the art of singing” (Boston Symphony Orchestra 1912) in Boston and surrounding areas.

BARTHOLOMEW, WILMER T. (1903-1994): Bartholomew was a Professor of Acoustics at the Peabody Conservatory of Music for nearly twenty years where he conducted research on the physiology of the voice (Rasmussen 1992, 4B), and was “the first to report on the singer's formant” (Sundberg 2003, 11).

BRODNITZ, FRIEDRICH S. (1899-1995): Brodnitz was a “well-known medical specialist in vocal disorders” (Stark 1999, 20) and longtime Chief of the Voice and Speech Clinic at Mount Sinai Medical Center in New York. In addition to numerous articles published in peer-reviewed journals, and contributions to voice pedagogy textbooks such as Doscher’s The Functional Unity of the Singing Voice, he authored two influential textbooks: Vocal Rehabilitation, and Keep Your Voice Healthy. For a comprehensive discussion of Brodnitz's life and work, see von Leden 2001.

BROWN, OREN (1909-2004): Brown began his career as a voice teacher in 1932 and was appointed to the staff of Washington University's School of Medicine in St. Louis as a Lecturer in Voice Therapy, and to St. Louis City Hospital as a Lecturer in Otolaryngology. A Juilliard Faculty Member from 1972 until 1991 and an active NATS Member, Brown served on the Editorial Board of the Journal of Voice and of the Research Committee, and was Chairman of the Committee on Vocal Education for six years (Blades-Zeller 2002, 234).
CARSON, LEON (1885-1973): Carson was one of the Founding Members of NATS in 1944. An active voice practitioner first in New Jersey and then in New York, Carson was a one-time President of NYSTA, the second President of NATS, Editor of The NATS Bulletin (precursor to the Journal of Singing) from 1948 to 1955, Associate Editor of Musical Courier, Editor of the American Guild of Organists Quarterly, and Contributing Editor to Music (Mowe 1973, 18).

PAGE: 3

CHAPMAN, JANICE L.: A member of the founding committee of the British Voice Association and a Member of the vocal departments at both the Guildhall School and the Royal Academy of Music (Guildhall School, 2015), Australian-born soprano, Chapman, is well-known for her voice pedagogy textbook, Singing and Teaching Singing: A Holistic Approach to Classical Voice, which is described by Sataloff as “a fine example of progression from eighteenth-century teaching tradition to pedagogical enlightenment of the twenty-first century … [that] represents the best of the present state of voice education and the hope of the future for teaching and learning” (Sataloff 2006a, vii).

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COFFIN, BERTON (1910-1987): Coffin was a lifelong member of AATS and, in addition to numerous major contributions to NATS (including co-founding and acting as the first president of the NATS Foundation), was its thirteenth President from 1968-1970. Coffin founded one of the first voice pedagogy departments in the United States at the University of Colorado, Boulder where he was a long-time Faculty Member (Velarde 2013, 72). His legacy in print includes a multitude of articles written for The NATS Journal and several textbooks (Ringel 1987, 21-22).

PAGES: 13, 91

DOSCHER, BARBARA (1922-1995): Doscher, a student of both Vennard and Coffin, “continued Coffin's work in voice teaching and voice pedagogy at University of Colorado, Boulder” (Velarde 2013, 72) where she served as Chair of the Voice Faculty, and was Professor Emerita. Doscher was a widely recognized vocal pedagogy clinician, a Master Teacher at the first Intern Programs sponsored by NATS (in 1991 and 1992), and published numerous research articles in peer-reviewed journals such as the Journal of Research in Singing (Blades-Zeller 2002, 237, Doscher 1995, 36).

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FERREIN, ANTOINE (1693-1796): Ferrein published an “extensive empirical study of voice production in human and animal excised larynges” in 1741, which found “1) that a close reproduction of the voice could be obtained in a cadaver by bringing the vocal bands together and blowing through the trachea from below; 2) that the vibration of the vocal bands was the essential factor in the generation of sound and that the sound ceased on touching the vocal folds; 3) that the intensity of the voice depended on the force of the air pressure; 4) that the pitch was related to the action of the cricothyroid muscles; 5) that, the vocal bands followed the laws of the vibrating strings in their relation between pitch and length” (Clements 2008, 4-5). See Cooper 1989 for a short biography of Ferrein.

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FIELDS, VICTOR ALEXANDER (1901-1992): Fields was a New York-based singing teacher who, in addition to The Singer's Glossary, wrote Training the Singing Voice: An Analysis of the Working Concepts Contained in Recent Contributions to Vocal Pedagogy, which has been called “one of the most important content analyses in vocal pedagogy” (Chia 1993, 6). Fields chaired the NATS Committee on Vocal Education, and was a member of the 1948 Committee on Basic Fundamental Requirements for Teachers of Singing.

PAGES: 4, 5, 7

FROESCHELS, EMIL (1884-1972): Fröschels was born in Vienna where he studied medicine, developed his theories and clinical practices, and founded and directed the “phoniatric section of the world famous Ear, Nose, and Throat Department at the University of Vienna” (von Leden 1990, 100). Fröschels emigrated to America in 1938 (and changed the spelling of his name to 'Froeschels') where, in addition to founding the New York Society for Speech and Voice Therapy (Brodnitz 1972, 77), he “published some 24 books and 320 chapters and articles, mostly on topics related to breakdowns in speech perception and production and to therapies aimed at remediating them” (Duchan 2012a, 459). Froeschels's pupils, Paul J. Moses, Deso A. Weiss, and Godfrey E. Arnold emigrated to America during the same time period and also made major contributions to the field of speech science in North America.

PAGES: 16, 17

GALENUS, CLAUDIUS (c. 131-201 AD): Also known as Galen of Pergamon and “second only to Hippocrates as a medical pioneer” (Guthrie 1940, 476) the Greek physician is known as the “greatest contributor to the study of the larynx in the whole of antiquity” (Cooper and von Leden 1996, 3).

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GOULD, WILBUR JAMES (1919-1994): Otolaryngologist, Gould is remembered as the primary catalyst for the evolution of the new specialty of voice care: laryngology. A graduate of Harvard University and New York University Medical School, he was a dedicated clinician, an active academic (he was on the faculty of several teaching institutions), the founder of The Voice Foundation, and instrumental in the establishment and endowment of upwards of eighty-five voice laboratories throughout the world (Sataloff 1994, 97-98).

PAGES: 21, 22

GUTZMANN, HERMANN (1865-1922): Widely credited as “the founder of phoniatrics” (Vrtička 2009, 311), Gutzmann published some 300 papers and reports in addition to twelve books, which detailed the “foundations of contemporary phoniatrics, including description of voice and speech disorders, phonetics and hearing impairment” (Kuczkowski et al 2015, 263-264). In 1888, Gutzmann founded The Berlin School for Speech and Voice Therapy, widely considered the “most renowned, prolific, and well-established training center in the late nineteenth and early twentieth centuries” (Duchan 2012b, 390).

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HOBART, HENRY (d. 1966): Hobart taught at Phillips University in Enid Oklahoma (Lyon 1955, E4) and founded the Inspiration Point Fine Arts Colony at Eureka Springs, Arkansas (Opera in the Ozarks 2015). He served on the NATS Southwestern Advisory Committee in the mid-1900s, including as the Southwest Regional Governor from 1952-1955 (Osborn 1956, 22).

PAGE: 4
MALAS, MARLENA KLEINMAN: “Widely regarded as one of the finest teachers in the country [the United States]” (Midgette 2005), Malas is a Faculty Member at the Julliard School and at the Manhattan School of Music. Her (shortened) biography can be found on the Curtis Institute of Music’s website: www.curtis.edu.
PAGE: 24

MCCOY, SCOTT: McCoy is Professor of Voice Science and Pedagogy at Ohio State University, director of the Swank Voice Laboratory, and author of the popular multimedia voice science and pedagogy textbook, Your Voice: An Inside View. A long-time NATS member, McCoy served as President from 2008-2010 and currently is Director of the NATS National Intern Program, and Associate Editor (Voice Pedagogy) of the Journal of Singing. In addition, McCoy is a founding faculty member of the NYSTA professional development program (Ohio State University 2015).
PAGES: 34, 37, 64, 66, 68, 72, 75, 79, 87

MCKINNEY, JAMES C. (1921-1998): A student of Vennard, McKinney began his voice-teaching career at the Southwestern Baptist Theological Seminary (Texas) in 1950 where he became Dean of Church Music and a Distinguished Professor of Voice. In addition to serving as a faculty member at the first International Congress of Voice Teachers in Strasbourg and on the faculty of The Voice Foundation Symposium on the Care of the Professional Voice, he was Editor of The NATS Journal (later called the Journal of Singing) beginning in 1987 and President of NATS when he passed away in 1998 (Coldiron 1998, 4, Velarde 2013, 74).
PAGES: 13, 24, 34, 36, 64, 72, 75, 86, 88

MILLER, DONALD GRAY: Miller began his career as a bass-baritone and voice teacher. Since 1987, he has worked closely with voice researcher Harm K. Schutte at the Groningen Voice Research Lab researching the acoustics and physiology of the singing voice. He designed and developed VoceVista (www.vocevista.com); a software program that gives real-time spectrum analysis of the voice, and that is used in voice labs and facilities for training singers throughout the United States, Germany, the Netherlands (VoceVista 2007), and Canada.
PAGE: 9

MILLER, RICHARD (1926-2009): Miller is a towering figure in the voice pedagogy field. The author of six influential voice textbooks (see Works Cited), Miller was a Professor of Singing at the Oberlin Conservatory of Music for over forty years where he founded and directed the Otto B. Shoepfle Vocal Arts Center. Miller was the editor of The NATS Journal (later called the Journal of Singing) from 1980-1987 and “brought the science of pedagogy to the voice teacher via his regular column Sotto Voce” (Velarde 2013, 74).
PAGES: 8, 12, 13, 22, 34, 64, 72, 73, 79, 87

MOORE, G. PAUL (1907-2008): Moore did his doctoral dissertation on laryngeal stroboscopy in 1936 and, together with Hans von Leden, developed an inter-disciplinary unit for the continued study of vocal anatomy and physiology using the new techniques, at Northwestern University’s College of Medicine in Chicago (von Leden 1990, 104). Noted for his contributions to the fields of audiology and speech-language pathology, Moore was a Professor of Speech at the University of Florida (Velarde 2013, 74).
PAGES: 18, 22
REID, CORNELIUS L. (1911-2008): “One of the most highly respected vocal coaches and theorists in vocal pedagogy of the past quarter century” (Baily 1985, 517), Reid “wrote extensively on applying science to voice pedagogy” (Velarde 2013, 74) and taught singing lessons in his New York studio until eleven days before his death at the age of 97 years old (Cornelius L. Reid 2015).

PAGES: 7, 75

SCHUTTE, HARM K.: Schutte is an otolaryngologist and medical speech specialist and (retired) Research Director at the University of Gronigen's Voice Research Lab, who worked closely with leading voice pedagogues such as Richard Miller (See Works Cited) and Donald G. Miller (See Works Cited).

PAGE: 8

SEASHORE, CARL EMIL (1866-1949): Seashore wrote over 235 books and articles and is “renown for his work in psychology, musicology, the science of human development, and university administration” (Miles 1956, 265). He was made Dean of the Graduate College of the State University of Iowa in 1908, and in that role established (among other programs) the Iowa Psychological Clinic, the Psychopathic Hospital at the University of Iowa, the Iowa Institute for Mental Hygiene, and the Iowa Child Welfare Research Station.

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SEEMAN, MILOSLOV (1892-1975): Seeman, a “prominent Czech physician” (Svec and Sram 2006) established an outpatient department for diseases of speech and voice and impaired hearing at the Prague Otologic Clinic in 1922, and the world's first academic phoniatric clinic and laboratory at the Medical Faculty of Charles University in Prague in 1967 (Vrtička 2009, 313).

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SHAW, W. WARREN (1866-1939): American voice teacher, Shaw was a student of Lamperti, Shakespeare, and Vannuccini, and was a prolific writer for The Musician magazine, by whom he is described as, “an acknowledged authority on the scientific phases of voice production, besides being an eminently successful teacher of voice” (Shaw 1928, 24). His best-known work, Authentic Voice Production (1930) is “based largely on a series of articles previously published in The Musician” and was written with the main purposes of “the standardisation and stabilisation of fundamental principles of theory and practice in voice-production” (G.G. 1930, 894). See Works Cited for a sampling of Shaw's articles and books.

PAGE: 3

SONNINEN, AATTO (1922-2009): Sonninen held degrees both in otorhinolaryngology (1957) and phoniatrics (1956) from the University of Helsinki Medical School and was instrumental in founding the Finnish Association of Logopedics and Phoniatrics (Wendler 2009, 1).

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SPILLANE WILSON, KATHLEEN: A recipient of The Voice Foundation's Van L. Lawrence Fellowship for “demonstrated excellence in teaching of singing and active interest in voice science and pedagogy,” Wilson is a Vocal Professor and Faculty Fellow at Florida International University School of Music (FIU 2016).

PAGES: 7, 8, 74
STANLEY, DOUGLAS (1890-1958): After qualifying as a Doctor of Science in England, Stanley came to America to study voice. Stanley “is either revered or reviled by more singers and teachers than any other writer on voice, except Garcia” (Vennard 1965, 3), due in large part to the controversial manual manipulation methodology he espoused.

PAGES: 13, 22

STERNE, HUGO (1877-1941): Stern, an Austrian laryngologist established the first clinic for speech defects in Prague in 1904, and was Director of the Department for Speech and Voice Defects, and later the Director of the Phoniatric Department of the Laryngology Clinic at the Emperor Franz Joseph Outpatients' Clinic of the Jubilaumsspital in Vienna (Killy and Vierhaus 2005, 528). According to some biographers, Stern was the first to discuss the necessity of a uniform nomenclature for physiology, pathology, and education of the voice (Mureșan and Cosgarea 2013, 37).

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TITZE, INGO (b. 1941): “Pursuing a deep interest in understanding the complexities of human sound production, particularly singing, ... [Titze's] dissertation on computational modeling of vocal fold vibration launched a career in research and teaching that has had a profound influence on the field of voice and speech science” (Story et al 2013, 4018). Titze is an active member of both NATS and The Voice Foundation, the Executive Director of the National Center for Voice and Research, and a singing teacher and University of Iowa Foundation Distinguished Professor of Speech Science and Voice (Velarde 2013, 74). For more information see Story et al (2013), and www.ncvs.org.

PAGES: 7, 8, 92

VAN DEN BERG, JANWILLEM (1920-1985): Dutch speech scientist and medical physicist, van den Berg was the Director of Research in the physiology laboratory of the State University at Groningen in Holland, and long-time voice research collaborator with Harm Schutte.

PAGES: 5, 18

VENNARD, WILLIAM (1909-1971): Vennard was an American singer, voice teacher, and “pioneer in the science of singing and in voice pedagogy [who] was instrumental in fostering collaborative efforts between singers, physicists, psychologists, and voice scientists” (Cleveland 2013). He wrote the seminal voice pedagogy textbook, Singing – the Mechanism and the Technic, and contributed articles to several peer-reviewed journals such as Acoustical Society of America, and Folia Phoniatrica, in addition to many research articles written for The NATS Bulletin (Journal of Singing), and numerous articles explaining singing and teaching singing for the American Music Teacher. Vennard was a founding member of NATS, its President from 1964-1966, and long-time Faculty Member of the Voice Department, School of Music at the University of Southern California.

PAGES: 5, 6, 7, 13, 22, 75, 91

VON LEDEN, HANS (1918-2014): Known as “a critical researcher and clinician in the development of the analysis and interpretation of laryngeal images” (Pacific Voice & Speech Foundation 2016) and his inter-disciplinary approach to treating voice professionals, laryngologist, von Leden held teaching positions at Northwestern University, UCLA Medical School, and University of Southern California (Los Angeles Times 2014).

PAGE: 22
WARE, CLIFTON (b. 1937): Ware, a professor emeritus of the University of Minnesota-Twin Cities describes *Basics of Vocal Pedagogy: The Foundation and Process of Singing* as a “comprehensive introductory textbook for vocal pedagogy classes at the college and university level” that “presents a pragmatic, unified pedagogy based on an eclectic integration of both scientific-mechanistic and holistic approaches” (1998, viii). Along with *Adventures in Singing*, *Basics of Vocal Pedagogy* is widely used for university-level pedagogy courses in North America (Ware 2015). For a comprehensive treatment of Ware's contribution to voice pedagogy, see Velarde 2013.

PAGES: 11, 22, 34, 64, 87

WILCOX, JOHN C. (1870-1947): Wilcox, a founding member of NATS and its first President (1944-1946), began and chaired the Committee on Vocal Education and the Research Committee (Chia 1993, 29) during his tenure. He became a member of AATS in 1927 and of the Chicago Singing Teachers Guild in 1936 (Ringel 1990, 11) and authored several books on voice training (Special to The New York Times 1947).

PAGE: 4

YENNE, VERNON (b. 1938): Yenne is an Emeritus Professor of Voice at Wichita State University (where he taught from 1966 to 2008) and has been an active NATS member throughout his career, serving in many capacities including that of President from 1991-1993.

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Appendix 2: Samples of Research to Clarify Singing Terminology 1960-2014

**belting:**


Correlation analysis and linear regression analysis shows that perceptual ratings of “vibrato” and “ring” are most highly correlated to elite student belters, and that “vibrato” and “ring” highly correlate with perceived loudness.


Analysis of selected acoustical and physiological characteristics of “belt” and “legit” singing of professional female singers fails to reveal a useful and universally accepted definition of “belting.”


Spectrographic, electroglottographic, and sub- and supraglottal pressure measurements of “operatic” and “nonclassical” singing show acoustic and laryngeal differences and lead to an objective definition of “belting.”

**coup de glotte:**


Following a review of the literature concerning the “coup de glotte,” a defense of Garcia's original concept is offered. In conclusion, the authors suggest avoidance of the term because of the prevalent misunderstanding of it.
**open throat:**


Research findings suggest that there is a sound quality associated with the use of “open throat” technique, and that the specific vocal quality in classical singing that it produces can be reliably identified by expert listeners.


Researchers conclude that, through qualitative, acoustic, and perceptual studies, they have defined the term “open throat” as a technique, an action, and a sound quality.

**placement:**


Acoustic analysis of singing voices reveals that “forward placement” correlates with higher frequencies of the second (F2) and third (F3) formants.


Results indicate that perception of “forward placement” correlates with higher frequencies of the first and second formants, and with the higher frequency and level of the singer's formant.

**registers:**


Data shows that aeromechanical mechanisms of vocal fold vibratory behaviour are substantially different between modal and vocal fry registers.

Use of MRI to track vocal tract shaping during lower and upper register transitions suggests that register transition is not primarily the result of modifications of the vocal tract.


Based on spectrographic, electroglottographic, and sub- and supraglottal pressure measurements of professional singers' 'correct' and 'incorrect' singing of passaggio, this study offers a definition of the 'chest'/’head' distinction.

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Measurements made by electroglottograph, pharyngeally placed wide-band pressure transducers, and an external microphone of sopranos using the “flageolet register,” reveal characteristic patterns of vocal fold movement and vocal tract formants that are specific to the register, providing a physical definition of the “flageolet register.”


Investigation of terms used to describe registers and to describe standard pitch with hope that investigators' suggestions for new terms will “contribute to a better understanding of various terminologies ...”. Authors suggest the “five basic registers” be called “the deepest range, the deep level, the mid level, the high level, and the highest range”.

---

Research suggests that terminology of registers is organized depending on their relation to the four laryngeal vibratory mechanisms.


Spectral analysis is used to determine the relationship between resonance balance and several categories of registration timbres identified in the historic Italian school.


Researchers analyze and evaluate several explicit and implicit assumptions that are embedded in the concepts, terminologies, and practices related to vocal registers.


Lists terms used to describe registers in many languages from the thirteenth century to the late 1980s and suggests a reading list to help voice teachers understand the history of register-related terms.


Data shows relationships between acoustic, configurational, and muscular characteristics of vocal registers.

Registration of four singers studied using hooked-wire electrodes inserted transcutaneously into muscles associated with phonation shows activation of specific musculature for each register.

support:


Study suggests that vocal vibrato is directly related to the sensation of “support”.


Results of data analysis show that the “supported” singing voice has different spectral characteristics from and higher SPL, peak airflow, and Ps than the “unsupported voice” ... but no significant differences in breathing activity were found.


Research data supports the assumption that the term “support” has similar meaning to voice experts and should thus be useful in singing voice terminology.


Research shows that there is no observable auditory difference between “supported” singing and good singing voice quality.

Study results suggest that greater “abdominal support” is required for greater projection and is obtained by increased activation of abdominal muscles acting medially.

*voice quality terms (resonance/ring, color/warmth, clarity/focus, vibrato, throaty, sonorous, etc.)*


Study results show that sounds that involve relatively restricted oropharyngeal cavities facilitated a greater extent of facial bone vibration during “resonant” voice production.


