

# Defining 'open throat' through content analysis of experts' pedagogical practices

Helen F. Mitchell, Dianna T. Kenny, Maree Ryan and Pamela J. Davis

From the Australian Centre for Applied Research in Music Performance (ACARMP), Sydney Conservatorium of Music, The University of Sydney, New South Wales 2006, Australia

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'Open throat' is a term regularly used in the singing studio, but agreement across pedagogues as to its definition and function has not yet been assessed. Fifteen expert singing pedagogues participated in a qualitative study involving a semi-structured interview to explore current thinking regarding terminology, pedagogy, sound quality and the perceived physiology to achieve open throat, as used in the singing studio. Most teachers included the use of the technique as a fundamental in singing training, and were positive about the sound quality it achieved, especially in classical singing. The purpose of the technique was described as a way of maximizing pharyngeal space and/or achieving abduction of the ventricular folds.

*Key words:* associated physiology, singing pedagogy, sound quality descriptors, terminology.

*Helen F. Mitchell, Australian Centre for Applied Research in Music Performance (ACARMP), The Conservatorium of Music, University of Sydney, NSW 2006, Australia. Tel.: +61 2 9351 1386. Fax: +61 2 9351 9540. E-mail: d.kenny@commusic.usyd.edu.au*

## INTRODUCTION

Historically, teaching and evaluating singing has been guided by an oral tradition in which pedagogical techniques are handed down from one generation of singing teachers to the next. The oral tradition, with its accompanying musical terminology, particularly that used to describe performance quality, can be confusing and indeed mystifying for those who use and practise it (1).

Many of the terms used to describe 'openness', 'space' or 'freedom' as a characteristic of the singing voice have been used inconsistently, and terminology associated with sound quality among expert singing pedagogues is diverse and idiosyncratic. Seashore recommended that 'musicians scrap a mass of the current synonyms for tone quality, because these words do not connote any demonstrable differences in content. The diversity of words simply adds to the confusion' (2, p. 111). There is, and has always been a recognition of an overall good sound and of its components (3), but in this case of openness there is need for clarification, especially in the area of professional classical singing.

Poor singing has been described as sound 'getting stuck' in the throat (4). Awareness of the throat as a

technique in good singing, or the lack of awareness as an explanation for bad singing, has appeared throughout the singing pedagogy literature. It is believed that sound should flow freely, with nothing impeding it, like a 'chimney' for air (5), or an unobstructed passage for a sound beam (6). Failure to achieve this free flow has been perceived to have serious consequences for the singer and the sound. 'If the scholar should have any defects, of the nose, the throat, or of the ear, let him never sing but when the master is by, or somebody that understands the profession in order to correct him, otherwise he will get an ill habit, past all remedy' (7, p. 187).

Concepts relating to open throat can be traced throughout pedagogical and scientific singing literature. Vennard defines open throat as the 'condition agreed upon by most voice teachers as desirable for resonance' (8, p. 252). That is, the use of open throat makes a fundamental difference to vocal quality. Titze (9) and Titze and Story (10) described a 'wide pharynx' as an acoustic enhancement to the first formant and to the overall sound. The difference to the sound has been described as rounder, larger (11), free (12), pure (13), rich, warm (14), and concentrated energy (15).

At least two views of open throat have been propagated in the pedagogical literature: the first focuses on the action at laryngeal level (16), and the other emphasizes pharyngeal involvement, at a level extending to the soft palate or velum (6, 8). These differing perspectives regarding the vocal mechanism required to achieve open throat have inevitably resulted in different teaching strategies and terminology. Examples include actions involved in inhalation, the surprise breath and smelling the rose (5, 17, 18). Visualization of space within the throat, through an 'air ball' or 'soap bubble' (6, 19), and various other configurations to alter the shape of the pharynx are common throughout the literature. The lowered larynx, often along with widening of the oropharynx, is also associated with open throat (6, 20, 21). Yawn is both advocated (15, 21–3), and also seen as potentially distorting to the sound if extended too far by creating tension and imbalance (24, p. 81). Forms of laughing as a technique to achieve an open throat were advocated in the late twentieth century (16, 24). Estill (16) and Citardi *et al.* (25) advocate a method involving retraction of the false vocal folds or abduction of the ventricular folds away from the midline.

