

The Legacy of John W. Large

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Abstract

Since his untimely death in 1987, the work of John W. Large continues to be relevant to current voice research and pedagogy. He pushed for specificity in voice terminology. For instance, he drew the distinction between speech science register nomenclature (for example, pulse/fry, modal, loft, flute) and singing register nomenclature (for example, chest, middle, head). He also proposed the usage of isoparametric tones (different register tones compared on the same fundamental, phoneme/vowel, and dynamic level) in order to standardize voice research protocols.

A pedagogical descendant of Manuel Garcia II, one of the first voice scientist and teachers, Large researched aspects of all three components of the vocal instrument: the actuator (breath), the vibrator (vocal folds and laryngeal structure), and the resonators (the bucco-pharyngeal cavity and nasal cavities as well as the sinuses and other supra- and sub-glottal spaces including the pyriform sinuses). He investigated airflow rate (actuator) in the *passaggio*, the vocal fold wavelength configuration (vibrator), formants (emphases of the harmonic partials), and the sub-glottal and supra-glottal coupling of resonators. Large, who agreed with Garcia's "mechanical principle," thought that vocal fold wave configuration was a primary determinant of vocal register. However, like his bel canto colleagues, he recognized the importance of the vowel in phonation as well as its use in pedagogy. In summary, while Large's pedagogy was informed by science, it was also firmly rooted in the bel canto tradition.

Introduction

John W. Large (1929-1987) is a noteworthy figure who contributed greatly to the voice profession as a vocal performer, pedagogue, and scholar. An American, whose career was ended prematurely when he died in Fort Worth, Texas on October 22, 1987 at the age of 57, he is probably best known for his work as a voice science researcher. Yet, in actuality he not only published articles on voice science and vocal literature, but concertized extensively, taught at a number of universities, was the founder of the International Association for Experimental Research in Singing, and served on the Musical Acoustics Technical Committee of the Acoustical Society of America as well as the Scientific Research Committee of the National Association of Teachers of Singing (NATS). Another of his memberships was in Collegium Medicorum Theatri.

Moreover, Large (1973b & 1980) edited two important publications pertaining to the implications of voice research for vocal pedagogy. The latter publication, a text that could be used as supplementary reading for beginning courses in voice science and vocal pedagogy, *Contributions of Voice Research to Singing*, was described by Sjoerdsma (1981) in a book review as an "outstanding anthology of twenty-five brilliant articles by such luminaries as Stetson, Gould, Garcia, Zemlin, Bartholomew, Delattre, Vennard, and others [organized] into categories that give attention to their historical perspective (p. 42)." Later in the review Sjoerdsma referred to

the aforementioned authors as “the keenest minds and most careful investigators that have had a significant impact upon the science of singing (p. 43).”

Biographical Information

Education

John W. Large (born in Appalachia, Virginia on November 29, 1929) received a Bachelor of Fine Arts and a Master of Music from the University of New Mexico. After completing these degrees, he did a stint in the United States Navy as a pilot, then attended Indiana University and graduated in 1962 with a Doctor of Music degree in vocal performance, literature, and pedagogy. His dissertations, entitled “The Linguistic Problem in the Performance of Claude Debussy’s Solo Song Setting of Fifteenth-Century Poetry” and “An Investigation of the Baritone Solo Cantatas of Jean-Philippe Rameau,” formed the basis for two articles later published in *The Journal of Research in Singing and Applied Vocal Pedagogy* (Large, 1982; Large, 1983). Another article, this one written in collaboration with Klaus Weissenberger (“The Irony of the Allusions in Dichterliebe”) and published in the *National Association of Teachers of Singing Bulletin*, is an additional example of Large’s earlier scholarship in the area of vocal literature.

While at Indiana University he studied with Frank St. Leger and Robert Evans. Additionally he performed major baritone operatic roles in the Indiana University productions, was the recipient of first prize in the Young Artists auditions of the National Federation of Music Clubs, and was a participant in 1961 in the Tanglewood Opera Theatre directed by Boris Goldovsky (Cattell, 1985; Kay, 1988; Large & Shipp, 1969). After graduation from Indiana, he continued his studies by studying French vocal literature in Paris under the tutelage of Pierre Bernac courtesy of a Fulbright. In 1963, he received the *Licence de Concert* from the *École Normale de Musique*. He also studied lieder with Otto Braun at the *Hochschule für Musik* in Frankfurt and performed professionally in France and Germany. The year 1964 marked an important milestone for him as a singer because he not only made his New York debut, but also placed in the Concert Artists Guild Auditions (Cattell, 1985; Large & Shipp, 1969).