Research results could help bridge the terminology gap between vocal artists and scientists, and help to promote understanding of the way in which acoustic stimuli influence perception of voice quality.


Study shows that the main acoustic correlates of “throatiness” seemed to be an increase of F1, a decrease of F4, and, in front vowels, a decrease of F2, which presumably results from a narrowing of the pharynx.


Results of the research are expected to contribute to the development of a method of automated computer assessment of singing quality.
Findings show that first formant tuning is exhibited during “resonant” voice production and that the degree of harmonic enhancement in the range of 2.0 to 3.5 kHz is related to voice quality. In addition, data indicates that laryngeal vestibule constriction is not consistently associated with “resonant” voice production.

Findings indicate that ease of production and vibrancy of “resonant” voice depends more on lowering phonation threshold pressure than on tissue or air resonance in or around the face.

Attempts to analyze function during “breathy,” “normal,” “covered,” and “focussed” production.

Research data shows that average CQs distinguish “resonant” from “pressed” tone quality in the singing voice, but inconsistently distinguish “resonant” from “breathy” tone quality.

Piezoelectric accelerometer is a useful tool for objectively measuring the extent of bone vibration in “resonant” voice phonation.
Appendix 3: Professional Associations Contacted and Responses

I. Voice Pedagogy

A. College Music Society – survey sent via direct email to members (no cost for distribution) – 30 January 2014

B. National Association of Teachers of Singing – survey link included in monthly newsletter (no cost for distribution) – February 2014

C. National Association of Teachers of Singing – Ontario Chapter – survey link included in monthly newsletter (no cost for distribution) – February 2014

D. Royal Conservatory of Music – unwilling to distribute to members – January 2014

II. Speech-Language Pathology

A. American Speech-Language Hearing Association - $100 for distribution to 300 names but no category to target SLPs that work with singers – December 2013

B. Voice and Speech Trainers Association – no response to multiple contact attempts – January 2014

C. Louisiana Board of Examiners for Speech-Language Pathology and Audiology – no response to multiple contact attempts – February 2014

III. Laryngology

A. American Head and Neck Society - $500 for distribution to membership – filled in application to have fee waived but did not hear back from association before survey closed – February 2014

B. American Laryngological Association – do not “participate in research that was not created and initiated by the Association” - February 2014

C. International Federation of Oto-Rhino-Laryngological Societies – no response to multiple contact attempts – February 2014

IV. Inter-Disciplinary

A. The Voice Foundation – “not able to facilitate research projects for any person, group or institution” – December 2013
Appendix 4: Researcher-Developed Distribution List

I. Laryngology
   - Albert Einstein College of Medicine (www.einstein.yu.edu) Otolaryngology Faculty Listing
   - American Academy of Otolaryngology-Head and Neck Surgery (www.entnet.org) Find an ENT Search Engine (search by State and by Province)
   - American College of Surgeons (www.facs.org) Advisory Council for Otolaryngology – Head and Neck Surgery Roster
   - American Head and Neck Society (www.ahns.info) Executive Director & Marketing Manager
   - American Laryngological Association (www.alahns.org) Faculty List
   - Canadian Rehab Directory (www.canadianrehabdirectory.com) Otolaryngology Listing
   - Canadian Society of Otolaryngology – Head & Neck Surgery (www.entcanada.org) Canadian Departments of Otolaryngology
   - Canadian Society of Otolaryngology – Head & Neck Surgery (www.entcanada.org) Council Contact List
   - ENT Today Online Magazine (www.enttoday.org) Advertisers List
   - Harvard Medical School (www.massgeneral.org) Laryngology Contact List
   - Institute of Laryngology and Voice Restoration, Voice Health Institute (www.voicehealthinstitute.org) Newsletter Contact List
   - International Association of Laryngectomees (www.theial.com) Physician List
   - International Federation of Oto-Rhino-Laryngological Societies (www.ifosworld.org) North American Members List
   - Mount Sinai (www.mountsinaihfpa.org) Faculty Practice Associates / Otolaryngology Faculty List
   - Northwestern University Scholars (www.scholars.northwestern.edu) Search: “Laryngology”
   - SUNY Downstate Medical Center (www.downstate.edu) Department of Otolaryngology Faculty Contact List
   - Tufts Medical Center (www.tuftsmedicalcenter.org) ENT – Head and Neck Surgery Physician Search
   - University of California, Irvine, Department of Otolaryngology Head and Neck Surgery (www.ent.uci.edu)
   - University of California, Los Angeles (David Geffen School of Medicine) Head and Neck Surgery (http://headandnecksurgeru.ucla.edu) Faculty List
- University of Colorado, Denver ([www.ucdenver.edu](http://www.ucdenver.edu)) Department of Otolaryngology Faculty List
- University of Connecticut Health Center ([www.uconnent.uchc.edu](http://www.uconnent.uchc.edu)) Otolaryngology – Head and Neck Surgery Faculty List
- University of Michigan ([www.umich.edu](http://www.umich.edu)) Otolaryngology-Head and Neck Surgery Faculty List
- University of North Carolina at Chapel Hill ([www.med.unc.edu](http://www.med.unc.edu)) School of Medicine Department of Otolaryngology / Head and Neck Surgery Faculty List
- University of Ottawa, Department of Otolaryngology – Head & Neck Surgery ([http://www.med.uottawa.ca/Otolaryngology/eng/People.html](http://www.med.uottawa.ca/Otolaryngology/eng/People.html)) Faculty List
- University of Texas – San Antonio Health Science Center ([www.uthscsa.edu](http://www.uthscsa.edu)) Department of Otolaryngology Voice Center Team List
- University of Wisconsin, Department of Surgery ([www.surgery.wisc.edu](http://www.surgery.wisc.edu)) Otolaryngology-Head & Neck Surgery Division Faculty List
- Voicedoctor.net ([www.voicedoctor.net](http://www.voicedoctor.net)) Physician List
- Weill Cornell Medical College ([www.cornellent.org](http://www.cornellent.org)) Voice Disorders / Laryngology Service Faculty List

II. Speech-Language Pathology

- American Speech-Language-Hearing Association ([www.asha.org](http://www.asha.org)) Contact Information
- Cincinnati Children's Hospital Medical Center ([www.cincinnatichildrens.org](http://www.cincinnatichildrens.org)) Speech Language Pathology Team Contact List
- International Association of Laryngectomees ([www.theial.com](http://www.theial.com)) Speech-Therapist List
- Kentucky Speech-Language-Hearing Association ([www.ksha.info](http://www.ksha.info)) Resources List
- Louisiana Board of Examiners for Speech-Language Pathology and Audiology ([www.lbespa.org](http://www.lbespa.org)) Contact Information
- McNeill Dysphagia Therapy Program ([www.procourseceus.com](http://www.procourseceus.com)) Certified Providers List
- National Association of Teachers of Singing Directory ([www.nats.org](http://www.nats.org)) SEARCH: pathologist
- University of Colorado, Boulder ([www.speechlanguagepractice.org](http://www.speechlanguagepractice.org)) Speech Language Practice Alumni Corner
- University of Iowa, Department of Communication Sciences and Disorders ([www.uiowa.edu](http://www.uiowa.edu)) Voice Team Locator
- University of Minnesota Speech-Language Hearing Sciences Department ([www.slhs.umn.edu](http://www.slhs.umn.edu)) Staff List
- University of Tennessee Health Science Center ([www.uthsc.edu](http://www.uthsc.edu)) Department of Audiology and Speech Pathology Faculty List
- University of Washington ([www.washington.edu](http://www.washington.edu)) Speech and Languages Division Faculty List
- University of Wisconsin – Milwaukee, College of Health Sciences ([http://www4.uwm.edu/chs](http://www4.uwm.edu/chs)) Communication Sciences & Disorders Faculty & Staff Contact List
- Voice and Speech Trainers Association (VASTA) ([www.vasta.org](http://www.vasta.org)) Find a Voice Pro Page Search: Canada, United States

III. Voice Pedagogy
- Florida Sings ([www.floridasings.com](http://www.floridasings.com)) Associate Teacher List
- MultiVoiceDimensions ([www.multivoicedimensions.org](http://www.multivoicedimensions.org)) Practitioners List
- National Association of Teachers of Singing, Ontario Chapter Membership
- National Association of Teachers of Singing – Puget Sound Chapter ([www.pugetsoundnats.org](http://www.pugetsoundnats.org)) Teacher List
- Previous Survey Conducted by Researcher, Contact List
- Vocalist.org ([www.vocalist.org](http://www.vocalist.org)) Voice Teachers List

IV. Inter-Disciplinary
- Bastian Voice Institute ([www.bastianvoice.com](http://www.bastianvoice.com)) Staff List
- Blaine Block Institute for Voice Analysis and Rehabilitation ([www.bbvivar.com](http://www.bbvivar.com)) Staff List
- Boston Singers' Resource ([www.bostonsingersresource.com](http://www.bostonsingersresource.com)) Vocal Health Directory
- Fall Voice Conference ([www.fallvoice.org](http://www.fallvoice.org)) Planning Committee List
- International Congress of World Voice Consortium Membership List
- Journal of Singing ([www.nats.org](http://www.nats.org)) Search for article authors: sing*, breath*
- Journal of Voice ([www.jvoice.org](http://www.jvoice.org)) Search for article authors: sing*, breath*
- Lakeshore Ear, Nose, and Throat Center ([www.lakeshoresent.com](http://www.lakeshoresent.com)) Voice Team Listing
- Lions Voice Clinic at University of Michigan ([www.lionsvoiceclinic.umn.edu](http://www.lionsvoiceclinic.umn.edu)) Staff List
- Medical University of South Carolina ([www.muschealth.com](http://www.muschealth.com)) Evelyn Trammell Institute for Voice and Swallowing Faculty List
- Multidisciplinary Treatment of the Professional Voice Conference 2009 Faculty List
- MultiVoiceDimensions ([www.multivoicedimensions.org](http://www.multivoicedimensions.org)) Practitioners List
- National Center for Voice and Speech ([www.ncvs.org](http://www.ncvs.org)) Faculty List
- National Spasmodic Dysphonia Association ([www.dysphonia.org](http://www.dysphonia.org)) Healthcare Referral Contact
- New York Eye and Ear Infirmary of Mount Sinai (www.nyee.edu) The Voice and Swallowing Institute Voice Team List
- Oberlin College & Conservatory (https://new.oberlin.edu) Vocal Symposium Presenter List
- Pacific Voice & Speech Foundation (www.pvsf.org) Membership List
- Plural Publishing (www.pluralpublishing.com) Author Index
- Rehabilitation Institute of Chicago, Center for Aphasia Research and Treatment (www.ric.org) Staff List
- University of Iowa, Department of Communication Sciences and Disorders (www.uiowa.edu) Voice Team Locator
- University of Minnesota Speech-Language Hearing Sciences Department (www.slhs.umn.edu) Staff List
- University of Kansas (www.ku.edu) Music Education and Music Therapy Division Faculty
- University of Pittsburgh Medical College (www.upmc.com) Ear, Nose, and Throat Voice Center Faculty List
- University of Tennessee Health Science Center (www.uthsc.edu) Department of Audiology and Speech Pathology Faculty List
- University of Texas – San Antonio Health Science Center (www.uthscsa.edu) Department of Otolaryngology Voice Center Team List
- Voice Foundation (www.voicefoundation.org) Board Member List & Membership List
- Weill Cornell Medical College (www.cornellent.org) Voice Disorders / Laryngology Service Faculty List
Appendix 5: Distribution Count from Researcher-Developed Distribution List (by Province/State)

<table>
<thead>
<tr>
<th>Province/State</th>
<th>Laryngology</th>
<th>Speech-Language Pathology</th>
<th>Voice Pedagogy</th>
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Appendix 6: Voice Pedagogy Textbook Survey

I. Survey Description:

The purpose of the Voice Pedagogy Textbook Survey was to discover which English language voice pedagogy textbooks that were published between 1985 and 2010 are used most often to teach voice pedagogy courses in North American tertiary institutions. The survey was a one-time, cross-sectional, online questionnaire containing primarily closed-ended, multiple-choice text data questions that was developed by the researcher using the online survey software, Survey Monkey. It was sent to sample populations in North America and was distributed using one of two methods: 1) emailed directly to sample population members, and 2) general link posted on NATS website. Respondents provided information about the quantity of voice pedagogy courses offered at their institution, the level (undergraduate, masters, or doctoral), the course duration, how many years the course(s) have been offered, the class sizes, and how long the instructor had been teaching the course. Respondents then indicated which of the provided English-language voice pedagogy texts written between 1985 and 2010\textsuperscript{55} were used in their institution's voice pedagogy course.

II. Survey Results:

The Voice Pedagogy Textbook Survey closed in May 2014 with a total of 202 completed and useable responses. Survey results show that the four voice pedagogy textbooks that are used most-often in tertiary-level voice pedagogy courses are:

\textsuperscript{55} See Appendix 10: Textbook Review 1985-2010


III. Voice Pedagogy Textbook Survey

1. **Demographic Information:**

   Name:

   Degree:

   Title/Position at Current Institution:

   Current Institution Name:

   * Institution City/Town:

   Email Address:

2. *Please provide your institution's location information:*

   Province / State:

   | Drop Down List of Provinces and States |
Country:

Drop Down List of Countries

3. **Voice Pedagogy Course Information:** how may voice pedagogy courses are offered at the institution and what is the average total enrollment in these courses?

   Total Courses Offered
   
   Drop Down Numerical List: 1, 2, 3, 4, > 5

   Total Enrollment in All Courses
   
   Drop Down Numerical List: 0-10, 10-20, 20-30, 30-40, 40-50, > 50

4. **First Course Information** (if your institution offers more than one voice pedagogy course, please choose the course with the highest enrollment number for this question):

   Course Name:

   Course Code:

5. **Course Demographics:**

   Course Level
   
   Drop Down List: Undergraduate, Graduate (Masters Level), Graduate (Doctoral Level)

   Average Course Enrollment Per Year
   
   Drop Down Numerical List: 0-10, 10-20, 20-30, 30-40, 40-50, > 50
Course Duration

Drop Down List: 1 Semester, 2 Semesters, > 2 Semesters, OTHER

Course Offered

Drop Down List: Annually, Bi-Annually, OTHER

Number of Years Course Offered

Drop Down Numerical List: 0-5, 5-10, 10-15, 15-20, > 20

Number of Years Instructing Course

Drop Down Numerical List: 0-5, 5-10, 10-15, 15-20, > 20

Other:

6. **Which of the following English language voice pedagogy texts published between 1985 and 2010 are used in this course:**

Required Text

Drop Down Textbook List

Required Text

Drop Down Textbook List

Required Text

Drop Down Textbook List

Recommended Text

Drop Down Textbook List

Recommended Text

Drop Down Textbook List
Recommended Text

Drop Down Textbook List

[The survey offers twenty 'Recommended Text' drop down boxes.]

Other (please specify):

7. *Does your institution offer more than one voice pedagogy course?*
   - [ ] No it does not, please take me to the end of the survey.
   - [ ] Yes it does, please take me to the next page of the survey.

[Respondents who choose NO are taken to the final page of the survey. Respondents who choose YES answer questions #4-6 for as many courses as their institution offers.]

Final Page:

Thank you for taking the time to fill out this survey! (And please be sure to click 'done' below!) If you have any comments, questions, or concerns, feel free to email me directly:

shannon.coates@utoronto.ca
Appendix 7: Survey Introductions

I. Primary Email Introduction to Survey:

Subject: Interdisciplinary Survey on Common Usage of Breathing Terminology

Dear Voice Practitioner,

My name is Shannon Coates and I am a doctoral candidate in Vocal Performance, Specializing in Vocal Pedagogy at the University of Toronto, under the supervision of Professor Lorna MacDonald, Lois Marshall Chair in Voice Studies. My area of research is the interdisciplinary use of terminology used to describe breathing for classical singing and I have created a survey to find quantitative data showing the level of consistency of terminology used by speech language pathologists, otolaryngologists, and singing teachers throughout North America.

The survey was approved by the University of Toronto Ethics Board on 24th January, 2014. Your participation is completely anonymous and voluntary, and data collected from this survey will remain confidential and non-identifiable, and will be used for research purposes only. While participation in this survey will not benefit you directly, it will contribute to the voice community as a whole, and you may find benefit from reflecting upon the terminology that you use in your studio, clinic, or practice.

The survey takes approximately 20 minutes and you may complete it all at once, or in more than one sitting. By clicking on the survey link, you are consenting to voluntary participation, and you are acknowledging that you are at least eighteen years of age and that you treat or teach classical singers in your studio, clinic, or practise.

I anticipate collecting data from 1st February 2014 until 15 March 2014, after which the survey link will no longer be active.

As a larger survey sample size will ensure more significant data, leading to a greater impact on the clarification of terminology used in the voice community, I would be grateful if you would consider forwarding this email with the survey link to any of your colleagues who teach or treat classical singers.

The survey may be accessed via this link: Interdisciplinary Survey on Common Usage of Breathing Terminology

If you have any questions concerning my research or the survey, please contact me or my supervisor (contact information below). Your time and dedication to voice research is valuable and highly appreciated.

Sincerely,

Shannon Coates, DMA Candidate
University of Toronto - shannon.coates@utoronto.ca

Professor Lorna MacDonald, Lois Marshall Chair in Voice Studies
University of Toronto - lorna.macdonald@utoronto.ca
Interdisciplinary Survey on Common Usage of Breathing Terminology

This survey was created by Shannon Coates (DMA Candidate, University of Toronto) to find quantitative data showing the level of consistency of terminology used by speech language pathologists, otolaryngologists, and singing teachers throughout North America.

The survey was approved by the University of Toronto Ethics Board on 24th January, 2014 and forms a major part of Shannon's doctoral research. Your participation is completely anonymous and voluntary, and data collected from this survey will remain confidential, non-identifiable, and will be used for research purposes only. While participation in this survey will not benefit you directly, it will contribute to the voice community as a whole, and you may find benefit from reflecting upon the terminology that you use in your studio, clinic, or practice.

The survey takes approximately 20 minutes to complete and you may complete it all at once, or in more than one sitting. By clicking on the survey link, you are consenting to voluntary participation, acknowledging that you are at least eighteen years of age, and that you treat or teach classical singers in your studio, clinic, or practice.

Shannon anticipates collecting data from 1st February 2014 until 15 March 2014, after which the survey link will no longer be active.

As a larger survey sample size will ensure more significant data, leading to a greater impact on the clarification of terminology used in the voice community, Shannon would be grateful if you would consider forwarding the survey link to any of your colleagues who teach or treat classical singers.

The survey may be accessed via this link: Interdisciplinary Survey on Common Usage of Breathing Terminology

If you have any questions concerning the research or the survey, please contact Shannon or her supervisor (contact information below). Your time and dedication to voice research is valuable and highly appreciated.

Shannon Coates, DMA Candidate in Vocal Performance, Specializing in Voice Pedagogy, University of Toronto

shannon.coates@utoronto.ca

Professor Lorna MacDonald, Lois Marshall Chair in Voice Studies, University of Toronto

lorna.macdonald@utoronto.ca
Appendix 8: Interdisciplinary Survey on Common Usage of Breathing Terminology

Survey Information:

The topic of this survey is the interdisciplinary use of terms used to describe breathing for singing in western art music, commonly known as classical singing. The survey was created and is being conducted by Shannon Coates, a Doctor of Musical Arts Candidate in Vocal Performance, specializing in Vocal Pedagogy at the University of Toronto, under supervision of Professor Lorna MacDonald, Lois Marshall Chair in Voice Studies.

Participation:

Anticipated participants are Singing Teachers, Speech Language Pathologists, and Otolaryngologists who treat or teach classical singers in North America. The survey takes approximately twenty minutes to complete and is accessible by means of a web link. Participation is completely voluntary and respondents may withdraw at any time.

Survey Description:

The survey consists of closed-ended questions about terms related to breathing for classical singing.

Ethics, Risk, and Confidentiality:

This survey presents low risk to participants and was approved by the University of Toronto Ethics Board on 24 January, 2014. All responses are completely anonymous. The email address that participants are required to submit prior to taking the survey cannot be accessed by the researcher and will be removed from the system once the survey is completed. Email addresses will not be linked to responses.

Data Storage:

All data will be collected electronically and stored securely online by the University of Toronto's Ontario Institute for Studies in Education. Data may be downloaded to the researcher's password protected computer for collation and will be stored indefinitely for possible use in future research.

Contact:

Any questions concerning this survey or research may be directed to Shannon Coates: shannon.coates@utoronto.ca, or to Lorna MacDonald (lorna.macdonald@utoronto.ca). Questions concerning the rights of research participants may be directed to the Office of Research Ethics ethics.review@utoronto.ca or 416-946-3273).
Informed Consent:

Submission of the completed survey will imply informed consent of the respondent.

I sincerely appreciate your time and your commitment to voice research.