Current pedagogical thought and teaching recommend the use of more than one term to define the relative openness of the pharynx and adjacent structures. Open throat and retraction are recognized in the literature (16, 24) as well as in teaching, and a wealth of other equivalents exist, such as throat widening, space, or space at the back. From this point on, open throat will be used as a generic term for all terminology and technique descriptors.

Wapnick and Ekholm (26) advocated consistency in the use of common terminology across singing pedagogues. They initiated links in the discovery and application of terminology, perceptual judgment and acoustic evaluation. Ekholm *et al.* (27) found striking connections were made across judges when one sound quality appeared dependent on another [resonance/ring and clarity/focus (.94) and colour/warmth with appropriate vibrato (.93)]. The methodology in this study builds on these works by linking the study of a technique with its consequent sound quality, to ascertain the relationship between the desired sound quality and the technique used to achieve it. This study sought to determine agreement, links and interdependency of descriptors on technique and perceptual qualities in describing technique in singing.

The focus of the study is on terminology and techniques of teaching open throat as practised by experienced singing pedagogues. In particular, we were interested in the perceived role of open throat in classical singing, and whether open throat was thought to improve the overall sound quality.

## METHODS

### *Participants*

Participants were 15 experienced singing teachers with established singing studios. All participants were known to the researchers via affiliations with key music centres in Australia and were personally invited to participate by one of the authors. Selection criteria for inclusion in the study were based on reputation within the singing profession, determined by renown or prominence according to the calibre of the students in the singing studio. Specifically, the participants:

1. taught singing at tertiary level in universities or conservatoria;
2. had a successful private studio, defined as one comprising of students who performed and auditioned at a big city or national level for positions in opera companies, music theatre or professional musical ensembles;
3. worked primarily in Australia or the United Kingdom;
4. represented the range of current singing pedagogies in their teaching methods (investigators aimed specifically to include both exponents and critics of the Estill (16) method);
5. have had, or continue to have, a successful career as a professional solo singer.

Participants were sent information about the project and were invited to undertake a taped, semi-structured interview regarding current vocal pedagogy, in particular, the terminology used by singing pedagogues to explain singing techniques to their students. Ethical approval to conduct the study was obtained from The University of Sydney Ethics Committee. All the interviews were conducted by the first author, and only the first author was aware of the identity of participants.

### *Instruments*

*Questionnaire.* Each participant completed a brief questionnaire giving details of their teaching experience and current singing students. The questionnaire was divided into three sections: demographic information, influences on singing pedagogy and characteristics of their singing studio. Participants were asked for information related to: age, professional education, number of years of teaching experience and proportion of time spent teaching or singing professionally. They were also asked to name people with whom they had studied, and workshops or masterclasses they had attended that had influenced their teaching. Finally, pedagogues were asked to classify themselves according to the level at which

their students performed. Pedagogues were asked to use the Bunch and Chapman taxonomy (28) to estimate the percentage of their students in each category (superstar, international, national/big city, regional/touring, local community, singing teachers, full-time students of singing, amateur, child) and in the primary genres (opera, contemporary music theatre, musical theatre, concert/oratorio/recital).

*Semi-structured interview.* A semi-structured interview was developed to assess the beliefs and attitudes of singing teachers related to open throat (29). This method of data collection is described by Smith (30). It was considered appropriate to the goals of the current study because it ‘facilitates rapport/empathy, allows a greater flexibility of coverage, enables the interview to enter novel areas, and tends to produce richer data’ (30, p. 12).

The interview schedule opened with general questions about the teaching of singing, for example, ‘How do you achieve a good sound in singing?’ and ‘How do you correct a problematic sound?’ No direct questions on open throat were asked but the topic was discussed in depth once the pedagogue initiated discussion. Reference to a key term or to an associated term, such as open throat, throat widening, retraction or space at the back, provided the impetus to begin a discussion of open throat. If the pedagogue did not mention open throat during the interview, the interviewer asked the question, ‘What do terms like open throat, throat widening, retraction and space at the back mean to you?’