His biography in *The American Music Teacher* (1976) yields some interesting details about his career as a singer:

Dr. John Large...opera-oratorio singer...has concertized widely in Europe and the USA under professional management. He has sung all the major Mozart baritone roles and such contrasting roles as Klingsor in Wagner’s *Parsifal* and Ramiro in Ravel’s *L’Heure espagnole* (p. 35).

Another biographical sketch, this one appearing at the end of a 1968 article by Large, listed some of his additional roles.

His modern repertoire includes the King in Orff’s *Die Kluge*, John Sorel in Menotti’s *The Consul*, and the musical comedy roles of Tommy in *Brigadoon* and Frank Maurant in *Street Scene*...Dr. Large is a well-known Handel and Bach soloist and interprets such modern scores as Rachmaninoff’s *Springtide* and Britten’s *Cantata Academica* (p. 15).

When Large later became interested in voice science, he obtained a postdoctoral fellowship from the Department of Health, Education, and Welfare National Institutes of Health to study

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at Stanford University for three years. He graduated in 1971 with a PhD in voice research. His dissertation reported the results of his investigation of spectral correlates of perceived differences in female registers in singing (Large, 1971). He also conducted post-doctoral research at Stockholm's Royal Institute of Technology.

Teaching

His first teaching job was in 1965 at the State University of New York at Potsdam. Other professorships and research jobs he had were at San Francisco State University (1966-1969); the University of Southern California (1969-1972); Associate Research Voice Scientist at the Institute of Laryngology and Voice Disorders in Los Angeles, California (1969); Santa Clara University (1973-1974); the University of California San Diego (1974-1978); the American Institute of Musical Studies at Graz, Austria (1979); and the University of North Texas (1978-1985). At the time of his death he was the director of the graduate program in voice pedagogy at Texas Christian University, a post he had held since 1985. His teaching specialties as a professor were voice science, pedagogy, vocal literature, applied voice, and the direction of vocal groups (*American Music Teacher*, 1976). He was also the founder in 1983 of the Manuel Garcia International Competition in Singing and beginning in 1981 the Artistic Director of the Santa Fe Institute of Vocal Studies (Cattell, 1985; Kay, 1988).

The John Large Vocal Laboratory at Texas Christian is a tangible illustration of how singers can make use of the knowledge and equipment associated with voice science research to improve their singing. This voice lab was "named for John Large because he initially designed our pedagogy MM degree and was on the faculty here when he died (S. Allen, personal communication April 16, 2007)." Students can use the lab to analyze their singing in a number of ways: The first is in terms of amount of acoustic energy. This allows them to strive for vowel definition, balance of tone colour, and the consistent presence of the singer's formant (2800-3200 Hz) (Miller, 1986); A second is to use spectral analysis to get feedback on the degree and periodicity of their vibrato; A third is to use spectral analysis to detect breaks in a legato line due to improper timing in the initiation of the consonant such as by starting it too soon; A fourth is to receive acoustical data to aid in the equalization of timbre in vocal registers; A fifth is to work on the production of accurate vowels by comparing the spectrographic analysis of their vowel to a vowel chart appearing next to it on the machine's screen. The spectral differences between speech and singing can also be studied in the lab (Retrieved June 20, 2007 from <http://www.music.tcu.edu/voice.asp>).

Research and Publications

John Large was an active researcher in voice science who chose topics for study that were directly associated with his teaching: One of these topics was vocal abuse and misuse. In a 1978 review of the literature published in the National Association of Teachers of Singing Bulletin (NATS), he traced the history of literature on the topic of vocal hygiene/therapy and vocal function from antiquity to modern times (Large, 1978). His extensive bibliography and the historical perspective provided in the text make the article an invaluable reference for those who desire to locate primary source material. A second article on the subject, this one a quantitative study in which he and Murray (1975) surveyed over 100 voice teachers who were members of NATS as to their opinion concerning the safety of extended monophonic and multiphonic vocal techniques such as Tibetan chant, yielded further information about the

perceived potential harmfulness of some vocal practices. The authors suggested that this topic receive further attention from voice scientists.