Shannon Coates

shannon.coates@utoronto.ca

NOTE: You may wish to print a copy of this information page for your reference.
NOTES:

Quotations & Terminology:

All quotations used in this survey are from one of the four vocal pedagogy texts that are used most predominantly at tertiary institution vocal pedagogy courses in North America (as determined by a previous survey by the researcher that closed in May 2013). All terms and definitions used in this survey are found in either three or four of those texts. The four vocal pedagogy texts (listed in order of prevalence) are:


Mandatory Questions: Eight mandatory questions are marked with a red asterisk.

Survey Navigation: Respondents may use their browser's back and forward arrows to move through the survey prior to or while responding.

1. *Do you teach or treat Western Art Music (classical) singers?

Please select one of the following:

Yes - I treat or teach classical singers.
By clicking here to begin the survey, I signal that I have read and understood the Survey Information Page, and I give my free and informed consent.

No - I do not treat or teach classical singers.
I wish to exit the survey.
2. *How often do you use the term appoggio in your studio, practice, or clinic?*

*Please select one of the following:*

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<td>never</td>
</tr>
</tbody>
</table>

I am unfamiliar with this term, please take me to the next section.

3. How closely does the following definition of appoggio resemble your understanding of the term?

"the establishment of dynamic balance between the inspiratory, phonatory, and resonatory systems in singing"

*Please select one of the following:*

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>very closely resembles</td>
</tr>
<tr>
<td>mostly resembles</td>
</tr>
<tr>
<td>undecided</td>
</tr>
<tr>
<td>somewhat resembles</td>
</tr>
<tr>
<td>does not resemble</td>
</tr>
</tbody>
</table>

4. In your opinion, which of the following terms may be used synonymously with appoggio? (choose all that apply)

*Please select all that apply:*

<table>
<thead>
<tr>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>balanced breathing</td>
</tr>
<tr>
<td>breath control</td>
</tr>
<tr>
<td>breath management</td>
</tr>
<tr>
<td>breath support</td>
</tr>
<tr>
<td>none of the above</td>
</tr>
<tr>
<td>other (elaborate below, if you wish)</td>
</tr>
<tr>
<td>undecided</td>
</tr>
</tbody>
</table>

Other: ____________________________________________
5. With which singing process do you associate the term appoggio?

*Please select one of the following:*

<table>
<thead>
<tr>
<th>Option</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>strictly with breathing for singing</td>
<td></td>
</tr>
<tr>
<td>with a singing process other than breathing (such as resonance)</td>
<td></td>
</tr>
<tr>
<td>with several singing processes collectively, including the process of breathing for singing</td>
<td></td>
</tr>
<tr>
<td>with several singing processes collectively, excluding the process of breathing for singing</td>
<td></td>
</tr>
<tr>
<td>other (elaborate below, if you wish)</td>
<td></td>
</tr>
<tr>
<td>undecided</td>
<td></td>
</tr>
</tbody>
</table>

Other: ____________________________________________________________________________
6. *How often do you use the term breath control in your studio, practice, or clinic?*

<table>
<thead>
<tr>
<th>Please select one of the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>very frequently</td>
</tr>
<tr>
<td>frequently</td>
</tr>
<tr>
<td>occasionally</td>
</tr>
<tr>
<td>rarely</td>
</tr>
<tr>
<td>never</td>
</tr>
<tr>
<td>I am unfamiliar with this term, please take me to the next section.</td>
</tr>
</tbody>
</table>

7. How closely do the following two definitions of breath control resemble your understanding of the term?

1. "concerned with delaying both the collapse of the ribs and the reversion of the diaphragm to its dome-shaped position"

<table>
<thead>
<tr>
<th>Please select one of the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>very closely resembles</td>
</tr>
<tr>
<td>mostly resembles</td>
</tr>
<tr>
<td>undecided</td>
</tr>
<tr>
<td>somewhat resembles</td>
</tr>
<tr>
<td>does not resemble</td>
</tr>
</tbody>
</table>

2. "a dynamic relationship between the breath and the vocal cords which determines how long you can sing on one breath"

<table>
<thead>
<tr>
<th>Please select one of the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>very closely resembles</td>
</tr>
<tr>
<td>mostly resembles</td>
</tr>
<tr>
<td>undecided</td>
</tr>
<tr>
<td>somewhat resembles</td>
</tr>
<tr>
<td>does not resemble</td>
</tr>
</tbody>
</table>

8. In your opinion, which of the following terms may be used synonymously with breath control? (check all that apply)
Please select all that apply:

<table>
<thead>
<tr>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>appoggio</td>
</tr>
<tr>
<td>balanced breathing</td>
</tr>
<tr>
<td>breath management</td>
</tr>
<tr>
<td>breath support</td>
</tr>
<tr>
<td>none of the above</td>
</tr>
<tr>
<td>other (elaborate below, if you wish)</td>
</tr>
<tr>
<td>undecided</td>
</tr>
</tbody>
</table>

Other: ___________________________________________________________________
9. *How often do you use the term breath management in your studio, clinic, or practice?

Please select one of the following:

very frequently
frequently
occasionally
rarely
never

I am unfamiliar with this term, please take me to the next section.

10. How closely does the following definition of breath management resemble your understanding of the term?

"a learned technique of breath control for singing which permits efficient handling of the breath cycle"

Please select one of the following:

very closely resembles
mostly resembles
undecided
somewhat resembles
does not resemble

11. In your opinion, which of the following terms may be used synonymously with breath management? (check all that apply)

Please select all that apply:

appoggio
balanced breathing
breath control
breath support
none of the above
other (elaborate below, if you wish)
undecided

Other: ______________________________________________________
12. *How often do you use the term breath support in your studio, practice, or clinic?

<table>
<thead>
<tr>
<th>Please select one of the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>very frequently</td>
</tr>
<tr>
<td>frequently</td>
</tr>
<tr>
<td>occasionally</td>
</tr>
<tr>
<td>rarely</td>
</tr>
<tr>
<td>never</td>
</tr>
<tr>
<td>I am unfamiliar with this term, please take me to the next section.</td>
</tr>
</tbody>
</table>

13. How closely does the following definition of breath support resemble your understanding of the term?

"the dynamic relationship between the muscles of inspiration and expiration that are used to control pressure in the air supplied to the larynx" while singing

<table>
<thead>
<tr>
<th>Please select one of the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>very closely resembles</td>
</tr>
<tr>
<td>mostly resembles</td>
</tr>
<tr>
<td>undecided</td>
</tr>
<tr>
<td>somewhat resembles</td>
</tr>
<tr>
<td>does not resemble</td>
</tr>
</tbody>
</table>

14. What is your level of agreement with the following four statements concerning breath support?

1. the "main source of more energy in singing ... is increased breath support"

<table>
<thead>
<tr>
<th>Please select one of the following:</th>
</tr>
</thead>
<tbody>
<tr>
<td>strongly agree</td>
</tr>
<tr>
<td>agree</td>
</tr>
<tr>
<td>undecided</td>
</tr>
<tr>
<td>disagree</td>
</tr>
<tr>
<td>strongly disagree</td>
</tr>
</tbody>
</table>

2. breath support is "a pulmonary function"

<table>
<thead>
<tr>
<th>Please select one of the following:</th>
</tr>
</thead>
</table>
3. "an essential element of breath support ... [is] equilibrium between the breathing-in and the breathing-out mechanisms"

Please select one of the following:

<table>
<thead>
<tr>
<th>strongly agree</th>
<th>agree</th>
<th>undecided</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
</table>

4. "muscular antagonism between the inspiratory and expiratory muscles is the foundation of a well-supported breath"

Please select one of the following:

<table>
<thead>
<tr>
<th>strongly agree</th>
<th>agree</th>
<th>undecided</th>
<th>disagree</th>
<th>strongly disagree</th>
</tr>
</thead>
</table>

15. In your opinion, which of the following terms may be used synonymously with breath support? (check all that apply)

Please select all that apply:

- appoggio
- balanced breathing
- breath control
- breath management
- none of the above
- other (elaborate below, if you wish)
- undecided

Other: __________________________________________________________________________
16. * How often do you use the term muscular antagonism (as it relates to breathing for singing) in your studio, clinic, or practice?

Please select one of the following:

<table>
<thead>
<tr>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>very frequently</td>
</tr>
<tr>
<td>frequently</td>
</tr>
<tr>
<td>occasionally</td>
</tr>
<tr>
<td>rarely</td>
</tr>
<tr>
<td>never</td>
</tr>
</tbody>
</table>

I am unfamiliar with this term, please take me to the next section.

17. What is your level of agreement with the following three statements as they relate to muscular antagonism in breathing for singing?

1. the proper application of "muscular antagonism ... in breathing for singing ... [results] in increased control of breath pressure and air flow"

Please select one of the following:

<table>
<thead>
<tr>
<th>Agreement Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>strongly agree</td>
</tr>
<tr>
<td>agree</td>
</tr>
<tr>
<td>undecided</td>
</tr>
<tr>
<td>disagree</td>
</tr>
<tr>
<td>strongly disagree</td>
</tr>
</tbody>
</table>

2. "in the early stages of a musical phrase, muscular antagonism is used to limit the amount of pressure in the well-filled lungs"

Please select one of the following:

<table>
<thead>
<tr>
<th>Agreement Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>strongly agree</td>
</tr>
<tr>
<td>agree</td>
</tr>
<tr>
<td>undecided</td>
</tr>
<tr>
<td>disagree</td>
</tr>
<tr>
<td>strongly disagree</td>
</tr>
</tbody>
</table>

3. "abdominal muscular antagonism ... feels both firm and supple"

Please select one of the following:

<table>
<thead>
<tr>
<th>Agreement Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>strongly agree</td>
</tr>
<tr>
<td>agree</td>
</tr>
<tr>
<td>undecided</td>
</tr>
<tr>
<td>disagree</td>
</tr>
<tr>
<td>strongly disagree</td>
</tr>
</tbody>
</table>
18. * How often do you use the term suspension (as it relates to breathing for singing) in your studio, practice, or clinic?

Please select one of the following:

- very frequently
- frequently
- occasionally
- rarely
- never

I am unfamiliar with this term, please take me to the next section.

19. How closely do each of the following five definitions of suspension (as it relates to breathing for singing) resemble your understanding of the term?

1. the "setting up controls period" of breathing for singing
   Please select one of the following:
   - very closely resembles
   - mostly resembles
   - undecided
   - somewhat resembles
   - does not resemble

2. the "feeling of holding back the breath"
   Please select one of the following:
   - very closely resembles
   - mostly resembles
   - undecided
   - somewhat resembles
   - does not resemble

3. "the purpose of this moment of suspension is to prepare the breath support mechanism for the phonation which follows"
   Please select one of the following:
<table>
<thead>
<tr>
<th>very closely resembles</th>
<th>mostly resembles</th>
<th>undecided</th>
<th>somewhat resembles</th>
<th>does not resemble</th>
</tr>
</thead>
</table>

4. the point at which "recoil forces overcome the muscular forces of rib-cage expansion, and the process reverses direction"

Please select one of the following:

<table>
<thead>
<tr>
<th>very closely resembles</th>
<th>mostly resembles</th>
<th>undecided</th>
<th>somewhat resembles</th>
<th>does not resemble</th>
</tr>
</thead>
</table>

5. a "balanced pressure ... between inhalation and exhalation"

Please select one of the following:

<table>
<thead>
<tr>
<th>very closely resembles</th>
<th>mostly resembles</th>
<th>undecided</th>
<th>somewhat resembles</th>
<th>does not resemble</th>
</tr>
</thead>
</table>
20. Which of the following twelve terms do you use in your studio, practice or clinic, and how often?

1. abdominal breathing
   Please select one of the following:
   
   [ ] very frequently
   [ ] frequently
   [ ] occasionally
   [ ] rarely
   [ ] never

   I am unfamiliar with this term.

2. belly breathing
   Please select one of the following:
   
   [ ] very frequently
   [ ] frequently
   [ ] occasionally
   [ ] rarely
   [ ] never

   I am unfamiliar with this term.

3. clavicular breathing
   Please select one of the following:
   
   [ ] very frequently
   [ ] frequently
   [ ] occasionally
   [ ] rarely
   [ ] never

   I am unfamiliar with this term.

4. deep breathing
   Please select one of the following:
very frequently
frequently
occasionally
rarely
never
I am unfamiliar with this term.

5. high breathing

Please select one of the following:

very frequently
frequently
occasionally
rarely
never
I am unfamiliar with this term.

6. low breathing

Please select one of the following:

very frequently
frequently
occasionally
rarely
never
I am unfamiliar with this term.

7. low torso breathing

Please select one of the following:

very frequently
frequently
occasionally
rarely
never
I am unfamiliar with this term.

8. middle torso breathing

Please select one of the following:

very frequently
frequently
occasionally
rarely
never
I am unfamiliar with this term.

9. rib breathing
*Please select one of the following:*

<table>
<thead>
<tr>
<th>very frequently</th>
<th>frequently</th>
<th>occasionally</th>
<th>rarely</th>
<th>never</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I am unfamiliar with this term.

10. thoracic breathing
*Please select one of the following:*

<table>
<thead>
<tr>
<th>very frequently</th>
<th>frequently</th>
<th>occasionally</th>
<th>rarely</th>
<th>never</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I am unfamiliar with this term.

11. upper chest breathing
*Please select one of the following:*

<table>
<thead>
<tr>
<th>very frequently</th>
<th>frequently</th>
<th>occasionally</th>
<th>rarely</th>
<th>never</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I am unfamiliar with this term.

12. upper torso breathing
*Please select one of the following:*

<table>
<thead>
<tr>
<th>very frequently</th>
<th>frequently</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>occasionally</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td></td>
</tr>
<tr>
<td>rarely</td>
<td></td>
</tr>
<tr>
<td>never</td>
<td></td>
</tr>
</tbody>
</table>

I am unfamiliar with this term.
Interchangeability of selected terms

21. In your opinion, can the following six pairs of terms be used interchangeably?

1. breath support & breath management

   Please select one of the following:

   | ALREADY:       | the two concepts are not distinct |
   | FREQUENTLY:    | the two concepts are not distinct enough to always warrant separate use |
   | UNDECIDED:     |                                |
   | RARELY:        | the two concepts are mostly distinct |
   | NEVER:         | the two concepts are completely distinct and are not interchangeable |

2. breath support & breath control

   Please select one of the following:

   | ALREADY:       | the two concepts are not distinct |
   | FREQUENTLY:    | the two concepts are not distinct enough to always warrant separate use |
   | UNDECIDED:     |                                |
   | RARELY:        | the two concepts are mostly distinct |
   | NEVER:         | the two concepts are completely distinct and are not interchangeable |

3. breath control & breath management

   Please select one of the following:

   | ALREADY:       | the two concepts are not distinct |
   | FREQUENTLY:    | the two concepts are not distinct enough to always warrant separate use |
   | UNDECIDED:     |                                |
   | RARELY:        | the two concepts are mostly distinct |
   | NEVER:         | the two concepts are completely distinct and are not interchangeable |

4. airflow & breath pressure

   Please select one of the following:
<table>
<thead>
<tr>
<th>Always:</th>
<th>FREQUENTLY:</th>
<th>RARELY:</th>
<th>NEVER:</th>
</tr>
</thead>
<tbody>
<tr>
<td>the two concepts are not distinct</td>
<td>the two concepts are not distinct enough to always warrant separate use</td>
<td>the two concepts are mostly distinct</td>
<td>the two concepts are completely distinct and are not interchangeable</td>
</tr>
</tbody>
</table>

**5. airflow & breath energy**

*Please select one of the following:*

<table>
<thead>
<tr>
<th>Always:</th>
<th>FREQUENTLY:</th>
<th>RARELY:</th>
<th>NEVER:</th>
</tr>
</thead>
<tbody>
<tr>
<td>the two concepts are not distinct</td>
<td>the two concepts are not distinct enough to always warrant separate use</td>
<td>the two concepts are mostly distinct</td>
<td>the two concepts are completely distinct and are not interchangeable</td>
</tr>
</tbody>
</table>

**6. breath pressure & breath energy**

*Please select one of the following:*

<table>
<thead>
<tr>
<th>Always:</th>
<th>FREQUENTLY:</th>
<th>RARELY:</th>
<th>NEVER:</th>
</tr>
</thead>
<tbody>
<tr>
<td>the two concepts are not distinct</td>
<td>the two concepts are not distinct enough to always warrant separate use</td>
<td>the two concepts are mostly distinct</td>
<td>the two concepts are completely distinct and are not interchangeable</td>
</tr>
</tbody>
</table>
22. Country in which you practice or teach
   Please select one of the following:
   - Canada
   - United States of America
   - Other

23. Province / State in which you practice or teach
   Please select one of the following:
   - AB - Alberta
   - BC - British Columbia
   - MB - Manitoba
   - NB - New Brunswick
   - NFL - Newfoundland
   - NT - Northwest Territory
   - NS - Nova Scotia
   - NU - Nunavut
   - ON - Ontario
   - PEI - Prince Edward Island
   - QC - Quebec
   - SK - Saskatchewan
   - YT - Yukon Territory
   - AL - Alabama
   - AK - Alaska
   - AZ - Arizona
   - AR - Arkansas
   - CA - California
   - CO - Colorado
   - CT - Connecticut
   - DE - Delaware
   - DC - District of Columbia
   - FL - Florida
   - GA - Georgia
   - HI - Hawaii
<table>
<thead>
<tr>
<th>US State Abbreviation</th>
<th>Full Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID - Idaho</td>
<td></td>
</tr>
<tr>
<td>IL - Illinois</td>
<td></td>
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<tr>
<td>IN - Indiana</td>
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<td>OR - Oregon</td>
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<td>PA - Pennsylvania</td>
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<td>PR - Puerto Rico</td>
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<td>RI - Rhode Island</td>
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<td>SC - South Carolina</td>
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<td>SD - South Dakota</td>
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<td>TN - Tennessee</td>
<td></td>
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<tr>
<td>TX - Texas</td>
<td></td>
</tr>
<tr>
<td>UT - Utah</td>
<td></td>
</tr>
</tbody>
</table>
24. *What is your primary vocation?

*Please select one of the following:*

- Voice Teacher
- Speech-Language Pathologist
- Otolaryngologist
- Other (please elaborate below)

Other: _________________________________________________________________
Appendix 9: Excluded Demographic Questions

1. Education: what is the highest degree or level of school you have completed? (If currently enrolled, indicate highest degree received.)

*Please select one of the following:*

<table>
<thead>
<tr>
<th>Degree/Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor of Arts</td>
</tr>
<tr>
<td>Bachelor of Education</td>
</tr>
<tr>
<td>Bachelor of Music</td>
</tr>
<tr>
<td>Bachelor of Science</td>
</tr>
<tr>
<td>Master of Music in Vocal Performance</td>
</tr>
<tr>
<td>Master of Music in Voice Pedagogy</td>
</tr>
<tr>
<td>Master of Science</td>
</tr>
<tr>
<td>Master of Science in Speech-Language Pathology</td>
</tr>
<tr>
<td>Certificate of Clinical Competence in Speech-Language Pathology</td>
</tr>
<tr>
<td>Doctor of Medicine</td>
</tr>
<tr>
<td>Doctor of Music</td>
</tr>
<tr>
<td>Doctor of Musical Arts</td>
</tr>
<tr>
<td>Doctor of Musical Arts in Voice Pedagogy</td>
</tr>
<tr>
<td>Doctor of Philosophy</td>
</tr>
<tr>
<td>Otolaryngologist – Head &amp; Neck Surgeon</td>
</tr>
<tr>
<td>Other:</td>
</tr>
</tbody>
</table>
2. Primary Vocation: what is your primary vocation?

*Please select one of the following:*

- Voice Teacher – independent voice studio / music school
- Voice Teacher – tertiary institution
- Voice Teacher – independent voice studio / music school & tertiary institution
- Speech-Language Pathologist – clinic
- Speech-Language Pathologist – academic appointment
- Speech-Language Pathologist – academic appointment & clinic
- Otolaryngologist – clinic
- Otolaryngologist – academic appointment
- Otolaryngologist – academic appointment & clinic
- Other:

3. How long have you practised or taught?

*Please select one of the following:*

- 0-5 years
- 6-15 years
- 16-25 years
- Longer than 25 years

4. What is your age?
Please select one of the following:

<table>
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<td>18-24 years old</td>
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<td>25-34 years old</td>
</tr>
<tr>
<td>35-44 years old</td>
</tr>
<tr>
<td>45-54 years old</td>
</tr>
<tr>
<td>55-64 years old</td>
</tr>
<tr>
<td>65-74 years old</td>
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<tr>
<td>75 years or older</td>
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5. What is your gender?

*Please select one of the following:*

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<tr>
<td>Female</td>
</tr>
<tr>
<td>Male</td>
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6. What is your primary language?