The interview schedule focused on elucidating pedagogues’ view of open throat, using categories and terminology derived from the literature. These were:

1. Relationships between the four most commonly used terms: open throat, throat widening, retraction and space at the back
2. Preferred term/terms
3. Sound qualities associated with these terms
4. Required technique to achieve the sound quality
5. Relationships between terms, actions and sound qualities
6. Physical sensations and presumed physiology associated with the terminology

#### *Procedure*

The interview was pilot tested on an experienced singing pedagogue and modifications were made to increase the clarity of the questions where necessary. The interview schedule was used as a guide; specific open-ended questions were followed by individualized prompts and probes (30). A lexicon of interview

prompts was used to facilitate the flow of ideas in the interview, although care was taken not to interrupt the participant (31). Participants were encouraged to elaborate on ideas through the use of agreement prompts from the interviewer. The interviewer used clarifying prompts to refine participants’ statements as necessary. Researcher agreement was established regarding the appropriate use of prompts during the interview prior to commencement.

Interviews were conducted either in person ( $N = 4$ ) or by phone ( $N = 11$ ) at a time and place convenient to the participant, and permission to record the interviews was obtained before proceeding. Tapes were marked by participant number and transcribed with transcriptions sent back to respondents for verification and final approval before they were qualitatively analysed. At this stage, participants were given the opportunity to clarify anything that they had said.

#### *Analysis*

Transcripts were analysed using in-depth qualitative analysis, detailed in Smith (30) to identify relationships between terminology, theory and teaching practice for each pedagogue (32). Transcripts were read in depth to generate a profile of the topic responses. They were then similarly coded and common themes were identified. Significant or representative statements were highlighted and collated across participants. Recurrent themes were examined for inter-subject similarities and differences. For example, mentions of new terms were compared across pedagogues with regard to term used, sound quality achieved and technique applied. This type of qualitative data collection and analysis has been used extensively in research of singing evaluation and assessment (33, 34).

A coding scheme for the transcripts was developed. Three of the four authors reviewed the codes and independently selected exemplars of each code. This type of interpretative analysis is described by Smith (30) as a way of capturing the meaning of a participant’s responses.

These qualitative data form the basis of the results presented below. Participants’ responses to the question topics are grouped thematically in Results, in accordance with the stated aims of the semi-structured interview topics. The quotes were examined by an expert pedagogue, within the context of the transcript, to ensure they represented instances of the stated theme, or illustrated a significant statement unique to an individual or sub group.

RESULTS

Participants

The 15 singing pedagogues interviewed for the study were aged between 39 and 63 years, with an average age of 49. Ten primarily taught in Australia and five taught in the UK. They dedicated an average of 95% of their professional life to singing or the teaching of singing. They had between 4 and 28 years of experience in teaching singing, with an average of 20 years.

For nine participants (P1, 2, 3, 6, 7, 9, 10, 11, 12), an average of 67% of their students performed in the top four categories (superstar, international, national/big city, regional/touring) of the Bunch and Chapman taxonomy (28). Participants' studios contained an average of 20% full-time singing students, and for six participants (P1, 4, 5, 8, 13, 14), ≥ 50% of their studio comprised full-time students at a tertiary institution.

Influences

Table 1a and Table 1b present data in response to the two questions 'Do you follow any particular school of thought or pedagogy or scientific approach?' and 'How does that pedagogy or writer influence your view on open throat, throat widening, retraction or space at the back?' respectively. From the table, it can be seen that the major influences were divided equally between Estill (7 participants), Richard Miller (7 participants) and Janice Chapman (5 participants). Seven participants also referred to their own experience or study as influential on their pedagogy.

Participants who cited experience as their key influence made comments of the following type: 'I got to the point in my development where I just had to know what those things meant for me personally, so I think it was a lot of my own exploration that brought about a deeper level of understanding' (P15).

Factors in the achievement of good sound

In response to the questions 'How do you achieve a good sound in singing?' and 'How might you correct a problematic sound in singing?' 50% of participants offered an average of four key concepts that they considered essential to good sound (range 1–6 terms). Good breathing was the most important factor for ten participants (67%) followed by balance or coordination for eight (53%). Table 2a presents all the factors cited by participants and the frequency of citation, and Table 2b presents references to open throat.

Samples of typical comments on good sound are: 'A good sound really relies so much on freedom and good coordination and connection with air so that the right muscles are engaged with the right amount of energy and there's no interference' (P8). 'I would aim to establish a freedom of production, so that is looking at breath, de-constriction, a free flow, a free pathway for the sound' (P9). 'I'm looking for a looseness around the neck and for the articulators to be loose so that there's no musculature resistance to the emission of sound. I'm looking for something that old pedagogy would call space making' (P15).