Large (1984b) was motivated by his interest in vocal health to publish a third article, "The German Fach System." Essentially, the article is a list of vocal roles and how they were categorized according to the Fach system in German opera houses. This information, he thought, would aid singers by giving them the option to choose roles appropriate to their voice type, thus helping them avoid the potential for vocal harm.

Physical Fitness and Singing

Another topic of interest to Large was the vital capacity of singers. In his study, Large (1971) defined vital capacity as "the largest volume of air that can be expired after the deepest possible inspiration." The purpose of the study was to examine the hypothesis that singers will improve their vital capacity as the result of practicing singing. Twenty male and 20 female students were tested for vital capacity as measured by a Collins respirator. An interesting result was that there was little relationship between years of singing and increase in vital capacity, thus suggesting that the act of singing by itself may not bring about improved vital capacity.

Perhaps the results of this study suggested the hypothesis for the Large and Patton (1981) study on the effects of a physical fitness program on singers' performance. In this study the nine singer-subjects were assigned to participate in either the weight training or the jogging group. Subjects' level of physical fitness was measured and they were pre-tested on measures of vocal performance. They then participated in a 12-week training program (30-minute exercise sessions, three times a week). The posttests revealed that the joggers had improved their vital capacity while the weight trainers had shown a slight decrease. All subjects had improved on the measures of vocal power (singing a pitch of their choice as loud and long as possible without forcing), vocal control (singing softer without losing control), vocal agility (singing a scale as quickly as possible), and endurance (singing "America" on one breath). Although these results seemed to support the efficacy of a physical fitness program in the improvement of singing, the research design of experimental group only did not control for the effect of the students' applied voice study. It is possible that it was students' voice lessons rather than the fitness program that had brought about their enhanced performance on the posttest.

Vocal register terminology

One of Large's primary areas of interest as a voice science researcher was that of vocal registration. Large (1972) subscribed to the view that laryngeal adjustment, supra-glottal coupling to the larynx, sub-glottal coupling to the larynx, and formant enhancement of partials should be investigated in order to explain the phenomenon of vocal registers.

Large was an advocate of the 1840 Garcia definition of registration, but expanded it. The following is Garcia's definition:

By the word "register" we mean a series of succeeding sounds of equal quality on a scale from low to high produced by the application of the same mechanical principle, the nature of which differs basically from another series of succeeding sounds of equal equality [*sic*] produced by another mechanical principle (Garcia, 1840). [To which Large adds] Mechanical principle is understood to include both myoelastic and acoustic

determinants (Large, Baird, & Jenkins, 1980, p. 33). [Note: in another citation of the same Garcia quotation, the phrase was “equal quality” (Large, 1972, p. 18)].

Two to three register schemes seem to be the most common among voice scientists. The use of nomenclature referring to the existence of three registers began as early as John of Garland (ca. 1193 to ca. 1270) and Jerome of Moravia (ca. 1250), both of whom designated three registers: chest, throat, and head voice (Duey, 1951). Large found that in the United States, singing voice scientists such as himself, Appelman and Vennard preferred to use the register terms chest, middle or medium, and head for the main vocal registers.

Large (1973b), however, was aware that speech voice scientists such as McGlone and the team of Hollien and Wendahl used different terminology than singing voice scientists – vocal fry, modal or normal, and falsetto or upper for the main registers. Oncley (1973) corroborated this speech voice scientist terminology usage and offered the opinion that singing teachers were probably dealing with sub registers of the modal register. In contrast, Brown (1996) did not make a distinction between the register terminology of singing and speech voice scientists. His terminology for registers was the following: Pulse (vocal fry) register comprises the lowest singing notes, modal (corresponding to chest) is the speech register, loft (falsetto, head) is the singing range above modal, and flute (whistle) is the singing range above loft.

Because of the confusion caused by the various classification systems for vocal registers, Large made the recommendation that speech voice scientists utilize specific terminology (that is, modal, fry, and so forth) for speech registers and that the terms be specified as such. Regarding singing registers, Large (1972) suggested that the sensations of singers should dictate register terminology as well as be the basis of voice scientists’ experimentation.

For Large (1972), the standard terms of chest, middle, and head seemed to be as useful as any other terminology for the main singing register areas. He considered other terms such as falsetto, whistle, and Strohbass to be subcategories rather than the main registers themselves. Interestingly, Large (1986, 1987, 1988) did use Italian terminology at times, for example, *voce mista/zona di passaggio* (mixed voice/passage zone) for middle voice and *voce di testa* (head voice) appear in an article on tenor pedagogy and others. But, regardless of what the registers were named, Large (1974) steadfastly maintained that the concern of voice teachers was to teach singers to perform register transitions in such a way that the breaks were difficult to discern.

