

# Differentiating Between Speaking and Singing Vocal Registers

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## 1. Definitions

It is now reasonably well established that attributes appropriately identified as vocal registers exist in the human voice. Generalized (if not operational) definitions can be seen in the literature; one of the earliest being that of Garcia (1840) who indicated that a voice register is ... 'a series of succeeding sounds of equal quality, 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 quality produced by another mechanical principle.' In the years to follow, many vocal pedagogists, laryngologists and phoneticians offered like definitions; virtually all described voice registers in much the same terms as did Garcia (see for example Appelman, 1967; Fields, 1970; Hollien, 1974; Large, 1972; Preissler, 1939, Ruth, 1963; Vennard, 1962). It would be of little value to list any portion of these hundreds of definitions or labels (see Morner et al., 1964, for examples of terms) as they add little to the rather simplistic concept articulated by Garcia. Our use of the term simplistic is not intended to be judgmental or negative. Rather, it indicates that Garcia's definition, while a good one, does little but scratch the surface of the issue. That is, it must be asked: what are the scales to which Garcia refers? And.... what series, what qualities, what mechanisms are involved? Admittedly, Garcia implies that the fundamental frequency level of the sung tone is one of the controlling elements. However, until all of the questions are answered, his definition must necessarily be viewed as superficial, or at least, incomplete.

In over a century, the cited definition has been improved upon very much. Many scientists have tended to coin, or at least be sympathetic to, definitions of the type offered by Hollien and his associates (1974, 1976) who suggest that a register is a 'series or range of consecutively phonated frequencies which can be produced with nearly identical vocal quality... that there should be relatively little overlap between adjacent registers and that, to be a vocal register, the mechanism should be laryngeal in nature'. Thus, in some ways, they extend Garcia by postulating an entire second set of 'vocal tract' based registers that are parallel to, or overlap, vocal registers of laryngeal origin. However, questions again can be asked - what frequencies, qualities, mechanisms? In response, both Hollien (1974) and Titze (1980) insist that defini-

tions of this type add only little to the knowledge of registration. Indeed, as Titze points out, it is necessary to describe the entire production – and with respect to as many levels and dimensions as is possible, ‘starting ...from the neuromuscular level to the biomechanical level, to the kinematic level,... to the aerodynamic and to the acoustic levels, and finally, to the perceptual level,’ Titze warns against relating acoustics to acoustics. Finally, and in the same vein, it is suggested that, if registers are to be understood, they must be operationally defined with respect to their perceptual, acoustic, physiological, aerodynamic and neurological elements/bases.

On the other hand, there are a number of vocal pedagogists who have taken the position that voice registers do not exist within the *singing voice*; several references/arguments could be cited in this regard (see Fields, 1970, for example). However, Johnson (1982) articulates the argument succinctly when he suggests: 1) that it is only the *untrained* singer who distorts productions in such a manner that unrelated (register) sounds are produced, 2) that many great singers developed their voices without even being aware of the concept of registers, 3) that ‘smoothness of scale and tone’ more functionally relate to good development of voice rather than does training ‘pieces’ of the voice and 4) that the so-called registers could be the result of *illusions* based on singers feeling vibrations in their chests (or head) when they sing certain frequencies. There is little doubt but that successful singers – at least those trained in the classical ‘western’ opera or concert mode – are able to conceal register differences when they sing. Indeed, while Sundberg (1982) agrees with Johnson to some extent (as do we), he points out (as do others), that some forms of singing depend on a singer’s ability to covary ‘articulation, subglottal pressure and formant frequencies’ with phonatory frequency. Specifically, Sundberg stresses that register usage can be an important part of technique in certain types of singing. That such instances exist is conceded by Johnson. However, she argues that ‘distortions’ of this type can be, and probably are, dangerous to the singer

The cited controversies led Hollien and his associates (1966, 1968, 1974, 1976, 1982) to attempt to provide new perspectives for the study of voice registers. First, a series of experiments on voice were carried out; nearly all made contributions to the issue of voice registers even though this purpose often was only a secondary one. Further Hollien notices that few phoneticians experienced any real difficulty in their conceptualization of voice registers. Indeed, except for a controversy which concerned the nature (pathology/nonpathology) of the vocal fry register (see Hollien et al. 1966) few phoneticians disagreed in any major way as to the nature, boundaries and/or functioning of vocal registers. Moreover, it was noted then – and it should be noted now – that many singers could produce register-related sung tones which were perceptually identifiable whenever they were requested to do so. Thus voice registers exist in singers – even though the concept is subject to much controversy – just as they do in speakers.

## 2. Register Types

The contrasts cited above have resulted in new insights relative to vocal registers. They can best be understood as follows. Recent attempts by the CoMeT (Collegium Medicorum Theatri) committee on vocal registers to develop appropriate models for their work have led them to articulate a position that appears to have been long overdue (it is reviewed in their reports, which are edited by Hollien, 1982, 1983). While this postulate is so simple that it seems not to be very profound, its absence has resulted in a substantial amount of confusion relative to vocal registers. Simply stated, the concept suggests that singing registers and speaking registers are different entities. Of course it must be conceded that they may overlap in function; that they may (in part anyway) have similar physiological roots. Nevertheless, it is recognized that while voice (laryngeal?) registers exist and are sometimes used in speech, no attempt is made to ‘train’ them out of the productive repertoire of the speaker. Moreover, a physiological register (vocal fry, pulse, creak) exists in speaking that is virtually nonexistent in singing. The most serious problem in this regard relates to confusions resulting from research reported in the literature. Specifically, it appears that vocal register studies carried out on non-singers cannot be extrapolated to singers on the basis of some simple mathematical relationship.