Five teachers referred to the subjective nature of its definition. Specifically, a good sound 'is a sound that is non-abusive and appropriate to genre' (P7); 'is subjective to people's tastes, so I work towards making sure that the sound is safe, and then I work on the aesthetics of the sound' (P12); 'needs good aural awareness and good aesthetic training' (P4).

Of the eleven participants, three referred to specific technical instructions to achieve a good sound. They emphasized specific components of their pedagogical approach and named the phenomenon of open throat technique: 'Well the first thing I work on is posture, and the second thing I work on is breathing and the third thing I work on is resonance ... and the most important thing about resonance is the open throat' (P1); 'I teach all my clients to retract, that's one of the

Table 1a. *Pedagogues most regularly cited as influential in the development of teaching techniques for singing*

Influence	Chapman	Estill	Miller
Pedagogues	1, 4, 7, 9, 15	1, 2, 3, 4, 7, 9, 10, 11, 13, 15	2, 4, 8, 9, 10, 13, 15
%	33	67	47

Table 1b. *Pedagogical influences of singing teachers with respect to open throat techniques*

Influence	Estill	Miller	Self/eclectic	Chapman	Caesari	Other
Pedagogues	1, 2, 3, 7, 9, 10, 11, 12, 13	1, 4, 6, 8, 10, 11, 14	1, 2, 4, 5, 6, 8, 10, 13, 15	2, 9, 10, 11, 14, 15	11, 14	4, 11
%	60	47	60	40	13	13

Table 2a. *General factors necessary to achieve a good sound, ranked by pedagogue frequency of citation*

Factors	%
Breathing	67
Balance/coordination	53
Posture	40
Support	20
Energy	13
Primal sound	13
Resonance	13
Tongue	13
Airflow	7
Aural awareness	7
Effort	7
Placement	7
Positioning	7
Ring/twang	7

Table 2b. *Specific open throat references as a necessary factor to achieve a good sound, ranked by pedagogue frequency of citation*

Open throat references	%
Ease/freedom	40
De-constriction/not constricted/tense	33
Open/open throat	20
Depth	13
Retraction	13

first things I teach them' (P12); 'The larynx is sitting in a slightly lower position ... basically the larynx is being pulled down by one laryngeal depressor, namely the sternothyroid' which 'maximizes pharyngeal depth' (P10).

An additional two participants mentioned primal sound in their account of achieving good sound. This was later defined as an action containing a component of open throat technique. 'I'll start with breathing, support, posture and the primal sound' (P2). 'Sound is related to primal expression, people say it's over the top, I say opera starts over the top' (P14).

#### *Associations between the four terms*

After the open-ended questions exploring general concepts of pedagogy, participants were offered four common terms used in the singing literature and in singing pedagogy: open throat, throat widening, retraction and space at the back, and were asked 'What do the terms mean to you?' and 'How do you feel these terms are related?'

Nine participants (P1, 3, 5, 6, 7, 8, 11, 12, 14) agreed that the terms were either interrelated or interchangeable, through universal use in singing studios. However, each participant went on to define more specific differences between terms and chose one or more that they advocated in teaching: 'Well, they do [mean the same thing]. If you're talking about open throat, everybody knows what you mean—it's a generally accepted term' (P5).

Three preferred the term open throat (P5, 6, 14) and consistently used the term throughout the interview.

Five (P1, 3, 7, 11, 12) of the nine interpreted all terms as attempts to describe the action of retraction: 'All of those [terms] to me mean that the false folds are retracted, that there is no interference of the false folds in the airflow' (P3). 'I would say that open throat and retraction are the same thing' (P7).

For six participants (P2, 4, 9, 10, 13, 15), each term was defined differently, and they described subtle differences between these terms. Statements gave either positive or negative associations. For example:

*Positive statements:* 'Retraction I use because I find it's actually a very useful technique when people are constricted, I can hear false vocal fold interaction very clearly ... open throat is an end product of getting something right physiologically ... it doesn't have any meaning outside of the actual physiological basis' (P2). 'I think retraction for me would mean false folds opening up or open wider, so that there's a sense of free emission of sound ... Space for me, also carries a physical sensation of stillness, so that it's not forced in any way, there's no laryngeal depression via the base of the tongue, or no artificial palate lifting that involve tension of any of the other articulators' (P15).