*Please select one of the following:*

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<td>French</td>
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<tr>
<td>Spanish</td>
</tr>
<tr>
<td>Other</td>
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7. Rank what has been most influential in helping you to develop your singing terminology from 1 to 8, where 1 is most influential and 8 is least influential.
<p>| | |</p>
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<td>Discussion with Colleagues</td>
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<td>Experience</td>
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<td>Media (Internet, Television, etc.)</td>
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<td>Text Books</td>
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<td>Other:</td>
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Appendix 10: Textbook Review 1985-2010

I. Voice Pedagogy Texts

(breathing chapters noted)


Part I: The Secrets to Beautiful Singing

b) Breathing

c) Breath Support

e) Ease of Breath

f) Adequate Breath

g) The Breath Initiates the Tone

h) Breathe When You Breathe and Sing When You Sing


Chapter 4: Breath Management for Singers


Chapter 1: Vocal Concepts, Section 2: Breath


Chapter 14: Vocal Techniques: A Few Tricks of My Trade, Section 2: Breathing

Chapter III: Posture and Breathing


Chapter 3: Posture and Breathing in Singing


Chapter 3: Breathing


Volume I: Beginning the Process,

Chapter 3: Flexibility at Multiple Levels, Section 2: Understanding the Voice at Multiple Levels, Sub-Section 2B: The Air Inside the Body, Sub-Section 2C: The Sound: the Interplay Between the Body and Air

Chapter 4: The Boyd: The Vocal Instrument, Section 1: The Air Inside the Body

Section 4: Breath (Airflow in and out of the Lungs, Major Body Parts in Breathing, and Optimizing Breathing for Singing)

Chapter 5: The Air Inside the Body (The Springiness of Air, Air in Motion, and Air's Search for Equilibrium)

Chapter 6: The Sound: The Interplay Between the Body and Air

Volume II: Mastering the Fundamentals

Introduction: Developing Flexibility in the Parts that Control the Voice, Section 1A: The Supportive Body, Section 1B: Flexible Breath
Chapter 8: Teaching and Learning Flexible Breath


Chapter 3: Breath Management


Chapter 4: Breathing and Support (by Janice Chapman and Ron Morris)


Chapter 18: The Breath


Chapter 2: The Basics: Posture and Relaxation, Mouth Position and Breath


Chapter 2: Mechanism and Technique, Section 3: Respiration


Chapter 3: Summoning the Power: Breath


Chapter 1: Respiration

Chapter 1: Breath Energy that Supports Vocal Tone


I: The Basic Principles – Breath


Entire text is relevant to breathing for singing

Explanation of 'breath support'


Chapter 1: Respiration


Chapter 3: The Singer's Breath


Chapter 3: Vocal Equipment, Section 4A: The Vocal Apparatus - Breathing


Chapter 7: Respiration

Chapter 4: Breathing and Support


Glossary contains 'appoggio', but no other terms associated with breathing for singing


Unit 5: Breath Control


Chapter 2: Breathing for Singing


Chapter 2: The Supported Singing Voice: Breath Management in Singing


Part I: On Training the Singing Voice

Section 5: Breath Management, Diction, and the Vocal Legato

Section 12: “What You Need Is More Support!”


Chapter 4: Breath Energy in Singing

Chapter 1: Breath Management


Chapter 3: Managing the Breath


Part I: The Mechanics of Singing, Section 2: Breathing / The Torso


Chapter 5: Respiration: Instinctive Breathing

Chapter 6: Singer's Respiration and Support


Chapter 6: Breathing


Part I: The Vocal Instrument, Chapter 1: What Is My Instrument and How Is It Put Together, Section 1A: Respiration


Part I: Basic Instincts 3. On Breathing

Part II: The Inventions 5. The Second Invention: Free-Flowing Air


Volume II: How Voices are Made and How They are 'Played' – Section 6: Creating Breathflow for Skilled Speaking and Singing.


Chapter 5: Respiration: Managing Breath

II. Speech-Language Pathology Texts

(unless otherwise noted, texts do not contain references to breathing for singing)


Contains section on the role of the singing teacher and mentions 'breath support' and 'breath control' but does not offer definitions


Mentions singing but not breathing for singing


Section on 'breath support' but no definition


Lengthy description of 'diaphragmatic breathing'

Mentions 'breath support' but no definition


Mentions 'breath support' but no definition.


Mentions 'breath support' and 'respiratory support' but no definitions.


Glossary but no breathing terms listed.

Section on teaching breathing but not breathing for singing.


Mentions following terms but offers no definitions: 'breath management', 'breath support', 'clavicular breathing', 'respiratory support' 'thoracic breathing'

'Diaphragmatic breathing' referred to as the “preferred way of breathing for both song and speech”

Chapter 2: Breathing and Speech Production – calls breathing for singing a “special act of breathing”


Information about vibrato in singing but no breathing for singing terms


Chapter entitled 'Breathing for Singing'


Mentions and defines following terms: 'abdominal-diaphragmatic breathing', 'bronchial breathing', 'clavicular breathing', 'cortical breathing', 'nasal breathing', 'opposition breathing', 'oral breathing', 'thoracic breathing', but not in relation to breathing for singing

Mentions but does not define: 'breath support'


States that singers require specialized attention during diagnosis


Discussion of terminology for breathing (but not of breathing for singing), especially 'diaphragmatic breathing'


“inhale deeply” used but no definitions


Mentions singing but no definitions and no mention of breathing for singing


“Glossary of Terms Used in Singing” does not include terms related to breathing for singing


Mentions but does not define in terms of breathing for singing: 'breath support', 'breath control', 'tidal breath'


III. Laryngology Texts

(unless otherwise noted, texts do not contain references to breathing for singing)


“deep, high-chest breath” and “abdominal breath” mentioned, but no definitions


IV. Multidisciplinary Texts

(unless otherwise noted, texts do not contain references to breathing for singing)


Mentions “mastering the breathing,” but no breathing for singing terms or definitions


Glossary: 'airflow rate', 'flow volume', 'respiration', 'sitting on the breath', 'subglottic pressure'

Inefficient “breath support” listed as possible cause of 'breathy' vocal quality in singing

'Breath Support' defined (under 'respiration'): “Breath support occurs when, as opposed to a passive release of air, exhalation becomes an active and dynamic force by engaging the lower abdominal muscles and moving the air through the expanded rib cage.”


Glossary: 'airflow rate', 'flow volume', 'respiration', 'sitting on the breath', 'subglottic pressure'

Inefficient “breath support” listed as possible cause of 'breathy' vocal quality in singing

'Breath Support' defined (under 'respiration'): “Breath support occurs when, as opposed to a passive release of air, exhalation becomes an active and dynamic force by engaging the lower abdominal muscles and moving the air through the expanded rib cage.”


Chapter 2: The Anatomy of the Vocal Mechanism, Section 3: Respiratory Structures Related to Voice

The only two terms associated with breathing for singing mentioned in the glossary are: 'diaphragm', and 'intercostal muscles'


Chapter 7: Vocal Support: The Third Chakra

Glossary: 'respiration' (medical definition)


Chapter 10: Respiratory Kinematics in Classical (Opera) Singers


Discusses professional voice users


'breath management' and 'diaphragm control' mentioned in Chapter 14: Vocal Pedagogy History (by Richard Miller)

'deep, abdominal breathing' mentioned but not defined


Glossary: 'tidal volume', 'diaphragm', 'intercostal muscles'


Chapter on Interdisciplinary Care and on Care of the Professional Voice User


Chapter 3: Breathing


Chapter 3: Fluid Flow in Respiratory Airways (Breathing)

'breath control' and 'breath support' used but not defined
Appendix 11: Fifty Breathing Terms Found in Voice Pedagogy Texts

Terms found in the following texts:


*Table 1: Fifty Terms – Ordered Alphabetically*

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<th>Number of Texts</th>
<th>Authors</th>
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<td>20</td>
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<td>65</td>
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<td>All</td>
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<td>Appoggio</td>
<td>40</td>
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<td>1</td>
<td>McKinney</td>
</tr>
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<td>17</td>
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<td>McKinney, Miller, Ware</td>
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Appendix 12: Survey Terms with Definitions and Statements from Textbooks

I. Abdominal Breathing / Belly Breathing

   A. McCoy

      1. page 88: one of four “principal methods of breath management”

      2. page 88: synonymous with “belly breathing”

      3. page 90: “rely solely on diaphragmatic contraction for inhalation ... contraction ... is accompanied by simultaneous relaxation of one or more pairs of abdominal muscles ... [allowing diaphragm to] displace the incompressible abdominal viscera ... [resulting in] obvious outward movement of the abdominal wall”

      4. page 90: “exhalation ... caused by contraction of abdominal muscles pulling in against the viscera, which in turn press the diaphragm back to its resting position”

      5. page 91: “combination of the best attributes of thoracic and abdominal breathing” [RE: balanced / appoggio breathing]

   B. McKinney

      1. page 56: one of “four methods of breathing which are to some degree inefficient or tension-producing ... identified by the portions of the anatomy involved”

      2. page 56: one of “four incorrect methods of breathing”

      3. page 59: belly breathing “limits the ability of the diaphragm to move upward during exhalation”

      4. page 59: taking a deep breath and then pushing your belly out while you sing “has the effect of locking the diaphragm in the lowest position to which it has descended and not allowing it to make its return as air is expended”
5. page 60: in “belly-breathing” method, the breathing-in muscles are so prominent during exhalation that they overpower the breathing-out muscles” so expelling the breath is accomplished “by squeezing the chest down on the lungs or by bending backward form the waist ... [to decrease] the size of the chest cavity and force air from the lungs”

6. page 60: “seems to help some singers with their lowest notes ... difficult to create much breath pressure while belly breathing” and because “many singers cut off their lowest notes by maintaining too much breath pressure against the vocal folds” ... “the lower voice may benefit” ... [however] “highest notes can become a disaster area”

7. page 60: disadvantages: restricts upward travel of diaphragm during phonation, poor posture, limits breath support for upper voice, tone quality and vibrato problems

C. Miller

1. page 24: “appoggio ... refers to the point of appoggio, whether it be of the abdominal or the thoracic region where the maximum muscular tension is experienced in singing ...”

2. page 24-25: “in appoggio the region between the sternum and the umbilicus moves outward on inspiration, but the chief outward movement occurs in the lateral planes ... [not] the pushing outward of the lower abdominal wall ... found in some breathing techniques”

3. page 278: downward and outward “pressure against the wall ... supposedly will produce better management of the breath ... commonly termed “belly breathing””

D. Ware

1. page 84: Methods of Breathing – chapter subtitle: “three principal ways people can breathe – high torso, middle torso, and low torso – but the most efficient method is a combination of both the middle and low torso”

2. page 85: RE: middle torso breathing: “involves expansion of the ribs ... but neglects lower abdominal breath-related action ... “corseted” manner of breath control tends to create an overly pressurized, tense breathing system with restrained airflow ... [this]
manner of breathing is encouraged by a voice culture using the admonition “hold in those tummy muscles” ...

3. page 85: RE: low torso breathing: “involves greater use of low abdominal muscles ... the diaphragm fully descends for a relaxed and complete breath ... less desirable low torso breathing method is advocated by the “German school,” which overemphasizes forced breathing activity in the lower abdominal area ... while deep breathing is beneficial for singers, excessive pushing-down-and-out muscular effort should be avoided”

4. page 86: pregnant singers at the end of the pregnancy use “slightly more abdominal breathing, somewhat similar to that of a male”

II. Air / Breath Flow

A. McCoy

1. page 53: “research into acoustics and biomechanics – including issues of breath pressure and airflow – have been particularly important”

2. page 63: “in the aspirate onset, airflow precedes tone; in the glottal onset, air is pressurized beneath the glottis and explosively released at the instant tone begins”

3. page 70: Breathing and Airflow - subsection title

4. page 70: a common use for lab instrumentation is to measure airflow rate

5. page 70: “if you know the rate at which air is flowing, you have objective evidence to monitor phonation changes on the breathy-to-pressed continuum”

6. page 70: “airflow rates during artistic singing ... are [best] examined through specialized instruments ... able to measure and display airflow in realtime”

7. page 70: “singers often have airflow-related problems with high notes ... [for example] those who overfill with air and subsequently push too hard, blowing out air too quickly and overpowering the voice” ... students may learn “to equate reduced airflow with an
easier, more beautiful sound” using these tools ... alternatively, “singers who habitually produce a tight, pressed tone can learn to release their laryngeal squeeze by gently increasing airflow”

8. page 70: “with appropriate hardware and software, it is possible to correlate airflow with acoustic bio-mechanical parameters in voice production”

9. page 72: “airflow and subglottal pressure are interrelated and often will be inversely proportional”

10. page 77: “diaphragm performs its work – its contraction – during inhalation ... generally passive during exhalation, making little or no contribution to breath pressure or airflow”

11. page 78: “muscular antagonism is important in breathing for singing, where the muscles of inspiration are contracted to resist the action of the muscles of expiration, resulting in increased control of breath pressure and airflow”

12. page 88-89: breath control is “determined by the efficiency of [the regulation of airflow by the glottis] ... the lower the flow rate, the higher the efficiency”

13. page 97: “big vocal folds require more airflow to maintain vibration than do smaller folds”

14. page 98: “as the quantity of air is reduced during exhalation, more and more muscles must be activated to propel the breath out of the body ... breath support becomes a balancing act ... in the early stages of a musical phrase, muscular antagonism is used to limit the amounts of pressure in the well-filled lungs ... as the air is depleted ... increasing amount of abdominal and thoracic contraction are required to maintain a steady breath stream of sufficient flow and pressure”

15. page 104: “vibration [at high] velocity only can be achieved with the assistance of airflow”

16. page 104-107: myoelastic/aerodynamic, one-mass, three-mass models
17. page 113: “glottal onset ... occurs when strong adduction precedes breath energy.”
   aspirate onset: “breath flow is started and the vocal folds are slowly adducted,” balanced
   onset: “adduction and airflow begin at precisely the same instant”

18. page 114: “optimal production of sustained tones requires a perfect union of airflow and
   adductory tension”

19. page 114: breathy vocal quality is likely caused by two things: “not adducting the glottis
   firmly enough ... and blowing out too much air” ... “the breath can be corrected by
   proper implementation of muscular antagonism in the support process”

B. McKinney

1. page 28: whispering sound “is created by the turbulence of air passing through the
   partially-closed glottis”

2. page 76-77: myoelastic theory, aerodynamic theory, Bernoulli effect, neurochronaxic
   theory

3. page 81: "the breath pressure and the vocal cord tension are so perfectly balanced that
   the desired vibration can take place without unnecessary tension or leakage of breath ... 
   Sundberg calls this balanced phonation flow phonation"

4. page 90: "secret of a balanced attack is the synchronization of breath pressure with the
   closure of the glottis ... in a tight attack the cords are closed first and then pressure is
   applied ... in a breathy attack, the breath is flowing out before the cords start to close"

C. Miller

1. page 2: “expiratory airflow commences, and ... subglottic air pressure begins to rise ...
   just prior to each audible utterance”

2. page 3: “aspirated onset” - “flow of breath before vocal sound”

3. page 7: “prephonatory tuning of the laryngeal muscles in combination with the exact
   degree of subglottic pressure and airflow provides the basis for good singing”
4. page 8: “by its very fault of excessive airflow and reduced pressure, the aspirated onset may be exactly what is temporarily needed to combat tense vocal production”

5. page 12: RE: onset “balance of airflow and vocal-fold approximation”

6. page 13: “must be no excess of airflow (whisper factor) and no excess of subglottic pressure (grunt factor)”

7. page 14: “flow of breath and the emergence of tone occur simultaneously”

8. page 21-22: Ladefoged's “bellows analogy:” “the four factors affecting the pressure of the air below the vocal cords may be considered by an analogy with a pair of bellows which has (1) a mechanism to pull the handles apart, corresponding to the inspiratory activity of the diaphragm and external intercostals; (2) a opposing mechanism which will pull the handles together, corresponding to the expiratory activity of the internal intercostals and other muscles; (3) a variable orifice, corresponding to variations in the constrictions at the glottis, and in the vocal tract; and (4) a spring between the handles, corresponding to the relaxation pressure, which will exert a considerable force on the handles when they have been pulled wide [a]part, with continually increasing force, as soon as the bellows have been closed beyond their normal unsqueezed position (which corresponds to the position of the lungs at the end of a normal expiration)” ... “equally applicable to a description of the regulation of subglottic pressure and airflow rate in singing”

9. page 23: “technical skill in singing is largely dependent on the singer's ability to achieve consistently that fine coordination of airflow and phonation – the vocal contest – which is determined by cooperation among the muscles of the larynx and the chest wall, and diaphragmatic contraction, a dynamic balancing between subglottic pressure and vocal-fold resistance”

10. page 37: “unless the singer ... understands the delicate physical balances appropriate to the shifting demands of breath management, to call for “more support” only complicates the task of balancing subglottic pressure, airflow rate, and vocal-fold approximation ... requesting “more support” may only exacerbate problems of dynamic muscle equilibrium”
11. page 56: “initial amplitude depends on the rate of change from maximum to minimum airflow value ... vocal effort is raised primarily by increasing subglottic pressure ...”

12. page 58: “the singer must concretely understand how the tone is “supported” (how the rate of breath emission is determined) ...”

13. page 152: “when subglottic pressure and airflow are commensurate with the need for balanced, resonant sounds in the singing voice, some epiglottic participation in general sphincteral activity may unconsciously take place”

14. page 172: “the untrained singer tends to make more efficient use of the airstream in louder passages ... a good singer uses efficient, lower airflow rates when singing softly than does the untrained singer ... the “sighing, yawning” piano permits high airflow rates ..”

15. page 186-187: “slow vibrato rate ... usually results from slackness of the vocal folds due to insufficient resistance to airflow ... if subglottic pressure and the balance between the intrinsic laryngeal musculature and external supportive musculature of the neck prove insufficient, vibrato rate will mirror those conditions ...”

16. page 188: “the tone will tend to go somewhat straight, as ... happens if the “support” is too rigid; absence of vibrato may also result from too little contact between the approximating vocal folds and the airflow”

17. page 257: “efficient phonation is largely dependent ... on balanced interaction among the intrinsic laryngeal muscles and vocal fold tissues in response to the demands of pitch, volume, and phonetic timbres, and to the application of appropriate subglottic pressure and airflow”

18. page 290: “smooth entrance into middle and upper voice requires flexible balance of the laryngeal muscles, vibrating vocal-fold mass, subglottic pressure, and airflow rate”

19. page 292: “vocal registers appear to be determined by actions of the intrinsic muscles of the larynx, by actions of the cricothyroid muscles in altering relationships between the
laryngeal muscles that function as an external frame to the laryngeal musculature, by subglottic pressure and breath flow rate ...”

20. page 312: DEF of vibrato: ... “pitch variant produced as a result of neurological impulses that occur when proper coordination exists between the breath mechanism and the phonatory mechanism; a natural result of the dynamic balancing of airflow and vocal-fold approximation”

D. Ware

1. page 55: “a singer might exhibit efficient breath functioning but inefficient phonation ... might be phonating well, but due to inadequate airflow the voice will ... be deficient in resonance ... ultimate objective ... is a balanced coordination of the four physiological elements of the vocal process: respiration, phonation, resonation, and articulation”

2. page 66: “note that it takes more breath energy (airflow or breath support) to speak in a higher range”

3. page 70-71: “once you have achieved a well-focused tone in both head resonance and at the vocal folds, you will have a good breath connection as well ... that's why many teachers prefer to concentrate initial efforts on phonation and resonation before spending much time on “breath hook-up” ... the voice is carried on a flowing airstream ... must always be aware of using sufficient airflow as the foundational support for the voice”

4. page 82: “expiration muscles ... become activated and rib-cage volume ... continue decreasing even further ... when ... executed steadily, the release of air is sufficient to maintain an even tone”

5. page 85: RE: middle torso breathing: “involves expansion of the ribs ... but neglects lower abdominal breath-related action ... “corseted” manner of breath control tends to create an overly pressurized, tense breathing system with restrained airflow ... [this] manner of breathing is encouraged by a voice culture using the admonition “hold in those tummy muscles” ...”
6. page 88: “airflow rate varies, depending on the demands of the … phrase and the resistance of the vocal folds at the laryngeal level”

7. page 92: “myoelastic-aerodynamic theory of vocal fold vibration …”

8. page 95: “lip buzz / hum” for “consistent breath flow”

9. page 108: “increasing airflow for louder dynamic levels”

10. page 118: airflow, subglottal pressure as relates to registration

11. page 130: “when a force (airflow) is applied to a vibrator (vocal folds), a sound wave of a certain amplitude and period is produced”

12. page 170: “in general, more interior (mouth and throat) space and airflow are needed in singing high pitches”

13. page 175: “voiced consonants ... are useful in inducing both sufficient airflow and mask sensations”

14. page 178: DEF of phonation: “airflow, released by passive forces of exhalation in combination with action of the abdominal wall muscles, meets resistance by the vocal folds”

15. page 179: “‘flat singing” is commonly caused by a lack of energy (airflow)” ...