Before proceeding further, the questions can be asked: what are some of these singing and/or speaking voice registers; what are their boundaries and/or dimensions? As was cited above, a rather substantial number have been proposed and labeled (Morner et al., 1964); indeed, Vennard (1967) reports different scholars to have suggested that there are as few as one or as many as nine. Figure 1 should provide some insight as to the number, classification and extent of vocal registers; data here are drawn from the writings of four representative scholars. It should be noted, however, that the cited data were not necessarily obtained from a single reference. Rather, they are compilations of the ‘best’ information each of the authors provide in their writings. It should be noted also that dashed lines extend certain of the register ranges and that they suggest areas of uncertainty (either on the part of the author or on our part when interpreting his data). Moreover, the boundaries, as given, are not those of an individual or even the means of a subject group. Rather, they are the maximum extent of the register as portrayed by the most extreme individual within a sex. Further observation will reveal that Vennard, Garcia and Appelman all suggest the presence of *three* registers whereas Hollien suggests only two. This difference is easily resolved. Hollien’s data are based upon the registers encountered in the *speaking* voice (two of the three he suggests have been established – out of a possible five) whereas the registers proposed by the other three authors relate specifically to singers and the singing voice.

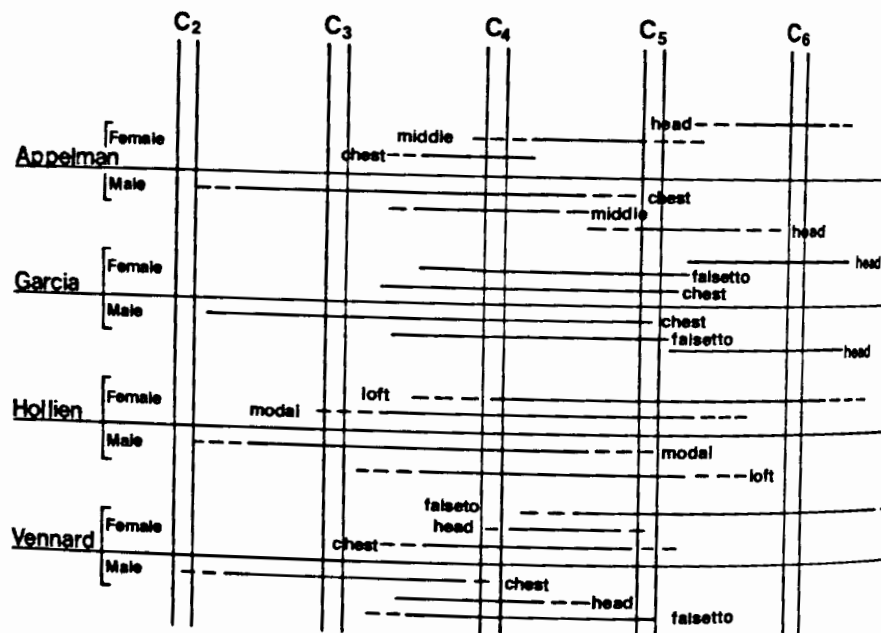


Fig. 1. Voice register types and extents as presented by four investigators.

### 3. Resultant Problems

But how do the two approaches do a disservice to each other? Consideration of Hollien's (1974) models (which predict/suggest the differences among voice registers), demonstrate how data on speakers may be misleading when applied to singers. For example, many of the contrasts he cited are not readily apparent when the phonatory productions of singers are reviewed. Relative to acoustics: PFR probably does not relate very well to singing range. Physiologically the two phenomena may not be so different but the efficiency and power of the singers are not very well portrayed by his models - nor are the aerodynamic contrasts. Briefly, data obtained on the registers of speakers probably do not predict singer's behavior very well at all. Research must be carried out on singers specifically - or on groups of singers and speakers - if these phenomena are to be well understood.

How can research on singers' registers mislead individuals interested in speakers - especially since very little research of this type has been carried out in the first place? Consider the following. Although the term 'modal' may be overtaking them, the two labels that appear more often than any other (in vocal music anyway) are 'chest' and 'head' - with *chest* referring to the lower register and *head* to the higher (if, indeed, there is only one higher register). As we all know, these terms are based upon singers sensations - i.e. on the mechanical response of the bodies of the singers to tones sung at or within certain frequency ranges. The generic connotation of these terms is such that

they suggest certain relationships - specifically that the timbre for the lower register resides in the *chest*; that the quality/mechanism of the upper register results from activation of the vibratory properties of the sinuses and/or cavities in the head or 'mask'. Once these entities are considered physiologically, and/or mechanically, their use as definitions for vocal registers is shown to be illogical if not absurd. The lower register results from operation of the larynx - not from sympathetic vibrations of the chest to low frequency sung tones. The source of the upper register again is the *larynx* - not sympathetic vibrations (to higher sung frequencies) in the face. In short, while the sensations felt by singers, of course, are valid sensations (indeed, even the non-singer can experience them) *they have nothing to do with vocal registers*. It is only a chance relationship that brings the two into juxtaposition; that is, voice registers are frequency related and so are the sites of the sympathetically vibrating, sensation producing, structures of the torso and head. What a classic case of misdirection this is. For three hundred years, corollary but independent operations have been viewed as related - even causal - yet they were not and are not. Worst yet, this seeming relationship has led scholar after scholar astray - including many in the area of Phonetics.

### 4. Conclusions

The two examples cited above demonstrate how research concepts in one area can negatively effect those in the other. Accordingly, it is recommended that research on vocal registers be carried out (and interpreted) *independently* for singers and for speakers.

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