Large advocated the making of a distinction between male and female voices to improve clarity in the reporting of the results of studies on registers. Large (1972) also called for better use of controls in the methodology of research being done in regard to registration. One thing Large did in his own experimentation to reduce confusion concerning his methodology was to use the concept of isoparametric tones. These he defined as “tones of the same fundamental frequency, sound level, and phonemic category in different vocal registers (Large, Iwata, & von Leden, 1970, p. 393).” He also used the term “phoneme” to refer specifically to vowel.

In a pilot study, Large and Shipp (1969) used isoparametric tasks similar to the *messa di voce* to study register shifts in female singers. Singers were asked to sing the vowel [a] at 330 Hz and switch back and forth between the chest and middle register without changing the vowel, frequency, or intensity. The judges listened to the recorded examples by the singers and indicated which register they thought they were hearing. The results were that the judges were relatively successful in identifying the correct register even though the transitions had been edited out. This suggests that the judges were responding to timbre differences in the registers

created by variation in the configuration of partials and their relative energy between the two registers.

Register Function

Large (1988) also studied what he considered to be the primary register transitions. For the female, it was the transition from chest to middle voice. The primary male register transition (tenor, in this study) was from *voce mista* to *voce di testa* (Large, 1987b). The results Large (1986) reported were that the transition from female chest voice to middle voice was similar to the male transition from *voce mista* to *voce di testa* because they both resulted from a laryngeal change. Thus, he had concluded that the primary transitions for both genders were resultant from essentially the same laryngeal action. Large (1987b) stated that register transitions should be thought of not only in terms of obscuring the perceived sound of the passage from one register to the other, but rather in terms of equalization of the entire scale.

Research into the nature of the mechanics of vocal fold registration occupied Large starting at least as early as 1968 when he commented on the results of his study: "These findings would seem to support the theory that it is primarily the wave form of the source [vocal folds] [Large's brackets] that changes when a change is made from chest to middle register in the female voice in singing (p. 15)." This theory was also borne out in another psychoacoustic study of female registration equalization by Large in 1974.

Additionally, in Large, Iwata, and von Leden (1970), the equalization or blending of register and timbre was shown to be related to the airflow rate. This also suggested to Large (1974) that the cause of register shifts between female chest and middle voice was from the larynx, not the pharynx. Large and Shipp (1969) found that the female chest register was characterized by greater energy in the upper partials, while the female middle register exhibited more energy in the fundamental. Large (1973a) reported supporting findings: Female chest voice used more energy above the third partial, particularly in partials 4 and 5, and the middle voice was stronger in the fundamental. Similar results were also found in males although with some variation (Russo & Large, 1978). The 1970 Large, Iwata, and von Leden study of female register transition corroborated the hypothesis that the vocal folds become thinner when a singer crosses between chest and middle registers, even as pitch remains constant.

Function and Use of the Falsetto

Large thought that there were two approaches to male high voice registration: the grand opera or dramatic tenor approach, which uses chest voice throughout but with covering, thus giving a darker vowel, and the bel canto or lyric tenor approach, which uses a falsetto production for part of the range as well as a blending of the falsetto and chest registers (Russo & Large, 1978). Large (1972) noted that in the United States, falsetto and head mean two different registers. As previously mentioned, Large (1972) advocated the use of chest, middle, and head as singing register terminology. He was presumably talking about two variations of head voice when distinguishing between the male operatic head and falsetto registers (Large, Baird, & Jenkins, 1980). He considered operatic head to be the more desirable, legitimate sound on high notes. Male operatic head voice is small in compass, only a perfect fourth or perfect fifth, but it

is employed by all trained male singers. Large (1984a) saw that a distinction between falsetto and head was that the falsetto had a thinner sound than head.

In addition to different sounds, Large recognized that there were physiological differences between falsetto and head. Male head voice was characterized by a complete closure of the vocal folds, while in falsetto, fold approximation was incomplete, with a gap appearing between the folds; additionally, there was a greater distance between the arytenoid cartilages in head register during the register transition than there was in falsetto. Air flow rates were less for head voice than for falsetto (Large, 1984a). However, the head voice was also characterized by more energy in the upper partials than was the falsetto (Large, 1984a). Further terminology variants for head voice were noted by Large such as top, which is overlapped by two other registers: artistic head tone and natural falsetto.