16. page 179: “‘sharp singing” can result from ... forcing too much air through the folds” ...

17. page 188: “when singing louder, particularly in the upper range, increase breath flow [as] higher singing normally requires a relatively louder dynamic level, hence more breath flow”

18. page 197: “excessive breath flow through overrelaxed vocal folds may result in negative compensatory adjustments throughout the vocal mechanism”
19. page 199: one of the “major factors accounting for most irregularities in vocal-fold vibration” is airflow: “unsteadiness in the airstream through the glottis during vocalization can create extra noises”

20. page 280: DEF of myoelastic-aerodynamic theory of voice production: “vocal-fold vibration results from a combination of muscular (myoelastic) adjustments and breath pressure (aerodynamics)”


III. Appoggio / Balanced Breath

A. McCoy

1. page 88: one of “four principal methods of breath management”

2. page 88: “combination of [thoracic and abdominal breathing]”

3. page 91: “combination of the best attributes of thoracic and abdominal breathing”

4. page 91: “often referred to as balanced breathing or through the Italian term appoggio”

5. page 91: “inhalation occurs through contraction of the diaphragm and external intercostals, accompanied by relaxation in the abdominal structure ... [resulting in] expansion that extends around the base of the thorax and through the middle to lower abdomen”

6. page 91: “exhalation is controlled by the coordinated efforts of the abdominal muscles and the external intercostals – and possibly the diaphragm – which work in gentle antagonism to control pressure in the air supply”

7. page 91: variations “in the way singers successfully implement appoggio” are a) chest up/belly in, and b) chest down / belly out
8. page 91: a) “thorax remains in an expanded position for as long as possible during each exhalation, while the abdominal wall works antagonistically, gradually pulling inward to provide power for the breath”

9. page 91: b) “abdominal distension is maintained as long as possible during exhalation, working antagonistically with a lowered thorax ... the rectus probably remains relaxed while the obliques and transverse muscles contract, directing the viscera against the anterior abdominal wall rather than up toward the diaphragm”

10. page 93: serratus anterior muscles are “able to help elevate and expand the lateral portion of the thorax and can assist with both thoracic and appoggio breathing”

B. Miller

1. page 23: The Technique of Appoggio – chapter subtitle

2. page 23: “amazingly uniform concept of breath management ... dominated serious twentieth-century vocalism ... cannot narrowly be defined as “breath support” ... because ... includes resonance factors as well as breath management ... may be translated as “support” (appoggiarsi a, “to lean upon”) ... a system for combining and balancing muscles and organs of the trunk and neck, controlling their relationships to the supraglottal resonators, so that no exaggerated function of any one of them upsets the whole”

3. page 24: “appoggio ... refers to the point of appoggio, whether it be of the abdominal or the thoracic region where the maximum muscular tension is experienced in singing ...”

4. page 24: “with regard to breath management, appoggio maintains ... a posture near that which pertained at the beginning of the inspiratory phase of the breath cycle ... [and] ensures cooperative muscle activity in the pectoral, epigastric and umbilical regions, and diaphragmatic control ... the powerful abdominal musculature undergirds the breath mechanism”

5. page 24: “in appoggio technique, the sternum must initially find a moderately high position; this position is then retained throughout the inspiration-expiration cycle ...
sternal posture in part determines diaphragmatic position ... if the sternum lowers, the ribs cannot maintain an expanded position and the diaphragm must ascend more rapidly ... a felling of internal-external muscular balance is present ... this sensation directly influences the diaphragm “

6. page 24-25: “in appoggio the region between the sternum and the umbilicus moves outward on inspiration, but the chief outward movement occurs in the lateral planes ... [not] the pushing outward of the lower abdominal wall ... found in some breathing techniques”

7. page 25: RE: appoggio: “following the initial expansion, a nearly imperceptible inward motion commences unless consciously resisted internally by counterbalancing pressure ...”

8. page 25: “there should be an awareness, when inhaling, of transverse expansion, the result of antagonism of the anterolateral muscles”

9. page 25: “balance of muscular action is felt both in the frontal regions ... and in the lateral-posterior areas ...”

10. page 25: “little or no feeling occurs in the pectoral region in inspiration, even though the pectoral muscles contribute to the supportive framework”

11. page 25: “to move out the lower abdomen either during inspiration or during the execution of a phrase ... is foreign to appoggio technique”

12. page 25: alien to appoggio is “the practice of pulling inward on the pubic area as a means of “supporting” the voice”

13. page 29: “silent inspiration is the hallmark of appoggio ... the process of inspiration remains the same in appoggio technique ... the breath for singing must be inaudible”

14. page 29: “it might be logically presumed that all techniques of singing embrace this functionally efficient approach to breath management [silent inspiration in appoggio] and that persons dealing professionally with singers recognize noiseless inspiration as
part of correct vocal production ... [but] there are teachers of singing who hold that a noisy inspiration indicates an “open throat””

15. page 38: “the same breath coordination of the appoggio technique occurs whether a complete breath is taken within a split second or paced over a longer period ...”

16. page 41: “the sensation of agile dynamic muscle balance must be subjectively experienced, certain of its hallmarks can be identified: abdominal muscle antagonism (appoggio) feels both firm and supple; power and energy are not static conditions; breath renewal remains easy”

17. page 61: “both breath management and resonance factors are included in the term appoggio; although imposto, or impostazione, refers to placement sensations, these sensations are not considered apart from breath management. Imposto does not narrowly indicate a localized “place,” but rather expresses the more general concept of resonance in singing as a result of appoggio.”

18. page 126: “care should be taken that neither chin nor larynx be raised on the pitches above the easy speaking range. An increase in breath support, in accordance with appoggio practice, should be felt in the trunk.”

19. page 184: “vibrato applied externally to the larynx by the musculature of the thorax (the “abdominal” vibrato) is responsible for the shake that plagues many singers, and is a direct result of failure to apply appoggio technique to singing”

20. page 187: “the kind of physical coordination expressed by the appoggio technique can provide the structural support for the larynx that will permit desirable vibrato to be present. Wobble is largely a “support” problem.”

21. page 187: “each individual voice will require a different balance of ratios among contributing members of the torso, neck, and head, in order to produce the proper appoggio”

22. page 191: “the anterolateral wall should remain firm (ben appoggiato), but exhibit a supple muscle synergism that supplies the proper breath source for the glottis”
23. page 265: “diaphragmatic ascent is considerably slower ... during the expiratory phases of the breath cycle when the appoggio technique is used.”

24. page 311: DEF of appoggio: “the establishment of dynamic balance between the inspiratory, phonatory, and resonatory systems in singing”

C. Ware

1. page 85: RE: middle and low torso breathing: “involves a combined use of the costal (rib) and low abdominal muscles. This ideal breathing technique is achieved through a combination of middle and low torso expansion, which includes ... a relaxed lower abdominal expansion as a result of diaphragm distension which causes downward lung expansion and inhalation ... promoted in the “Italian school” of voice training”

2. page 194: “when the human voice is in correct function, that is, when fully coordinated” ... “Italian masters coined the term appoggio (literally “to lean”) to describe the sensations one experiences when the vocal mechanism ... is in dynamic equilibrium”

3. page 194: “most written sources refer to the importance of breath management in appoggio [but] the coordinating function is paramount”

4. page 194: “represents the epitome of the reconciliation of opposites concept because precise mind-body functioning requires interdependence and synergy”

5. page 254: Italian School: “appoggio system of breath management consisting of a noble posture that sets up natural sterno/costal/diaphragmatic breathing to “satisfy the lungs””

6. page 275: DEF of appoggio: “development of a coordinated, dynamic balance among the processes of respiration, phonation, and resonance in singing”

IV. Breath Control

A. McCoy

1. page 61: non-legato “might result ... from technical issues, such as breath control ...”
2. page 86: “for many singers, muscles located in the abdomen are more important than the intercostals for the control of breath”

3. page 88: “each of [“the four principal methods of breath management”] can be used to provide breath support for singing and to aid in breath control”

4. page 88: “support and control in breathing ... are independent, yet related functions” [quoting McKinney]

5. page 88: “laryngeal function”

6. page 88-89: “determined by the efficiency of [the regulation of airflow by the glottis] ... the lower the flow rate, the higher the efficiency”

7. page 89: “breath support enables the production of beautiful sounds; breath control allows those sounds to last to the end of long phrases”

8. page 98: “vocal exercises of extended duration that require continued breath support and control until depletion of vital capacity” can be used to help students “master” maintaining a “steady breath stream of sufficient flow and pressure” while singing

9. page 127: sing well: “maintain effective breath support and control”

B. McKinney

1. page 26-27: effective device “for getting a singer to produce a better legato and more efficient breath control is to suggest that he imitate the smooth bowing technique of an experienced string player”

2. page 54: “although the terms “breath support” and “breath control” are often used interchangeably, they really are not the same thing”

3. page 54: “breath control mainly is a function of the vocal cords themselves. It may be defined as a dynamic relationship between the breath and the vocal cords which determines how long you can sing on one breath. ... if the vocal cords are not closing properly, it is possible to run out of air very quickly, regardless of how well your support mechanism is functioning”
4. page 54: possible to control the breath through use of lips, through use of tongue and teeth, through use of vocal cords “which is the way it is normally done in speaking and singing. This is the meaning of the term breath control.”

5. page 62: “if you have good breath control and are producing a good vocal sound, it is surprising how long you can sing on a rather small breath”

6. page 64: “breath control problems fall into [the category of “faults related to phonation”] because they originate from the vibratory action of the vocal cords”

7. page 82: "efficient tone is basic for efficient breath control" [quoting Christy]

8. page 82: "wasted air also leads to lack of breath control"

9. page 178: "phonation comes into its true perspective only when it is connected with respiration; the articulators affect resonance ... the vocal folds affect breath control ...

C. Miller

1. page 20: “to accomplish skillful control of breath management for singing, special coordination of the phrases of the breath cycle (inhalation, onset, phrase duration, release) must be learned”

2. page 31: “Farinelli's astounding breath control, and his ability to renew breath silently and imperceptibly” is often attributed to Exercise 2.2 [page 30]

3. page 32: “the exercise [2.4, page 32] goes to the heart of inspiratory-expiratory control ...”

4. page 34: “control over three specifics of breath pacing (breath management) is essential to efficient function in singing (1) the rate and ease of each initial inhalation; (2) the variable rate of breath emission (in response to phrase demand); and (3) the quiet renewal of breath energy (replenishment of the source of power) ... drill these three aspects of control ... establish the appropriate prephonatory tuning, the dynamic muscle equilibrium appropriate to subsequent phonation ...”
5. page 37: “any error in vocal technique, or any accomplishment of technical skill in singing, usually can be traced to techniques of breath management; control of the breath is synonymous with control of the singing instrument”

6. page 38: “such directions as “fill out the rubber tire” ... inhibit freedom of breath control”

7. page 38: “exercises aimed at increasing the time during which breath can be “held” have questionable value as aids in breath control ... based on an extreme degree of subglottic pressure and static laryngeal function; they tend to induce earlier breath expulsion...”

8. page 38: “systems of breath control which consciously induce the collapse of the rib cage, request a “relaxed” sternum, promulgate lower abdominal distention, or require inward movement of the abdomen in inspiration are contrary to functionally efficient practices of breath management for singing”

9. page 94: “the tongue-point trill ... exercises have two specific goals: (1) to induce freedom in the larynx and tongue and (2) to increase awareness of good breath management, which is essential for lingual vibration. The consciousness of the trunk as the source of breath control is heightened by the use of the tongue point flutter. There is a marked sensation in the anterolateral abdominal wall during the execution of the prolonged tongue blade trill ...”

10. page 108: “freedom at the glottis can be present in the long phrase only if breath emission is controlled in the epigastric-umbilical and costal regions”

11. page 174: “during the course of any sustained phrase, maintaining a steady epigastric-umbilical balance requires increased attention to breath management ... there should never be sudden conscious increase in breath pressure [during messa di voce] ... the concluding pianissimo will require the highest levels of control. Such control is the result of having earlier developed the sensation of breath “suspension” discussed in Chapter 2”

12. page 274: “evidence that [the latissimus dorsi] plays a major role in breath control is limited”
13. page 278: Systems of **Breath Control** – appendix subtitle

14. page 278: “**breath control** in singing is concerned with delaying both the collapse of the ribs and the reversion of the diaphragm to its dome-shaped posture ... the musculature of *inspiration* offers continued resistance to the collapsing breath mechanism”

15. page 278: “when **control of breath emission** is given over almost entirely to the muscles of the flank and lower abdomen, the chest tends to collapse ... when the pectoral musculature is assigned the task of **controlling the breath**, the lack of abdominal muscle interaction with the diaphragm results in the diaphragm's rapid ascent ... any system of **breath management** that permits the sternum to lower will invite collapse of the thoracic cage ... sternum and rib cage elevation are closely wedded to abdominal action”

16. page 311: DEF of **breath management**: “a learned technique of **breath control** for singing which permits efficient handling of the breath cycle”

D. Ware

1. page 73: “although breathing is, for most purposes, a subconscious (autonomic) function ... [we] develop increased **breath control** by increasing ... levels of aerobic, and anaerobic exercise”

2. page 85: RE: middle torso breathing: “involves expansion of the ribs ... but neglects lower abdominal breath-related action ... “corseted” manner of **breath control** tends to create an overly pressurized, tense breathing system with restrained airflow ... [this] manner of breathing is encouraged by a voice culture using the admonition “hold in those tummy muscles” ...”

3. page 110: “vocal hook-up effect is achieved by ... staccati and marcati exercises, which require coordinated **control** of the respiratory and phonatory systems ... need to vigorously apply **breath energy**”

4. page 251: RE: history of voice pedagogy: “Garcia's teaching method was founded on his scientific understanding of the vocal mechanism, with attention focused on such
fundamentals as posture, phonation (coup de glotte), breath control, enunciation, and use of the three registers ...”

V. Breath Energy

A. McKinney

1. page 79: "breath energy should not come in spurts or surges"

2. page 83: to correct hypofunctional phonation: “encourage proper closure of the vocal folds … by asking the student to employ more energy when singing”

3. page 84: "breathiness which results from not using enough energy"

4. page 86: use more energy “by singing louder,” use more energy with “gentle lifting exercises” - ways to correct hypofunctional (breathy) phonation

5. page 176: "the speaker [whose "vocal energy" is coming in "spurts or surges"] needs a new concept of the use of the support mechanism which will stabilize it and cut down on the hyperfunctional use"

6. page 181: “three factors which significantly affect the ability to sing higher or lower: (1) energy, (2) space, and (3) depth” ... “as you sing higher, you must use more energy; as you sing lower, you must use less”

7. page 182: “continuum of carefully graduated changes in the amount of energy, space, and depth”

8. page 182: “changes in the vocal folds as pitch rises; the length, thickness, and tension of the folds changes ... those factors are not under conscious control, but energy, space, and depth can and should be consciously controlled until they become conditioned reflexes”

9. page 182: The Energy Factor: subchapter title
10. page 182: “energy has several connotations ... refers to a dynamic relationship between the breathing-in muscles and the breathing-out muscles – the support mechanism ... refers to the amount of breath pressure delivered to the vocal folds and their resistance to that pressure ...”

11. page 182: “each [ascending] tone requires a little more energy ... the support mechanism increases its output ... more breath pressure is delivered to more resistive vocal cords ... complex explanation of a simple fact – it takes more energy as you get higher”

12. page 182: “better to approach this increase of energy as being supplied by your whole body ... if you think too much about the support mechanism or breath pressure, you may end up exerting too much local effort ... main source of more energy in singing actually is increased breath support ... should use energy from your whole body”

13. page 189: “do not reach up for a high note; think down for it; feel a deeper center of support within your body; supply energy smoothly with your whole body”

14. page 189: when “singing down wide intervals ... learn not to maintain so much support after the upper note that [one] cannot be heard on the lower note; too much support tends to cut off the lower notes of a voice to the extent that they are almost inaudible ... the lower notes take less energy ...”

15. page 194: RE: register unification: “adjustment needs to take place in continual increments from the lowest note to the highest in the modal voice – more energy, more space, more depth”

16. page 196: approach “transitional problems” with “more energy, more space, and more depth”

17. page 198: “supporting too much – supplying too much respiratory energy to the vocal cords – can have one of two results. If the larynx resists this excessive breath pressure, it may cause the tone to become almost straight ... if the larynx alternately resists and releases this excessive breath pressure, a vibrato problem develops...”
B. Miller

1. page 34: “control over three specifics of breath pacing (breath management) is essential to efficient function in singing (1) the rate and ease of each initial inhalation; (2) the variable rate of breath emission (in response to phrase demand); and (3) the quiet renewal of breath energy (replenishment of the source of power) ...

2. page 35-37: breath energy exercises

3. page 39: “‘relaxation’ is a relative term; breathing involves muscle antagonism (and synergism) just as does any other physical activity. Energy for the singing voice demands muscle coordination between the breath source (the motor) and the larynx (the vibrator)”

4. page 108: “the problem with sustained singing is that primitive sphincter action, ... is often carried over into energized singing”

5. page 108: descending from a “mounting, sustained line” can be “precarious ... [as] breath energy has been expended improperly on the dramatic “high” note, with nothing left in reserve. Muscular support should increase following a vocal climax, especially when one is redescending through the passaggio zone”

6. page 116: “between the primo passaggio and the secondo passaggio register points lie pitches ... that require an increase in breath energy ...”

7. page 123: “male singers who lack easy entrance into upper middle voice, vocalises that begin in light falsetto may be practiced, with the singer increasing breath energy, thereby moving into legitimate middle voice”

8. page 171: “many of the problems connected with breath energy and sustained tessitura come from improper approaches to dynamics ...”

9. page 177: “many voices ... permanently impaired by ... attempting to avoid “pushing,” advocate breath mixture and a general reduction of energization in singing”
10. page 177: “the voice can be “pushed” in more than one way: (1) breath pressure at the glottis can be so intense that muscular tension in singing becomes unavoidable, and (2) breath energy can be so lax that the laryngeal mechanism must unsuccessfully strive to meet the demands of pitch and amplitude without sufficient muscular support”

11. page 193: “in attempting to relax something ... the singer may actually increase the degree of hypofunction on the part of the muscles of breathing or of the muscles of laryngeal support ... because the notion of “relaxation” is inevitably associated with a decrease of whatever level of energy exists at that moment”

12. page 193: “tremolo is frequently accompanied by shrillness and sharpening, due to the lack of dynamic balance between breath energy and muscular action at the level of the larynx”

13. page 269: “The frequency and the depth of breathing for phonation are determined by the breath-energy requirements of the phrase.”

C. Ware

1. page 54: DEF: “Respiration (Actuator – Breath Energy). The muscles and organs of breathing (trachea, lungs, bronchi, diaphragm, ribs, and abdominal and back muscles) act in coordination to control the inhalation and emission of air, the fuel for vocal tone.”

2. page 66: “note that it takes more breath energy (airflow or breath support) to speak in a higher range”

3. page 68: “the focus of one's breath expansion and energy should be felt [at a “point approximately 2 inches below the navel”] when singing or expelling air”

4. page 75: “The source of energy or fuel in respiration is the very air we breathe.”

5. page 110: “vocal hook-up effect is achieved by ... staccati and marcati exercises, which require coordinated control of the respiratory and phonatory systems ... need to vigorously apply breath energy”
6. page 110: marcato attack exercise “will necessitate a more energetic use of the breath and greater activation of the supporting respiratory musculature”

7. page 124: “effectively negotiating ... register transitions normally requires an extra surge of breath energy in the pivotal zone”

8. page 179: “‘flat singing’ is commonly caused by a lack of energy (airflow) ...”

9. page 251: “Lamperti method was based on three fundamentals: powerful breath energy, trueness and ease of tonal production, and clear diction.”

VI. Breath Management

A. McCoy

1. page 2: “A single, universally accepted vocabulary describing breathing for singing is as elusive as a single, universally accepted method of breath management.”

2. page 88: “almost all voice pedagogues agree that four principal methods of breath management can be described: clavicular (upper chest), thoracic (lower chest), abdominal (belly breathing), and a balanced breath, often now called appoggio, which is a combination of the latter two”

3. page 88: “each of [“the four principal methods of breath management”] can be used to provide breath support for singing and to aid in breath control”

B. Miller

1. xvii: “grateful for the firm technical foundation in breath management...”

2. page 18: breathiness “represents insufficiency of breath coordination below the glottis throughout the pitch or throughout the phrase”

4. page 20: “to accomplish skillful control of breath management for singing, special coordination of the phrases of the breath cycle (inhalation, onset, phrase duration, release) must be learned”

5. page 23: “in cultivated singing, thoracic, diaphragmatic, and abdominal aspects of respiration must be coordinated (dynamic muscle equilibrium) without exaggerated activity in any one of the three areas ... how strange to ignore breath management if one is a teacher of singing!”

