

**Defining vocal quality in female classical singers:
pedagogical, acoustical and perceptual studies**

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Declaration

I, Helen Mitchell, hereby declare that this submission is my own work and that it contains no material previously published or written by another person except for co-authored publications submitted and where acknowledged in the text. It does not contain material that has been accepted for the award of a higher degree.

In addition, ethical approval from The University of Sydney Human Ethics Committee was granted for the studies presented in this thesis. Subjects were required to read a subject information document and informed consent was gained prior to data collection.

Signed: _____ Date: _____

Supervisor's signature: _____ Date: _____

Supervisor's certification

I certify the thesis of Helen Mitchell 'Defining vocal quality in female classical singers: pedagogical, acoustical and perceptual studies' to be suitable for examination.

Signed: _____ Date: _____

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Abstract

The technique of “open throat” is a pedagogical concept transmitted through the oral tradition of singing. This thesis explored the pedagogical perceptions and practices of “open throat” using empirical methodologies to assess technical skill and associated vocal quality. In the first study (Mitchell, Kenny, Ryan, & Davis, 2003), we assessed the degree of consensus amongst singing pedagogues regarding the definition of, and use in the singing studio of the technique called “open throat.” Results indicated that all fifteen pedagogues described “open throat” technique as fundamental to singing training and were positive about the sound quality it achieved, especially in classical singing. It was described as a way of maximising pharyngeal space or abducting the false vocal folds. Hypotheses generated from pedagogical beliefs expressed in this first study were then tested acoustically (Mitchell & Kenny, 2004a, 2004b). Six advanced singing students sang in two conditions: ‘optimal’ (O), using maximal open throat, ‘sub-optimal’ (SO), using reduced open throat and loud sub-optimal (LSO) to control for the effect of loudness. From these recordings, acoustic characteristics of vibrato (Mitchell & Kenny, 2004b) and energy distribution (Mitchell & Kenny, 2004a) were examined. Subsequent investigations of the vibrato parameters of rate, extent and onset, revealed that extent was significantly reduced and onset increased when singers did not use the technique. As inconsistent vibrato is considered indicative of poor singing, it was hypothesized that testing the energy distribution in these singers’ voices in each condition would identify the timbral changes associated with open throat. Visual inspection of long term average spectra (LTAS) confirmed differences between O and SO, but conventional measures applied to long term average spectra (LTAS), comparing

energy peak height [singing power ratio (SPR)] and peak area [energy ratio (ER)] were not sensitive to the changes identified through visual inspection of the LTAS. These results were not consistent with the vibrato findings and suggest that conventional measures of SPR and ER are not sufficiently sensitive to evaluate LTAS. In the fourth study, fifteen expert listeners consistently and reliably identified the presence of open throat technique with 87% accuracy (Mitchell & Kenny, in press). In the fifth study, LTAS measurements were examined with respect to the perceptual ratings of singers. There was no relationship between perceptual rankings of vocal beauty and acoustic rankings of vocal quality (Kenny & Mitchell, 2004, in press). There is a vast literature of spectral energy definitions of good voice but the studies in this thesis have indicated that current acoustic methods are limited in defining vocal quality. They also suggest that current work in singing has not sufficiently incorporated perceptual ratings and descriptions of sound quality or the relationship between acoustic and perceptual factors with pedagogical practices.

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