Terminology aside, Large (1984a) stated that “the results of this study demonstrate that male operatic head register is a different laryngeal mechanism from falsetto (p. 9).” In another study, he and his two co-authors identified the transition from male chest to falsetto as basically a laryngeal adjustment whereas the transition from chest to head they viewed as an acoustic (pharyngeal resonator) adjustment (Large, Baird, & Jenkins, 1980).

Mechanisms

In his study on teaching the tenor voice, Large (1986) employed the Italian model of teaching as described by Miller (1977) and wrote a brief description of how well the teaching procedures worked with each of the 10 tenors in the study. Large’s Italian model treatment included the concept of *voce di petto*, *voce mista/zona di passaggio*, and *voce di testa* (chest voice, mixed voice/passage zone, head voice) with a blending from *voce di petto* into *voce mista/zona di passaggio*. Large stated that the *voce di testa* was produced mainly by myoelastic-aerodynamic (laryngeal musculature and air wave) sources, the *voce mista/zona di passaggio* by a combination of the acoustics in the vocal tract and myoelastic-aerodynamic sources, and the *voce di petto* by myoelastic-aerodynamic sources. Large (1986) found that all of the singers he had worked with using the Italian model had shown some improvement.

In part two of the previous study, Large (1987a) applied the Italian method of teaching to baritones and basses. Although he noted that all 10 students had made some progress, Large (1987a) raised some doubts about the use of the Italian model with lower male voices because “the *voce mista* appears to be the primary high-note vehicle for baritones and basses (p. 28).” Therefore, the *voce di testa* mechanism is less important for baritones than it is for tenors.

Large, after studying both high and low male voices, concluded that the *voce mista* was likely an extension of chest voice, and was produced by an acoustic interaction between the first formant and the vocal folds. Conversely (according to him), the *voce di testa* was caused by the muscular action of relaxing the vocal folds after they had been fully extended. Large deemed the *voce mista* and *voce di testa* to be workable for high notes in tenors, although some heavier-voiced tenors might use only the *voce mista*. Large (1987a) observed that baritones and basses seemed to use mostly the *voce mista* on high notes, although high baritones might use the *voce di testa*. Large (1987) said that the smooth lengthening of the vocal folds at the *voce mista/zona di passaggio* would lead to a coordinated change of register from the *secondo passaggio* to the next register, the *voce di testa*.

Pedagogy

Large (1987b) used his research in voice science to inform his teaching. For example, he was an advocate of even scale pedagogy:

By even scale we mean a scale in which registers blend, vowels match, and dynamics merge, so that the differences shade into each other with no perceptible line of demarcation – every tone from lowest to highest matching as perfectly as possible in quality and passing smoothly from one to the other... (p. 12).

Another salient feature of Large's pedagogy was the importance he placed on the singer's formant or ring, found at about 3 kHz. The maintenance of the 3 kHz area of resonance is important because of the formants – those areas of emphasis in the harmonic partial or overtone series which vary with any instrument or voice. Because of the different emphases of resonance, different timbres are produced. Large (1987b) stated that "Students must learn to maintain the 3 kHz 'ring' across all registers (p. 14)." This statement was made regarding male students, but probably applied to all students. The reason for this is that the 3 kHz area is located where there is a gap in the formants produced by the Western orchestra, allowing the voice to carry over it. The *messa di voce* exercise develops the singer's formant, as well as intensity (Large, 1987b).

Although Large (1987b) thought that the even scale could be taught either through literature or through vocalises, he did have some exercises of his own to aid in the negotiation of the register break in both males and females. An exercise he thought was useful for all voices was the use of scales involving cardinal vowels, beginning with [i] on the bottom of the scale and [u] on the top; thus, the darkest vowels are at the higher pitches, with the brightest vowels on the lower. For female voices, the *messa di voce* was recommended, starting on A3 (220 Hz) to bring in the chest register in a healthy voice. Large then used one of Vennard's exercises, or one similar, which crossed registers by downward octave portamento glide and by ascending and descending scale degrees.