6. page 23: “amazingly uniform concept of breath management ... dominated serious twentieth-century vocalism ... cannot narrowly be defined as “breath support” ... because ... includes resonance factors as well as breath management ... may be translated as “support” (appoggiarsi a, “to lean upon”) ... a system for combining and balancing muscles and organs of the trunk and neck, controlling their relationships to the supraglottal resonators, so that no exaggerated function of any one of them upsets the whole”

7. page 24: “with regard to breath management, appoggio maintains ... a posture near that which pertained at the beginning of the inspiratory phase of the breath cycle ... [and] ensures cooperative muscle activity in the pectoral, epigastric and umbilical regions, and control ... the powerful abdominal musculature undergirds the breath mechanism”

8. page 29: “it might be logically presumed that all techniques of singing embrace this functionally efficient approach to breath management [silent inspiration in appoggio] and that persons dealing professionally with singers recognize noiseless inspiration as part of correct vocal production ... [but] there are teachers of singing who hold that a noisy inspiration indicates an “open throat””

9. page 29: Breath Management Exercises without Phonation - subtitle

10. page 32: Breath Management Exercises with Sibilants and Fricatives – subtitle

11. page 34: Breath Management Exercises Involving Phonation – subtitle
12. page 34: “control over three specifics of breath pacing (breath management) is essential to efficient function in singing (1) the rate and ease of each initial inhalation; (2) the variable rate of breath emission (in response to phrase demand); and (3) the quiet renewal of breath energy (replenishment of the source of power) ... drill these three aspects of control ... establish the appropriate prephonatory tuning, the dynamic muscle equilibrium appropriate to subsequent phonation ...”

13. page 37: “almost any vocalise is a breath management exercise. Vocalises indicated in this book as useful in developing precision in the onset are equally concerned with breath management [as are] exercises devoted to the development of agility and sostenuto ... any error in vocal technique, or any accomplishment of technical skill in singing, usually can be traced to techniques of breath management; control of the breath is synonymous with control of the singing instrument”

14. page 37: “unless the singer ... understands the delicate physical balances appropriate to the shifting demands of breath management, to call for “more support” only complicates the task of balancing subglottic pressure, airflow rate, and vocal-fold approximation ... requesting “more support” may only exacerbate problems of dynamic muscle equilibrium”

15. page 38: “systems of breath control which consciously induce the collapse of the rib cage, request a “relaxed” sternum, promulgate lower abdominal distention, or require inward movement of the abdomen in inspiration are contrary to functionally efficient practices of breath management for singing”

16. page 38: “breath management is partially determined by the singer's concept of what takes place physiologically during the inhalation-exhalation cycle. The singer ought not to base a method of “support” on incorrect information regarding the physical processes involved in singing”

17. page 38: “good physical condition is necessary to proper coordination, but breath capacity and management are largely determined by skill and not through the enlargement of organs or muscles. Breath-holding exercises teach one to hold the breath and have little to do with lung expansion or with muscle coordination during phonation”
18. page 61: “both breath management and resonance factors are included in the term appoggio; although imposto, or impostazione, refers to placement sensations, these sensations are not considered apart from breath management. Imposto does not narrowly indicate a localized “place,” but rather expresses the more general concept of resonance in singing as a result of appoggio.”

19. page 79: use of glottal fricative and glottal plosive “heighten awareness of abdominal control in breath management”

20. page 94: “the tongue-point trill ... exercises have two specific goals: (1) to induce freedom in the larynx and tongue and (2) to increase awareness of good breath management, which is essential for lingual vibration. The consciousness of the trunk as the source of breath control is heightened by the use of the tongue point flutter. There is a marked sensation in the anterolateral abdominal wall during the execution of the prolonged tongue blade trill ...”

21. page 108: “breath mixture is the result of inefficient vocal-fold occlusion, which, in turn, is the result of poor breath management”

22. page 124: a counter-tenor “must learn additional breath-management skills to compensate for the open chink that characterizes the glottal shape in falsetto ... often encounters difficulties in the technical area of breath management”

23. page 131: this “vocalise points up subtle but important differences in factors of resonance and breath management encountered either in ascent or descent ...”

24. page 137: “female singers ... [who] feel they must “produce” [chest voice are probably] not used to giving much attention to breath management in the lower speaking voice ... increased “support” may make the difference between failure and success”

25. page 140: “breath management and resonator response are not uniformly experienced in all ranges of the voice”

26. page 155: “can the demands of language, agility, ease in breath management, and the dynamic events of registration be accomplished with freedom?”
27. page 172-173: “mechanical efficiency in singing ... is dependent on skillful breath management, which reduces breath leakage”

28. page 174: “during the course of any sustained phrase, maintaining a steady epigastric-umbilical balance requires increased attention to breath management ... there should never be sudden conscious increase in breath pressure [during messa di voce] ... the concluding pianissimo will require the highest levels of control. Such control is the result of having earlier developed the sensation of breath “suspension” discussed in Chapter 2”

29. page 188: “correction of breath management factors, and the elimination of laryngeal tension will reestablish the dynamic equilibrium needed to bring in the vibrato ...”

30. page 193: “if most of the singers from a vocal studio exhibit a “shake,” there can be little doubt that techniques of breath management are based on false premises”

31. page 196: “there is a direct correlation between clean onset, efficiently managed breath, and a vibrant tone”

32. page 209: “some breath-management techniques alter even normal breath function and bring into play incorrect muscle activity”

33. page 212: “a complete technique of singing must consider the regulation of breath management (what we have earlier termed the energizing source) ...”

34. page 238: “whatever the technique of breath management, it is clear that a full stomach inhibits proper diaphragmatic descent ...”

35. page 262: “teachers … who urge diaphragmatic control may only be using such terminology loosely to indicate other possible muscular controls around the diaphragmatic region. The diaphragm is incapable of providing sensation ... It may play a completely different role in breath management from that assigned it by some teachers”
36. page 265: “until various methods of breath management for singing have been 
separately investigated by researchers, the question of how much direct control over the 
diaphragm may be achieved by the singer may remain unanswered”

37. page 265: “diaphragmatic movement during singing varies from one breath-management 
technique to another”

38. page 265-266: “possibilities of flank and rib movement [during inhalation] have ... given 
rise to theories of essential differences in the breath management during singing for men 
and women, generally with exaggerated conclusions”

39. page 267: “highly doubtful that structural differences between the sexes produce greatly 
contrasting methods of breath management in singing”

40. page 270: “although neither the external muscles of the neck nor those muscles of the 
upper costal region that relate to the shoulder are usually included among the direct 
participants in the mechanics of phonation or of breath management, they contribute 
externally in a structural way to both activities. (They also play a compensatory 
functional role in clavicular breathing.)”

41. page 273: although the serratus anterior may appear to be “important in breath 
management in singing,” it is not

42. page 275: “when considering methods for breath management (“support”) in singing ... 
only the scaleni and the sternomastoids contribute significantly to respiration”

43. page 278: downward and outward “pressure against the wall ... supposedly will produce 
better management of the breath ... commonly termed “belly breathing””

44. page 278: “when control of breath emission is given over almost entirely to the muscles 
of the flank and lower abdomen, the chest tends to collapse ... when the pectoral 
musculature is assigned the task of controlling the breath, the lack of abdominal muscle 
interaction with the diaphragm results in the diaphragm's rapid ascent ... any system of 
breath management that permits the sternum to lower will invite collapse of the thoracic 
cage ... sternum and rib cage elevation are closely wedded to abdominal action”
45. page 311: DEF of **breath management**: “a learned technique of **breath control** for singing which permits efficient handling of the breath cycle”

C. Ware

1. page 72: Respiration: Managing Breath – Chapter 5 Title

2. page 81: “respiratory role of the rectus abdominis ... has been minimized by Bunch (1995), who claims it has little if any effect on **breath management** ... however ... the rectus abdominis [should] be allowed to relax during inhalation, in order to allow for displacement of the abdominal viscera by the contraction of the diaphragm”

3. page 86: “heavy-weight persons (**endomorphs**) tend to **breathe more deeply** ... easier to let-go and “let it all hang out” ... weight gain is not recommended [to improve] a singer's **breath management** ... rapid weight loss can negatively influence one's pattern of **breathing** ...”

4. page 88: **Breath Coordination** and Management – chapter subtitle

5. page 91: “**breath management** as related to the principle of **muscular antagonism**”

6. page 169: “vowel modification will occur naturally – if the singer maintains ... sufficient **breath management**”

7. page 194: “most written sources refer to the importance of **breath management** in **appoggio** [but] the coordinating function is paramount”

8. page 201: technical voice production factors include: “pitch, tone quality, **breath management**, volume level ...”

9. page 253: “almost every teacher makes use of specific exercises to modify certain vocal behavior, including exercises for **breath management**, relaxation of the articulators ...”

10. page 254: “characteristics of these four schools can be summarized according to such factors as phonation, **breath management**, vowel formation ...”
11. page 254: German School: “lower trunk breath management resulting in a distended belly, gluteal-pelvic contraction, low dorsal expansion, and a low diaphragmatic fixation that emphasizes a down-and-out “breath support” during singing ...”

12. page 254: Italian School: “appoggio system of breath management consisting of a noble posture that sets up natural sterno/costal/diaphragmatic breathing to “satisfy the lungs””

VII. Breath Pressure / Air Pressure / Subglottal (Air) Pressure

A. McCoy

1. page 36: “during a cycle of vibration, the folds are opened by air pressure generated by the respiratory system and are closed through a combination of muscular energy and changes in air pressure”

2. page 53: “research into acoustics and biomechanics – including issues of breath pressure and airflow – have been particularly important”

3. page 68: “information provided by EGG is extremely useful for correcting problems created by insufficient or excess breath pressure ...”

4. page 72: “airflow and subglottal pressure are interrelated and often will be inversely proportional”

5. page 77: “diaphragm performs its work – its contraction – during inhalation ... generally passive during exhalation, making little or no contribution to breath pressure or airflow”

6. page 78: “muscular antagonism is important in breathing for singing, where the muscles of inspiration are contracted to resist the action of the muscles of expiration, resulting in increased control of breath pressure and airflow”

7. page 86: “in most singing pedagogies ... contraction [of the internal intercostal muscles] is delayed as long as possible ... because strong initial contraction over-pressurizes the breath”
8. page 88: **breath support** is “best described as the dynamic relationship between the muscles of inspiration and expiration that are used to control pressure in the air supplied to the larynx ... a pulmonary function”

9. page 89: “the problem with **clavicular breathing** lies ... in the ability to control air pressure during exhalation”

10. page 89: “ideally, [regulation of air pressure] is accomplished through the use of **muscular antagonism**”

11. page 89: “to produce beautiful sounds, singers must be able to adjust the pressure of the air that powers the vibrating vocal folds carefully and accurately”

12. page 89: “the high potential capacities of **clavicular breathing** lead to overfilling and over-pressurizing the air ... the larynx itself must act as a valve to help **regulate air pressure**”

13. page 89: **thoracic** breathing “offers significant advantages over **clavicular** ... in terms of regulating air pressure for optimal breath support”

14. page 90: “**thoracic** breathing offers excellent opportunities for the regulation of air pressure through muscular antagonism. The thorax is stabilized through simultaneous contraction of the external and internal intercostal muscles during exhalation, resulting in a high degree of control over pulmonary pressure”

15. page 91: RE: **thoracic breathing**: “in the absence of antagonistic relationships, breath support must be regulated by the degree of contraction in the abdominal muscles, which are pulled more tightly to increase pressure and released to reduce it”

16. page 91: “exhalation is controlled by the coordinated efforts of the abdominal muscles and the external intercostals – and possibly the diaphragm – which work in gentle antagonism to control pressure in the air supply”

17. page 91: “goal of breath support in singing is to provide a stable supply of air at the correct pressure for the desired pitch and loudness”
18. page 91: “as a general rule, higher and louder tones require greater breath pressure than lower, quieter ones”

19. page 97: “air pressure during speech typically varies over a range of about 0.3 to 3kPa. In very loud singing, pressures might reach as high as 6kPa. The maximum pressure that can be generated by the pulmonary system ... might be 10kPa or more”

20. page 98: as the pulmonary system is “capable of generating significantly more pressure than is required for phonation ... breath support ... becomes an exercise in minimizing as well as regulating breath pressure”

21. page 98: pressure regulation complicated by “constantly changing volume of air within the lungs”

22. page 98: “elastic recoil alone can probably generate sufficient breath pressure for most singing requirements” following a “maximal inhalation”

23. page 98: “as the quantity of air is reduced during exhalation, more and more muscles must be activated to propel the breath out of the body ... breath support becomes a balancing act ... in the early stages of a musical phrase, muscular antagonism is used to limit the amounts of pressure in the well-filled lungs ... as the air is depleted ... increasing amount of abdominal and thoracic contraction are required to maintain a steady breath stream of sufficient flow and pressure”

24. page 114: “singers must increase breath pressure to increase amplitude”

25. page 116: “pitch control requires an exquisite interplay between laryngeal tension and breath pressure”

26. page 117: “high pitches tend to require more subglottal air pressure than low pitches ... increased rigidity [in vocal folds] ...[means] need for greater air pressure ... increasing air pressure ... can raise fundamental frequency ... no surprise to singers who are experienced in controlling flattening through careful attention to breath support”

27. page 137: approaching “higher tones with too much breath pressure and laryngeal tension” can be causative in contact ulcers
28. page 149: “breath pressure” must be “carefully modulated” at registers changes

29. page 149: “breath support must be carefully modulated to avoid excess subglottal pressure” in transitions

B. McKinney

1. page 26: “breath pressure is applied to the vocal cords”

2. page 27: “breath pressure is applied to [vocal cords] in such a way that vibration ensues” (phonation)

3. page 53: "pressure of the breath against the vocal folds sets them in vibration and phonation ensues. Increasing breath pressure can affect phonation [pitch and/or intensity] ... breath pressure contributes to both the pitch and the intensity of the vocal tone"

4. page 53: "dynamic relationship between the breathing-in muscles and the breathing-out muscles ... purpose of which is to supply adequate breath pressure to the vocal folds for the sustaining of any desired pitch or dynamic level ... when a person establishes the correct posture, breathes in properly, and then suspends the breath, a balanced tension is set up between the muscles of inhalation and the muscles of exhalation"

5. page 54: "only time and disciplined practice will bring the support mechanism to its full potential for supplying fine adjustments of breath pressure to the vocal cords"

6. page 54-55: "breath support is a dynamic, ever-changing relationship between the forces which bring air into the body and the forces which cause air to leave the body. In the suspension phase of breathing, these forces are brought into equilibrium ... when phonation is initiated, the balance is tipped in favor of the breathing-out mechanism so that breath pressure may be supplied to the vocal cords; however, the breathing-in muscles - the diaphragm and the external rib muscles - must remain active as a counter-balancing force which resists the breathing-out muscles, but not enough to win the tug-of-war"
7. page 60: “seems to help some singers with their lowest notes ... difficult to create much breath pressure while belly breathing” and because “many singers cut off their lowest notes by maintaining too much breath pressure against the vocal folds” ... “the lower voice may benefit” ... [however] “highest notes can become a disaster area”

8. page 61: hyperfunctional breathing: “taking bigger and bigger breaths results in too much air being packed into the chest and too much breath pressure pushing back against the vocal cords” ...

9. page 61: analyzing where problems occur when inhaling too much air: “diaphragm becomes more and more tense ... so much pressure against the vocal cords”

10. page 62: hypofunctional breath support: "failure to demand enough activity of the support mechanism ... common only among beginning singers ... consists of the failure to activate the support mechanism enough to provide adequate breath pressure for the proper functioning of the vocal cords"

11. page 62: hyperfunctional breath support: "demanding too much from the support mechanism" "frequent vocal [fault, resulting] in malfunction of the phonation, resonation, and articulation systems" ... larynx "usually receives blame" but "real culprit is the over-support which is delivering so much breath pressure to the larynx that it cannot function freely"

12. page 63: result of hyperfunctional breath support: "abdominal wall is pulled in too strongly, with consequent excess tension and breath pressure ... normal people can produce subglottic breath pressures nearly ten times those ever required in singing"

13. page 65: Heimlich: "place enough pressure on the upper abdomen that the resultant breath pressure exerted upward will impel the blockage out of the windpipe"

14. page 76: phonation occurs "when the vocal folds are brought together and breath pressure is applied to them in such a way that vibration ensues"

15. page 76: myoelastic theory, aerodynamic theory, Bernoulli effect, neurochronaxic theory
16. page 81: "the breath pressure and the vocal cord tension are so perfectly balanced that the desired vibration can take place without unnecessary tension or leakage of breath ... Sundberg calls this balanced phonation flow phonation"

17. page 87: "forced breathiness" can occur when "hypofunction (breathiness) in the laryngeal mechanism is accompanied by hyperfunction in the support mechanism ... pulling in too hard on the abdominal muscles delivers too much air pressure to the larynx ..."

18. page 90: RE: attack with “tense vocal folds:” “breath pressure is increased until vocal folds are almost violently blown apart”

19. page 90: "secret of a balanced attack is the synchronization of breath pressure with the closure of the glottis ... in a tight attack the cords are closed first and then pressure is applied ... in a breathy attack, the breath is flowing out before the cords start to close"

20. page 91: don't want to supply "too much breath pressure"

21. page 96: "singers often lose their low notes or never learn to produce them because of excessive tension of the laryngeal muscles and of the support mechanism (too much breath pressure!)"

22. page 118: “when a person sings his lower notes correctly, there is an element of relaxation of subglottic air pressure which permits the vocal folds to vibrate freely”

23. page 182: “energy has several connotations ... refers to a dynamic relationship between the breathing-in muscles and the breathing-out muscles – the support mechanism ... refers to the amount of breath pressure delivered to the vocal folds and their resistance to that pressure ...”

24. page 182: “better to approach this increase of energy as being supplied by your whole body ... if you think too much about the support mechanism or breath pressure, you may end up exerting too much local effort ... main source of more energy in singing actually is increased breath support ... should use energy from your whole body”
25. page 185: one thing to avoid when learning to sing high notes: “pulling in too strongly on the upper abdomen-supplying too much breath pressure on the larynx”

26. page 186: “eventual goal ... is coordination of energy, space, and depth”

27. page 186: one way of approaching the goal of “lining up the voice” “is through the coordination of energy, space, and depth ...”

28. page 195: “careful not to apply too much breath pressure” in an exercise to help eliminate “chest voice break”

29. page 198: “supporting too much – supplying too much respiratory energy to the vocal cords – can have one of two results. If the larynx resists this excessive breath pressure, it may cause the tone to become almost straight ... if the larynx alternately resists and releases this excessive breath pressure, a vibrato problem develops...”

C. Miller

1. page 2: “expiratory airflow commences, and ... subglottic air pressure begins to rise ... just prior to each audible utterance”

2. page 7: “prephonatory tuning of the laryngeal muscles in combination with the exact degree of subglottic pressure and airflow provides the basis for good singing”

3. page 8: “by its very fault of excessive airflow and reduced pressure, the aspirated onset may be exactly what is temporarily needed to combat tense vocal production”

4. page 8: “coordinated onset, which results from dynamic equilibrium of the participating musculature and of subglottic pressure, produces healthy vocalism”

5. page 13: “must be no excess of airflow (whisper factor) and no excess of subglottic pressure (grunt factor)”

6. page 21: Subglottic Pressure and Glottal Activity – chapter subtitle

7. page 21-22: Ladefoged's “bellows analogy:” “the four factors affecting the pressure of the air below the vocal cords may be considered by an analogy with a pair of bellows
which has (1) a mechanism to pull the handles apart, corresponding to the inspiratory activity of the diaphragm and external intercostals; (2) a opposing mechanism which will pull the handles together, corresponding to the expiratory activity of the internal intercostals and other muscles; (3) a variable orifice, corresponding to variations in the constrictions at the glottis, and in the vocal tract; and (4) a spring between the handles, corresponding to the relaxation pressure, which will exert a considerable force on the handles when they have been pulled wide apart, with continually increasing force, as soon as the bellows have been closed beyond their normal unsqueezed position (which corresponds to the position of the lungs at the end of a normal expiration)” ... “equally applicable to a description of the regulation of subglottic pressure and airflow rate in singing”

8. page 23: “technical skill in singing is largely dependent on the singer's ability to achieve consistently that fine coordination of airflow and phonation – the vocal contest – which is determined by cooperation among the muscles of the larynx and the chest wall, and diaphragmatic contraction, a dynamic balancing between subglottic pressure and vocal-fold resistance”

9. page 37: “unless the singer ... understands the delicate physical balances appropriate to the shifting demands of breath management, to call for “more support” only complicates the task of balancing subglottic pressure, airflow rate, and vocal-fold approximation ... requesting “more support” may only exacerbate problems of dynamic muscle equilibrium”

10. page 38: “exercises aimed at increasing the time during which breath can be “held” have questionable value as aids in breath control ... based on an extreme degree of subglottic pressure and static laryngeal function; they tend to induce earlier breath expulsion...”

11. page 56: “initial amplitude depends on the rate of change from maximum to minimum airflow value ... vocal effort is raised primarily by increasing subglottic pressure ...”

12. page 58: “the singer must concretely understand how the tone is “supported” (how the rate of breath emission is determined) ...”
13. page 100: “advantage [to using] unvoiced linguadental fricative ... helps in releasing tension with some singers who make too much use of subglottal pressure ...”

14. page 100: “singers have a tendency on [d] to press the tongue against the inner surfaces of the upper teeth, to increase subglottic pressure ...”

15. page 101: “if there is evidence of too much glottal pressure ...”

16. page 117: “baritone ... by pushing his voice through added breath pressure and sustained TA function...”

17. page 119: “increase in breath energy is essential if normal registration events are to happen ...”

18. page 151: “singing with pronounced covering requires more air under increased pressure ...” (Brodnitz)

19. page 152: “when subglottic pressure and airflow are commensurate with the need for balanced, resonant sounds in the singing voice, some epiglottic participation in general sphincter activity may unconsciously take place”

20. page 171: “techniques built upon the soft onset often have difficulty in eliminating an admixture of breath from the tone, unless subglottic pressure is suddenly increased ...”

21. page 174: “during the course of any sustained phrase, maintaining a steady epigastric-umbilical balance requires increased attention to breath management ... there should never be sudden conscious increase in breath pressure [during messa di voce] ... the concluding pianissimo will require the highest levels of control. Such control is the result of having earlier developed the sensation of breath “suspension” discussed in Chapter 2”

22. page 177: “the voice can be “pushed” in more than one way: (1) breath pressure at the glottis can be so intense that muscular tension in singing becomes unavoidable, and (2) breath energy can be so lax that the laryngeal mechanism must unsuccessfully strive to meet the demands of pitch and amplitude without sufficient muscular support”
23. page 186-187: “slow vibrato rate ... usually results from slackness of the vocal folds due to insufficient resistance to airflow ... if subglottic pressure and the balance between the intrinsic laryngeal musculature and external supportive musculature of the neck prove insufficient, vibrato rate will mirror those conditions ...”

24. page 191: “when tremolo mars the singing voice, hyperfunction is indicated with subglottal pressure proving too intense for the normal responses at the larynx”

25. page 195: “excessive subglottic pressure produces extreme tension”

26. page 257: “efficient phonation is largely dependent ... on balanced interaction among the intrinsic laryngeal muscles and vocal fold tissues in response to the demands of pitch, volume, and phonetic timbres, and to the application of appropriate subglottic pressure and airflow”

27. page 290: “smooth entrance into middle and upper voice requires flexible balance of the laryngeal muscles, vibrating vocal-fold mass, subglottic pressure, and airflow rate”

28. page 292: “vocal registers appear to be determined by actions of the intrinsic muscles of the larynx, by actions of the cricothyroid muscles in altering relationships between the laryngeal muscles that function as an external frame to the laryngeal musculature, by subglottic pressure and breath flow rate ...”

D. Ware

1. page 66: “note that it takes more breath energy (airflow or breath support) to speak in a higher range”

2. page 73: “primary function of the respiratory mechanism is to provide subglottal air pressure which drives vocal-fold vibration”

3. page 80: RE: intercostal muscles: “their main purpose is to aid in inhalation and exhalation and to help create a constant subglottal ... air pressure for voice use, which is accomplished by coordinating and balancing the action of the inspiratory and expiratory muscles and by providing checking action to the passive processes of respiration ...”
4. page 82: “expiration muscles ... become activated and rib-cage volume ... continue decreasing even further ... when ... executed steadily, the release of air is sufficient to maintain an even tone”

5. page 92: “myoelastic-aerodynamic theory of vocal fold vibration ...”

6. page 92: “Louis Bachner (1944) coined the term “hook-up” to describe this coordination of breath pressure with the vocal vibrator”

7. page 108: “objective in phonation is to synchronize breath pressure with vocal-fold vibration ... avoid excesses in either breath pressure or vocal-fold tension ... includes a sensation of singing on the breath”

8. page 118: airflow, subglottal pressure as relates to registration

9. page 122: “registers are usually coordinated when ... adequate breath pressure is applied”

10. page 124: “effectively negotiating ... register transitions normally requires an extra surge of breath energy in the pivotal zone”

11. page 149: “audibility ... [depends] on the coordination of many interrelated factors, notably breath pressure ...”

12. page 183: RE: agility: “fast scale singing is associated with continuous steady breath pressure and vocal articulation ... Ideally, one only has to think vowel and pitch when applying a steady breath pressure to the larynx in order to achieve an accurate execution of a coloratura fast passage”

13. page 186: RE: dynamic flexibility: control “is determined principally by the ability to balance inspiratory and expiratory musculature. While maintaining the inspiratory “gesture of inhalation,” the singer concentrates on ... increased air pressure to sing louder ... diminishing a sustained tone requires even more concentration and coordination of inspiratory and expiratory muscles”
14. page 280: DEF of myoelastic-aerodynamic theory of voice production: “vocal-fold vibration results from a combination of muscular (myoelastic) adjustments and breath pressure (aerodynamics)”

VIII. Breath Support

A. McCoy

1. page 3: “breathiness of a tone ... is often made worse by poor breath support”

2. page 50: “when singing /i-e-a-o-u/ on a single pitch, one vowel might lose clarity or have defective intonation ... often singers attribute these inconsistencies to breath support – the tone that doesn't match simply isn't supported correctly ... I've never understood why a singer would abandon support for a single vowel”

3. page 88: “to maintain effective breath support, possibilities must exist for antagonism between the muscles of inspiration and expiration”

4. page 88: “each of [“the four principal methods of breath management”] can be used to provide breath support for singing and to aid in breath control”

5. page 88: “support and control in breathing ... are independent, yet related functions” [quoting McKinney]

6. page 88: “best described as the dynamic relationship between the muscles of inspiration and expiration that are used to control pressure in the air supplied to the larynx ... a pulmonary function”

7. page 89: “breath support enables the production of beautiful sounds; breath control allows those sounds to last to the end of long phrases”

8. page 89: thoracic breathing “offers significant advantages over clavicular ... in terms of regulating air pressure for optimal breath support”
9. page 90: “**thoracic** breathing offers excellent opportunities for the regulation of air pressure through **muscular antagonism**. The thorax is stabilized through simultaneous contraction of the external and internal intercostal muscles during exhalation, resulting in a high degree of control over pulmonary pressure”

10. page 91: RE: **thoracic breathing**: “in the absence of antagonistic relationships, **breath support** must be regulated by the degree of contraction in the abdominal muscles, which are pulled more tightly to increase pressure and released to reduce it”

11. page 91: “perusal of the pedagogic literature shows widespread agreement for the principle that **muscular antagonism** between the inspiratory and expiratory muscles is the foundation of a **well-supported breath**”

12. page 91: “goal of **breath support** in singing is to provide a stable supply of air at the **correct pressure** for the desired pitch and loudness”

13. page 96: “singers who rely on expansion in the middle and lower back as part of **breath support** must consciously relax the [latissimi dorsi] muscles during inhalation”

14. page 98: as the pulmonary system is “capable of generating significantly more pressure than is required for phonation ... **breath support** ... becomes an exercise in minimizing as well as regulating **breath pressure**”

15. page 98: “as the quantity of air is reduced during exhalation, more and more muscles must be activated to propel the breath out of the body ... **breath support** becomes a balancing act ... in the early stages of a musical phrase, **muscular antagonism** is used to limit the amounts of pressure in the well-filled lungs ... as the air is depleted ... increasing amount of abdominal and thoracic contraction are required to maintain a steady breath stream of sufficient flow and pressure”

16. page 98: “vocal exercises of extended duration that require continued **breath support** and control until depletion of vital capacity” can be used to help students “master” maintaining a “steady breath stream of sufficient flow and pressure” while singing
17. page 114: breathy vocal quality is likely caused by two things: “not adducting the glottis firmly enough ... and blowing out too much air” ... “the breath can be corrected by proper implementation of muscular antagonism in the support process”

18. page 115: “breath support is not solely responsible for variations in loudness”

19. page 117: “high pitches tend to require more subglottal air pressure than low pitches ... increased rigidity [in vocal folds] ...[means] need for greater air pressure ... increasing air pressure ... can raise fundamental frequency ... no surprise to singers who are experienced in controlling flatting through careful attention to breath support”

20. page 117: “intonation problems are more easily corrected by breath support adjustments in the lower part of a singer's range than at higher pitches”

21. page 117: laryngeal elevation “can result from a variety of reasons including poor support ...”

22. page 127: speak well: “speak with correct breath support”

23. page 127: sing well: “maintain effective breath support and control”

24. page 134: “poor breath support for speech” can be causative in MTD

25. page 136: “poor breath support” can be causative in nodules

26. page 140: “uterine cramping also can interfere with normal patterns of breath support”

27. page 148: “an obvious voice break” will occur between registers “unless appropriate adjustments are made to vowels and breath support”

28. page 149: “breath support must be carefully modulated to avoid excess subglottal pressure” in transitions

29. page 156: “proper breath support ... paramount”
B. McKinney

1. page 16: develop a “check list” to quickly evaluate new students including “posture, breathing, support ...”

2. page 32: “physical processes involved in singing ... [are] posture, breathing, and support”

3. page 46: Breathing and Support - Chapter 4 title

4. page 50: "suspension stage of breathing for singing has no parallel in natural breathing ... In breathing for singing ... it is very important that the breath should be suspended momentarily just as the act of inhalation is completed. The purpose of this moment of suspension is to prepare the breath support mechanism for the phonation which follows"

5. page 50-51: "breathe in easily and deeply ... as you are comfortably full of air, stop the downward movement of your diaphragm ... hold this position ... by keeping the diaphragm contracted ... imagine that you are still breathing in ... this allows you to set up an equilibrium between the breathing-in and the breathing-out mechanisms which is an essential element of breath support"

6. page 52: "relationship between the breathing-in muscles and breathing-out muscles which has been brought into play ... discussed ... in the section on breath support"

7. page 53: Breath Support - Chapter 4 subtitle

8. page 53: "dynamic relationship between the breathing-in muscles and the breathing-out muscles ... purpose of which is to supply adequate breath pressure to the vocal folds for the sustaining of any desired pitch or dynamic level ... when a person establishes the correct posture, breathes in properly, and then suspends the breath, a balanced tension is set up between the muscles of inhalation and the muscles of exhalation"

9. page 53: "singer learns to adjust this balanced tension [between muscles of inhalation and muscles of exhalation] just enough to supply the needed breath pressure for a given pitch and dynamic level"
10. page 54: "only time and disciplined practice will bring the support mechanism to its full potential for supplying fine adjustments of breath pressure to the vocal cords"

11. page 54: “although the terms “breath support” and “breath control” are often used interchangeably, they really are not the same thing”

12. page 54: the sensation felt in the abdomen when making a "soft hissing noise" versus a loud one is breath support ... "it takes more support to make the loud sound than the soft one"

13. page 54: “breath control mainly is a function of the vocal cords themselves. It may be defined as a dynamic relationship between the breath and the vocal cords which determines how long you can sing on one breath. ... if the vocal cords are not closing properly, it is possible to run out of air very quickly, regardless of how well your support mechanism is functioning”

14. page 54-55: "breath support is a dynamic, ever-changing relationship between the forces which bring air into the body and the forces which cause air to leave the body. In the suspension phase of breathing, these forces are brought into equilibrium ... when phonation is initiated, the balance is tipped in favor of the breathing-out mechanism so that breath pressure may be supplied to the vocal cords; however, the breathing-in muscles - the diaphragm and the external rib muscles - must remain active as a counter-balancing force which resists the breathing-out muscles, but not enough to win the tug-of-war"

15. page 57: primary weakness of the upper-chest method: ... "pulling in on the upper abdomen prevents the diaphragm from making its full descent; it thereby limits the capacity of the lower lung area, and interferes with the free functioning of the support mechanism"

16. page 60: “breathing in muscles stay active during the controlled exhalation stage; they help retain breath in the body by offering resistance to the breathing-out muscles, and assist in the process of breath support”
17. page 60: disadvantages RE: abdominal breathing: restricts upward travel of diaphragm during phonation, poor posture, limits breath support for upper voice, tone quality and vibrato problems

18. page 60: Other Breathing and Support Faults – Chapter 4 subtitle

19. page 61: “hyperfunctional breathing, demanding too much physical activity of the breathing mechanism” ... causes “breath support problems”

20. page 62: hypofunctional breath support: "failure to demand enough activity of the support mechanism ... common only among beginning singers ... consists of the failure to activate the support mechanism enough to provide adequate breath pressure for the proper functioning of the vocal cords"

21. page 62: hypofunctional breath support causes: no suspension phrase in breathing process, misconception that singer is singing much louder than actual, anemic concept of vocal tone, devitalized posture, lack of awareness of nature and function of support mechanism

22. page 63: "such exercises as panting like a dog or laughing like Santa ... may be helpful in setting up sensations of support"

23. page 63: "with experienced singers breath support presents an interesting paradox ... if anything goes wrong with a singer's technique, the first thing to be blamed is the support mechanism ... accused of failing to supply enough support" but experienced singers generally are not "lacking in support; they are much more often guilty of too much support (or hyperfunction)" ... and "support may not have been the problem in the first place" ... "more support" is not the "universal answer to all vocal faults"

24. page 63: hyperfunctional breath support: "demanding too much from the support mechanism" "frequent vocal [fault, resulting] in malfunction of the phonation, resonation, and articulation systems" ... larynx "usually receives blame" but "real culprit is the over-support which is delivering so much breath pressure to the larynx that it cannot function freely"
25. page 63: causes of too much support: "misconception that more support is the answer to all vocal evils," trying to make the voice bigger, pulling in on the upper abdomen, eliminating suspension phase of breathing, excess postural tension, too-muscular approach to singing

26. page 63: result of hyperfunctional breath support: "abdominal wall is pulled in too strongly, with consequent excess tension and breath pressure ... normal people can produce subglottic breath pressures nearly ten times those ever required in singing"

27. page 63: to correct hyperfunctional breath support: "practice the four stages of breathing quite deliberately, making certain [to] achieve expansion around the center of the body and that suspension is taking place before [attempting] to support a sound ... [suspension stage] forms the foundation for the support mechanism"

28. page 64: to “encourage less support ... ask the student to sing as if he is singing to a baby"

29. page 78: "perfect attack occurs when the breath support mechanism and the vocal folds are brought into action simultaneously and efficiently without unnecessary tension or wasted breath"

30. page 79: "if the breath has been taken properly and good posture has been maintained, you have already established enough support to sing most of your vocal range ..."

31. page 79: "to sustain something is to hold it up, to support it physically from below, to keep it going, to maintain or prolong it, to keep up its vitality ... should take place during the sustention phase: the energy used to start a sound must be kept going; the breathing mechanism must support the sound from below; the sound must be kept vital and headed somewhere"

32. page 80: with good posture and proper breathing, a balanced tension is set up between the breathing-in and breathing-out muscles ... this dynamic relationship - already identified as breath support - is essential to the proper sustaining of a sound"
33. page 80: "breath support which is necessary to sustain a sound should be continued until the release is finished ... do not let your support sag before the sound is completed"

34. page 82: "any time the vocal folds do not close adequately enough, breath support will push unused air past them"

35. page 84: a way to solve the problem of "breathiness which results from not using enough energy" is to "make the student aware of the function of the breath support mechanism"

36. page 86: activate "breath support mechanism by exercises" as a way to correct hypofunctional (breathy) phonation

37. page 87: best way to correct forced breathiness is "to correct the hyperfunctional breath support first"

38. page 87: "when hyperfunctional phonation is accompanied by hyperfunctional breath support, the sound is further described as harsh ... "

39. page 89: "wrong concept of breath support," "incorrect breathing techniques" can be contributing factors to hyperfunctional phonation

40. page 92: "when proper breath support has been established and some of the tension is released, the vibrato often will appear"

41. page 137: “faults resulting from tension ... often may be traced to a prior cause such as faulty breath support or posture”

42. page 176: "the speaker [whose "vocal energy" is coming in "spurts or surges"] needs a new concept of the use of the support mechanism which will stabilize it and cut down on the hyperfunctional use"

43. page 181: “the coordinated functioning of all the physical processes involved in singing, for it is not just a matter of laryngeal action, breath support, resonance adjustment, or articulatory movements, but a combination of all these factors working together”
44. page 182: “each [ascending] tone requires a little more energy ... the support mechanism increases its output ... more breath pressure is delivered to more resistive vocal cords ... complex explanation of a simple fact – it takes more energy as you get higher”

45. page 182: “better to approach this increase of energy as being supplied by your whole body ... if you think too much about the support mechanism or breath pressure, you may end up exerting too much local effort ... main source of more energy in singing actually is increased breath support ... should use energy from your whole body”

46. page 189: “cardinal errors [made when approaching high notes]: ... grab a large breath just before ... and pour on an excess of breath support”

47. page 189: think of a high pitch “as a note that requires more energy, more space, and more depth”

48. page 189: “do not reach up for a high note; think down for it; feel a deeper center of support within your body; supply energy smoothly with your whole body”

49. page 189: when “singing down wide intervals ... learn not to maintain so much support after the upper note that [one] cannot be heard on the lower note; too much support tends to cut off the lower notes of a voice to the extent that they are almost inaudible ... the lower notes take less energy ...”

50. page 199: “two main causes of vibrato problems: excessive tension in the laryngeal mechanism and unbalanced breath support”

C. Miller

1. page 23: [appoggio is an] “amazingly uniform concept of breath management ... dominated serious twentieth-century vocalism ... cannot narrowly be defined as “breath support” ... because ... includes resonance factors as well as breath management ... may be translated as “support” (appoggiarsi a, “to lean upon”) ... a system for combining and balancing muscles and organs of the trunk and neck, controlling their relationships to the supraglottal resonators, so that no exaggerated function of any one of them upsets the whole”
2. **page 126:** “care should be taken that neither chin nor larynx be raised on the pitches above the easy speaking range. An increase in breath support, in accordance with appoggio practice, should be felt in the trunk.”

D. Ware

1. **page 66:** “note that it takes more breath energy (airflow or breath support) to speak in a higher range”

2. **page 70-71:** “once you have achieved a well-focused tone in both head resonance and at the vocal folds, you will have a good breath connection as well ... that's why many teachers prefer to concentrate initial efforts on phonation and resonation before spending much time on “breath hook-up” ... the voice is carried on a flowing airstream ... must always be aware of using sufficient airflow as the foundational support for the voice”

3. **page 86:** “pregnant women ... claim valuable insights regarding their breathing and breath support system”

4. **page 88:** “best for beginning students to concentrate first on acquiring a relaxed yet energetic breath support ... goal is to find a “balanced pressure” (breath suspension) between inhalation and exhalation ... Lamperti [describes] this opposition of muscle forces [as] lutta vocale”

5. **page 110:** marcato attack exercise “will necessitate a more energetic use of the breath and greater activation of the supporting respiratory musculature”

6. **page 205:** “abdominal muscle cramping can cause discomfort and affect a singer's breath support”

7. **page 221:** “abdominal surgery is problematic because incisions divide the major abdominal muscles that are essential for breath support ... singing too soon following abdominal surgery can lead to impaired support ...”