Large (1987b) had observed that Vennard's vocalise was along the same lines as Garcia's technique of a repeated crossing of the registers. With male voices, the *Bella signora* exercise was presented as the best exercise for register equalization (Large, 1987b). It involved scale degrees 1-3-5-8 (1) in an arpeggio on the words *Bella signora*. This started on scale degree 1, one note per syllable from bottom to top, then descended on the syllable [o] of *signora* on the same scale degrees, ending with scale degree 1 on the last syllable ra of *signora*. The previously mentioned vowel scale exercise [i] to [u] was also recommended as beneficial (Large, 1987b).

Russo and Large (1978) noted that registers can be affected with or without a distinction in timbre, thus making them harder to deal with. This leads to a thorny issue in the examination of the registration process, that of the contribution of vowel and resonance. Large and Murray (1978a), in reviewing Ross' (1959) work, concluded that since the transition tones are different for each vowel, registers are related to the supraglottal vocal tract. Large's (1972) 1968 study with the use of a sonograph showed that the fundamental is stronger in the female middle voice than in the chest, and that the higher partials are stronger in the chest register. In another study, Large (1974) found that the perception of register change in female voices appeared to be related to harmonic partials.

Large (1986) found that the tenor *primo passaggio* varied with the vowel. At mf intensity level, the average tenor *primo passaggio* tones were, for the following vowels: [i], D4; [e], D#4/E4; [a], F#4/G4; [o], D#4, E4; [u], D4. Intensity level also influenced the transition tone, the softer dynamics inducing the transition a half step lower, the louder dynamics a half step

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higher. The subdivision of the tenor category also played a part, the lighter tenor voices having higher transition points than the heavier ones for both *primo* and *secondo passaggio* changes. Additionally, the *primo passaggio* corresponded with the first formant of the vowel (Large, Baird, & Jenkins, 1980). These findings seem to indicate a connection between the action of the larynx and that of the resonating tract in conjunction with vocal registers (Large, 1986).

Nevertheless, in a 1974 study of female singers, the perception by trained listeners regarding which register was being sung was not shown to be dependent on the singer's choice of vowel (Large, 1974). Instead, it was the wave forms of the vocal folds that were the source of timbre differences between the chest and middle voice. For Large then, it would seem that while the vowel was a factor in determining register, the harmonic partials and the laryngeal activity were more important.

Thus, it appears that Large was predisposed to consider the vocal folds as the primary determinant in vocal registers. This was in agreement with Garcia's mechanical principle (although Large thought that other factors such as vocal tract resonance were also involved). Additionally, Large consistently used the chest, middle, and head nomenclature even though he sometimes used the Italian for these in the male voice, specifically operatic head and falsetto. He did this because he viewed them as being two different mechanisms. For Large, maintenance of the 3 kHz singer's formant was an especially important factor in singing technique, since it not only helped to bridge register transitions, but also aided in other aspects of singing such as the projection of tone. Development of this formant he thought could be achieved by practicing the *messa di voce* as well as other vocalises. Large (1987b) thought this approach made possible the ideal end-product of Western pedagogy – the even scale: sung vocal sound without a break or blatant timbre, vowel, or dynamic difference in either direction throughout the complete voice range.

Summary

John W. Large was a versatile and productive voice professor and researcher. He was among the first professional singers who also conducted voice science research at a time when most voice researchers had PhDs in speech rather than singing. Allen (April 16, 2007) described Large as the “‘large’ link between Vennard's beginning of vocal science and the proliferation [of studies] we have today with Titze, Sundberg, the group in Holland, and the MDs like Sataloff (personal communication).” Austin (April 15, 2007) called Large a “very significant researcher...a very intelligent scientist, a great musician, and voice teacher (personal communication).” Thus, Large's many accomplishments and contributions provide evidence of a Renaissance man who deserves to be remembered.

Large's publications ranged from extensive literature reviews, to articles about vocal literature, to research studies related to vocal registration and other issues in voice teaching such as the effectiveness of bel canto techniques and vocalises. Large was also important in advancing voice science by editing an important book called *Contributions of Voice Research to Singing* (1980) and in founding the *International Journal of Experimental Research in Singing* in 1977, which later became the *International Journal of Research in Singing and Applied Vocal Pedagogy*. Both publications provided a forum for articles by “renowned” voice researchers (V.B. Russo, April 27, 2007, personal communication). Although some of Large's research is no longer timely because of the more sophisticated studies being done today, perhaps his greatest legacy is that he showed how voice science and pedagogy could be interrelated.

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