8. **page 254:** German School: “lower trunk breath management resulting in a distended belly, gluteal-pelvic contraction, low dorsal expansion, and a low diaphragmatic fixation that emphasizes a down-and-out breath support during singing ...”
IX. Clavicular / High / Upper Chest Breathing

A. McCoy

1. page 85: “inhale by gently contracting the diaphragm while simultaneously lifting the entire thorax ... accompanied by lifting the upper chest, clavicles, and shoulders”

2. page 86: “natural recoil of the lungs and diaphragm, along with the weight of gravity pressing down upon the thorax are sufficient to generate adequate respiratory force”

3. page 88: one of “four principal methods of breath management”

4. page 88: synonymous with “upper chest” breathing

5. page 89: “few advocates among voice professionals”

6. page 89: “breathing method often seen in the general population ... common among beginning singers”

7. page 89: “inhalation is caused by a pronounced elevation of the upper chest, which is induced by lifting the shoulders and clavicles ... these same structures drop during exhalation”

8. page 89: “muscularly, inhalation is induced by a contraction of the diaphragm, accompanied by contraction of any of the various muscles that lift the upper chest and shoulders”

9. page 89: “exhalation generally relies on the natural elastic recoil of the lungs and diaphragm assisted by the weight of gravity pushing down upon the ribcage”

10. page 89: “during forced exhalation ... the internal intercostal muscles also might contract, squeezing the thorax to help compress the lungs”

11. page 89: “professional singers and singing teachers discourage the use of this breath”

12. page 89: “many singers actually get a larger breath through the clavicular technique than with any other breathing method”
13. page 89: “the problem with clavicular breathing lies ... in the ability to control air pressure during exhalation”

14. page 89: “offers few – if any – opportunities to establish ... antagonistic control”

15. page 89: “the high potential capacities of clavicular breathing lead to overfilling and over-pressurizing the air ... the larynx itself must act as a valve to help regulate air pressure”

16. page 89: thoracic breathing “offers significant advantages over clavicular ... in terms of regulating air pressure for optimal breath support”

17. page 93: sternocleidomastoid and scaleni muscles are “likely to be active in singers who rely on high thoracic elevation during breathing”

B. McKinney

1. page 56: one of "four methods of breathing which are to some degree inefficient or tension-producing ... identified by the portions of the anatomy involved"

2. page 56: one of the "four incorrect methods of breathing"

3. page 56: synonymous with "clavicular breathing"

4. page 56: "draws its name from the highly visible rising and falling movements of the chest" [upon inhalation]

5. page 56: "not taught, but is naturally present in the majority of beginning students ... upper-chest breathing is the predominant method [in the general population], especially among women"

6. page 56: "characteristic feature ... chest rises during inhalation and falls during exhalation"

7. page 57: undesirable: inhibits downward travel of diaphragm, visually distracting to audience, wastes energy, associated with poor posture, tension inducing, inefficient/shallow
8. page 57: primary weakness of the upper-chest method: ... "pulling in on the upper abdomen prevents the diaphragm from making its full descent; it thereby limits the capacity of the lower lung area, and interferes with the free functioning of the support mechanism"

C. Miller (also: high chest breathing)

1. page 28: “breathing clavicularly gives the impression that the lungs are filled with breath, when actually the sensation the singer is experiencing is muscle tension, not lung expansion ... proper “low” breath may at first seem less complete to the singer who is unaccustomed to transferring the sensation of a full breath from the pectoral region to the region of the tenth rib”

2. page 29: “in order to avoid high-chest (clavicular) breathing, the chest and sternum must be relatively high so that the muscles of the torso may move outward ... no expanding of the pectorals should occur with the intake of the breath; they are positioned rather high, but they do not “feel” further expansion with inspiration”

3. page 270: “although neither the external muscles of the neck nor those muscles of the upper costal region that relate to the shoulder are usually included among the direct participants in the mechanics of phonation or of breath management, they contribute externally in a structural way to both activities. (They also play a compensatory functional role in clavicular breathing)”

D. Ware (also: high torso breathing)

1. page 84: Methods of Breathing – chapter subtitle: “three principal ways people can breathe – high torso, middle torso, and low torso – but the most efficient method is a combination of both the middle and low torso”

2. page 85: RE: high torso breathing: “involves shoulders and upper chest ... “breath of exhaustion” ... shoulders and chest pump violently to move air quickly in and out of respiratory system ... not conducive to effective vocalism, as it leads to tensions in neck and throat muscles and unsteady tone production”
3. page 105: “sternocleidomastoids' function is to lower and turn the head, but with the head and chin fixated they can also help raise the clavicle for high breathing”

X. Deep/Low/Low Torso Breathing

A. McCoy

1. page 84: “diaphragm lowers and becomes somewhat flatter when it contracts ... range of motion is about one-and-a-half centimetres during quiet breathing to as much as six or seven centimetres ... during deep breathing”

2. page 84: “during deep breathing, diaphragmatic movement alone should draw nearly two-and-a-half litres of air into the lungs.”

B. McKinney

1. page 36: “… breathe deeply being conscious of where you feel expansion …”

2. page 48: “… the breath goes deeper into the lungs than in natural breathing …”

3. page 49: RE: smelling flower image: “… notice … how deep the breath goes”

4. page 49: RE: yawn image: “notice how deep in the body your breath goes without any effort”

5. page 49: RE: drinking image: “… the breath will enter the body easily and noiselessly, and will go deep without any effort”

6. page 50: “breathe in easily and deeply, expanding around the middle of your body as you do so”

7. page 53: RE: catch breath “direct the breath deep into the body…”

8. page 54: RE: learning breath control vs breath support: “take a deep breath through your mouth ... take another deep breath …”
C. Miller

1. page 28: “breathing clavicularly gives the impression that the lungs are filled with breath, when actually the sensation the singer is experiencing is muscle tension, not lung expansion ... proper “low” breath may at first seem less complete to the singer who is unaccustomed to transferring the sensation of a full breath from the pectoral region to the region of the tenth rib”

D. Ware

1. page 68: “one is able to experience the effects of deep breathing [by placing the “palm of your left hand flat on the upper abdominal area ... with the tip of the little finger touching the navel and right thumb tip”]

2. page 73: “singers' cardiopulmonary (heart-lung) function during sustained deep breathing was similar to those found in conditioned athletes”

3. page 73: “benefit of the singer's practice of deep breathing is an increased output of endorphins”

4. page 82: “muscles of respiration are used to augment or check the passive forces of gravity and muscle/rib-cage contraction, breathing for speech or singing generally requires a shorter inspiration and longer expiration than quiet breathing ... after a deep inhalation, the recoil force of the lungs and diaphragm is very great ... the expiration would be very rapid ... when a slower release is desired ... external intercostals (muscles of inspiration) continue to contract, effectively maintaining rib-cage expansion and preventing the rapid expulsion of air ... results in a steady flow of air through the vocal folds”

5. page 84: Methods of Breathing – chapter subtitle: “three principal ways people can breathe – high torso, middle torso, and low torso – but the most efficient method is a combination of both the middle and low torso”

6. page 85: RE: middle and low torso breathing: “involves a combined use of the costal (rib) and low abdominal muscles. This ideal breathing technique is achieved through a
combination of middle and low torso expansion, which includes … a relaxed lower abdominal expansion as a result of diaphragm distension which causes downward lung expansion and inhalation ... promoted in the “Italian school” of voice training”

7. page 85: RE: low torso breathing: “involves greater use of low abdominal muscles ... the diaphragm fully descends for a relaxed and complete breath ... less desirable low torso breathing method is advocated by the “German school,” which overemphasizes forced breathing activity in the lower abdominal area ... while deep breathing is beneficial for singers, excessive pushing-down-and-out muscular effort should be avoided”

8. page 86: “heavy-weight persons (endomorphs) tend to breathe more deeply ...easier to let-go and “let it all hang out” ... weight gain is not recommended [to improve] a singer's breath management ... rapid weight loss can negatively influence one's pattern of breathing ...”

9. page 109: “take a relaxed, deep breath”

10. page 253: ““pretend you are smelling a rose” may be used to trigger a slow, deep breath” in Holistic Pedagogy

XI. Muscular Antagonism

A. McCoy

1. page 78: “muscular antagonism is important in breathing for singing, where the muscles of inspiration are contracted to resist the action of the muscles of expiration, resulting in increased control of breath pressure and air flow”

2. page 88: “to maintain effective breath support, possibilities must exist for antagonism between the muscles of inspiration and expiration”

3. page 89: “ideally, [regulation of air pressure] is accomplished through the use of muscular antagonism”
4. page 89: “clavicular breathing offers few – if any – opportunities to establish ... antagonistic control”

5. page 90: “thoracic breathing offers excellent opportunities for the regulation of air pressure through muscular antagonism. The thorax is stabilized through simultaneous contraction of the external and internal intercostal muscles during exhalation, resulting in a high degree of control over pulmonary pressure”

6. page 90: “muscular antagonism may be possible [between] the external intercostals [and the oblique muscles]”

7. page 90-91: “antagonism [may] exist between the abdominals and the diaphragm [in singers that “are capable of sustaining a degree of diaphragmatic contraction during exhalation]”

8. page 91: “in the absence of antagonistic relationships, breath support must be regulated by the degree of contraction in the abdominal muscles, which are pulled more tightly to increase pressure and released to reduce it”

9. page 91: “exhalation is controlled by the coordinated efforts of the abdominal muscles and the external intercostals – and possibly the diaphragm – which work in gentle antagonism to control pressure in the air supply”

10. page 91: appoggio chest up / belly in variation “thorax remains in an expanded position for as long as possible during each exhalation, while the abdominal wall works antagonistically, gradually pulling inward to provide power for the breath”

11. page 91: appoggio chest down / belly out variation: “abdominal distension is maintained as long as possible during exhalation, working antagonistically with a lowered thorax ... the rectus probably remains relaxed while the obliques and transverse muscles contract, directing the viscera against the anterior abdominal wall rather than up toward the diaphragm”
12. page 91: “perusal of the pedagogic literature shows widespread agreement for the
principle that muscular antagonism between the inspiratory and expiratory muscles is the
foundation of a well-supported breath”

13. page 98: “as the quantity of air is reduced during exhalation, more and more muscles
must be activated to propel the breath out of the body ... breath support becomes a
balancing act ... in the early stages of a musical phrase, muscular antagonism is used to
limit the amounts of pressure in the well-filled lungs ... as the air is depleted ...
increasing amount of abdominal and thoracic contraction are required to maintain a
steady breath stream of sufficient flow and pressure”

14. page 114: breathy vocal quality is likely caused by two things: “not adducting the glottis
firmly enough ... and blowing out too much air” ... “the breath can be corrected by
proper implementation of muscular antagonism in the support process”

B. Miller (dynamic muscle equilibrium & lutta vocale)

1. page 25: “there should be an awareness, when inhaling, of transverse expansion, the
result of antagonism of the anterolateral muscles”

2. page 26: “no initial sensation of grabbing or holding the breath should be associated
with singing ... when a singer feels extreme muscle resistance to inhalation ...
unnecessary muscle antagonism is taking place”

3. page 39: “relaxation” is a relative term; breathing involves muscle antagonism (and
synergism) just as does any other physical activity. Energy for the singing voice
demands muscle coordination between the breath source (the motor) and the larynx (the
vibrator)”

4. page 41: “the sensation of agile dynamic muscle balance must be subjectively
experienced, certain of its hallmarks can be identified: abdominal muscle antagonism
(appoggio) feels both firm and supple; power and energy are not static conditions; breath
renewal remains easy”
C. Ware

1. page 46: “a balance of muscle tension and relaxation ... refers to the natural muscle opposition that occurs in physical activity, as when one set or group of muscles contracts while an opposing group relaxes”

2. page 80: RE: intercostal muscles: “their main purpose is to aid in inhalation and exhalation and to help create a constant subglottal ... air pressure for voice use, which is accomplished by coordinating and balancing the action of the inspiratory and expiratory muscles and by providing checking action to the passive processes of respiration ...”

3. page 88: “the principal of muscular antagonism ... [is] two muscle groups work in opposition to one another ... with the lower abdominal muscles being active and the diaphragm remaining relatively passive”

4. page 88: “best for beginning students to concentrate first on acquiring a relaxed yet energetic breath support ... goal is to find a “balanced pressure” (breath suspension) between inhalation and exhalation ... Lamperti [describes] this opposition of muscle forces [as] lutta vocale”

5. page 89: “image of balanced muscular coordination ... “seesawing” [is an] appropriate analogy for the “point of suspension” state ... abdominal musculature [on one side] which may function in respiration to reduce lung volume by expiration from below ... on the other end sits the thoracic muscles, whose job is to provide resistance during expiration ... challenge is for these opposing forces to maintain equilibrium”

6. page 89: image to help “prevent the collapse of the respiratory system ... maintain a coordinated balance between inspiratory and expiratory forces”

7. page 89: avoid “any tendency to tighten muscles rigidly” when “attempting to maintain a muscular balance”

8. page 91: “breath management as related to the principle of muscular antagonism”

9. page 280: DEF: “anatomically, a balanced tension created when a muscle or muscle group opposes the primary countermovement of the agonist muscle or muscle group”
XII. Suspension

A. McKinney

1. page 48: “breathing for singing has four stages: (1) a breathing-in period (inhalation), (2) a setting-up-controls period (suspension), (3) a controlled-exhalation period (phonation), and (4) a recovery period”

2. page 50: "suspension stage of breathing for singing has no parallel in natural breathing ... In breathing for singing ... it is very important that the breath should be suspended momentarily just as the act of inhalation is completed. The purpose of this moment of suspension is to prepare the breath support mechanism for the phonation which follows"

3. page 50: "not part of natural breathing [so] suspension must be acquired by the singer through the imposition of conscious controls"

4. page 52: “feeling of holding back the breath is essential to establish "Suspension" ...” [quoting Christy in a discussion of exhalation]

5. page 53: "dynamic relationship between the breathing-in muscles and the breathing-out muscles ... purpose of which is to supply adequate breath pressure to the vocal folds for the sustaining of any desired pitch or dynamic level ... when a person establishes the correct posture, breathes in properly, and then suspends the breath, a balanced tension is set up between the muscles of inhalation and the muscles of exhalation"

6. page 54-55: "breath support is a dynamic, ever-changing relationship between the forces which bring air into the body and the forces which cause air to leave the body. In the suspension phase of breathing, these forces are brought into equilibrium ... when phonation is initiated, the balance is tipped in favor of the breathing-out mechanism so that breath pressure may be supplied to the vocal cords; however, the breathing-in muscles - the diaphragm and the external rib muscles - must remain active as a counter-balancing force which resists the breathing-out muscles, but not enough to win the tug-of-war"
7. page 62: hypofunctional breath support causes: no suspension phrase in breathing process, misconception that singer is singing much louder than actual, anemic concept of vocal tone, devitalized posture, lack of awareness of nature and function of support mechanism

8. page 63: causes of too much support: "misconception that more support is the answer to all vocal evils," trying to make the voice bigger, pulling in on the upper abdomen, eliminating suspension phase of breathing, excess postural tension, too-muscular approach to singing

9. page 63: to correct hyperfunctional breath support: "practice the four stages of breathing quite deliberately, making certain [to] achieve expansion around the center of the body and that suspension is taking place before [attempting] to support a sound ... [suspension stage] forms the foundation for the support mechanism"

10. page 83: "shallow breathing ... lack of suspension phase of breathing" can lead to hypofunctional phonation

B. Miller

1. page 31: “three-part breath cycle” in Farinelli’s exercise: “inhalation, suspension, and exhalation”

2. page 174: “during the course of any sustained phrase, maintaining a steady epigastric-umbilical balance requires increased attention to breath management ... there should never be sudden conscious increase in breath pressure [during messa di voce] ... the concluding pianissimo will require the highest levels of control. Such control is the result of having earlier developed the sensation of breath “suspension” discussed in Chapter 2”

C. Ware

1. page 82: “action of the diaphragm and abdominal muscles during a complete inspiration-expiration cycle can be described in four phases: inspiration, suspension, expiration, and recovery ...”
2. page 84: RE: suspension: “when recoil forces overcome the muscular forces of rib-cage expansion, and the process reverses direction”

3. page 88: “best for beginning students to concentrate first on acquiring a relaxed yet energetic breath support ... goal is to find a “balanced pressure” (breath suspension) between inhalation and exhalation ... Lamperti [describes] this opposition of muscle forces [as] *lutta vocale*”

4. page 89: “image of balanced muscular coordination ... “seesawing” [is an] appropriate analogy for the “point of suspension” state ... abdominal musculature [on one side] which may function in respiration to reduce lung volume by expiration from below ... on the other end sits the thoracic muscles, whose job is to provide resistance during expiration ... challenge is for these opposing forces to maintain equilibrium”

5. page 178: RE: vocal coordination: “respiration: Air is inhaled and momentarily suspended in the lungs”

XIII. Thoracic / Rib / Middle Torso Breathing

A. McCoy (Thoracic)

1. page 88: one of “four principal methods of breath management”

2. page 88: synonymous with “lower chest” breathing

3. page 89: thoracic breathing “offers significant advantages over clavicular ... in terms of regulating air pressure for optimal breath support”

4. page 90: “relies on contraction of the diaphragm and external intercostal muscles during the inhalation process ... resulting expansion is felt in lower ribcage”

5. page 90: “exhalation is caused by the release of the diaphragm and the contraction of the internal intercostal muscles ... intercostal contraction is used to increase the circumference of the thorax ... upper portions of the chest might move little or not at all”
6. page 90: “**thoracic** breathing offers excellent opportunities for the regulation of **air pressure** through **muscular antagonism**. The thorax is stabilized through simultaneous contraction of the external and internal intercostal muscles during exhalation, resulting in a high degree of control over pulmonary pressure”

7. page 90: on exhalation, “consciously [maintain] the outward expansion of the ribcage”

8. page 90: “**muscular antagonism** may be possible [between] the external intercostals [and the oblique muscles]”

9. page 90-91: “antagonism [may] exist between the abdominals and the diaphragm [in singers that “are capable of sustaining a degree of diaphragmatic contraction during exhalation]”

10. page 91: “in the absence of antagonistic relationships, **breath support** must be regulated by the degree of contraction in the abdominal muscles, which are pulled more tightly to increase pressure and released to reduce it”

11. page 91: “combination of the best attributes of **thoracic and abdominal breathing**”

   [balanced / appoggio breathing]

12. page 93: sternocleidomastoids and scaleni muscles are “likely to be active in singers who rely on high thoracic elevation during breathing”

13. page 93: serratus anterior muscles are “able to help elevate and expand the lateral portion of the thorax and can assist with both **thoracic and appoggio** breathing”

B. McKinney (Rib)

1. page 56: one of "four methods of breathing which are to some degree inefficient or tension-producing ... identified by the portions of the anatomy involved"

2. page 56: one of "four incorrect methods of breathing"

3. page 57: "seldom occurs naturally ... method passed on by teachers to their students"
4. page 58: “limits downward travel of diaphragm,” wastes energy, tension may be transferred from chest to larynx

5. page 58: on inhalation: "upper abdomen is pulled in to assist in the action of pushing the ribs out to each side ... prevents the diaphragm from making its full descent, limiting the capacity of the lower lung area and interfering with the functioning of the support mechanism"

6. page 58: correct rib-breathing by "release of postural tension ... and encouragement of upper abdominal expansion while inhaling"

7. page 58: "more prevalent among slender people than ... among plump ones" because "tend to have more trouble experiencing expansion around the middle of the bodies"

8. page 58: back breathing has “much in common with rib breathing ... could be considered another manifestation of it [except] ... in back breathing, the expansion is in the back itself”

C. Miller

1. page 24: “appoggio ... refers to the point of appoggio, whether it be of the abdominal or the thoracic region where the maximum muscular tension is experienced in singing ...”

D. Ware (middle torso)

1. page 84: Methods of Breathing – chapter subtitle: “three principal ways people can breathe – high torso, middle torso, and low torso – but the most efficient method is a combination of both the middle and low torso”

2. page 85: RE: middle torso breathing: “involves expansion of the ribs ... but neglects lower abdominal breath-related action ... “corseted” manner of breath control tends to create an overly pressurized, tense breathing system with restrained airflow ... [this] manner of breathing is encouraged by a voice culture using the admonition “hold in those tummy muscles” ...”
Appendix 13: Primary Vocation Inclusions & Exclusions

Respondents who indicated 'Other' for their Primary Vocation:

I. Excluded

• “Assistant of Vocal/Choral Music Education”
• “Cantor and Music Director of Synagogues (Retired)”
• “Career singer”
• “choir conductor”
• “choir director”
• “choral”
• “choral conductor”
• “Choral Conductor and Vocal Coach”
• “Choral Director”
• “choral music director”
• “community college music professor”
• “Composer, Musical Theatre, Choral Conducting, Theorist”
• “conductor”
• “Elementary General Music Teacher”
• “Music Education”
• “music history lecturer; beginning piano and voice”
• “Opera coach and Assistant Dean”
• “professional opera singer”
• “singer”
• “Singer, Conductor, Piano Teacher”
• “Teacher of Ideokinesis and Breathing Coordination”
• “University professor”
• “Vocal coach”
• “vocalist, composer”
• “Voice and Opera Professor / Professional Singer”
• “vocal coach”

II. Moved from 'Other' to 'Speech-Language Pathology'

• “am a singing teacher w/ MA in Speech Pathology who also practices as singing voice rehab specialist; in addition I have PhD in Voice Science and teach in a Communications Disorders Dept at a University”
• “current SLP and ex voice professor”

III. Moved from 'Other' to 'Voice Pedagogy'

• “Choral Director and Private Voice Teacher”
• “Choral Director who also teaches voice”
• “Choral director who teaches voice”
• “clinical vocologist, former classical recording artist, voice teacher, researcher”
• “Director of Choral Activities, Ast. Prof. Voice”
• “I have had an international career on the operatic and concert stage. I have always taught voice wherever I have been. The past 8 years I have been a Visiting Professor of Voice at a University.”
• “I teach singing part time”
• “Performer/Teacher/Conductor”
• “Performing Singer who also teaches voice”

• “Professor of music, including voice teaching / Professional singer”

• “Singer / Voice Teacher / Director”

• “Singing Voice Specialist”

• “voice teacher and coach / director / actor / speaking voice teacher”

• “Voice Teacher / Voice Science Researcher”