*Negative statement:* 'Open throat is the beginning of a yawn, relaxed, slightly soft back of the tongue, "high-ish" palate, wide pharynx. Throat widening might be slightly less relaxed and it might make me think a little bit about retraction' (P4).

For seven participants (P2, 4, 6, 7, 12, 13, 15), space at the back was perceived to be a different concept to open throat because of the required action of the soft palate in enlarging the space. 'Space at the back ... to me means wide pharynx and a high palate ... open throat is for me achieved by having a correct inhalation process, which in my terms is a relaxed abdominal or splat breath' (P2). 'Throat widening to me can be lower than 'at the back' ... [which] I perceive to be in the soft palate region' (P13).

Two participants (P7, 8) defined throat widening as an external action, and related less to the internal action of open throat. In their pedagogy, it was not perceived as a useful term: 'Throat widening [is not the same as retraction]; I prefer open throat, because then it, for me, indicates that something is being opened

from the inside rather than the outside which is where I teach people to make space' (P7).

Two participants (P9, 10) expressed dissatisfaction with all of the given terms because they were potentially misleading: 'Open throat, I think is a little bit misleading for some people in that most singers were raised on the old yawn sigh and the concepts of yawning and making space' (P9).

### *Preferred terms*

Eight participants favoured one or more of the four terms in their teaching. The other seven gave a different term. Table 3 presents the use of preferred terminology.

New terms were given as (i) replacements for the four given terms, or (ii) as better descriptors of similar concepts; or (iii) as descriptors of new vocal pedagogy believed to incorporate the same pedagogical goal. Four participants (P8, 9, 11, 13) favoured the use of the words free, freedom or freedom of tone. 'I wouldn't say I want an open throat ... I would say I want a free sound' (P11). 'A free sound, a freedom of sound but the beginnings of what we call a trained voice sound' (P13).

'Collar' and 'depth' were discussed by four participants (P2, 9, 10, 15) and described as similar to, or replacements for, open throat. For one, the concept of collar is intrinsically related to the function of retraction or open throat. 'I teach [retraction] as a fundamental of singing by getting the engagement of the collar ... the collar is both a postural and a physiological function' (P2).

For two participants (P10, 15), open throat was the achievement of pharyngeal depth in classical singing. It was also directly compared to the technique 'collar': '[The term collar], I'd call it low larynx or pharyngeal depth' (P10). 'There is also a sense of laryngeal lowering so that there feels like a great depth in the vocal tract' (P15).

Three of the participants (P2, 10, 15) would not use a specific term in teaching but rather preferred to use the students' own language to describe their sensation after teaching them the technique: 'I would look for as many synonyms as possible to describe the same thing, and then I would probably ask a person to feed back

to me in their own language what we've just been discussing so that we can actually have a point of reference, so we're both very clear as to what we're both talking about' (P15).

### *Sound qualities associated with the terminology*

Participants were asked 'What sound quality do you associate with these terms?' They collectively produced 18 descriptions that they felt best characterized the sound when open throat was used. Table 4 identifies the most common sound terms used. 'Balanced/coordinated' was the most important quality, named by 14 of 15 teachers (93%). 'Free', 'open', 'even/consistent' and 'warm' were each nominated by over 50% of pedagogues as the sound quality intrinsic to the use of some form of open throat.

Fourteen participants (93%) said that using open throat made the entire sound more balanced or coordinated. They explained that using open throat achieved: 'a much better range of harmonics and obviously from that, the formants' (P3); 'a resonating spectrum [in which] frequencies balance quite beautifully' (P15).

Eight pedagogues (53%) felt that the use of open throat made the overall sound more even or consistent: 'If I told them to laugh, I was going to get a more efficient result and a more effective sound, therefore a rounder, bigger, more even, more secure, more stable, more confident production of sound' (P1).

Five pedagogues (P1, 2, 3, 7, 12) described healthy, safe sound and then associated this with terms like clear, clean and free: 'The sound is clean ... the sound has no interference' (P7). 'The timbre changes when retraction is achieved, and the voice sounds much healthier, clearer, cleaner' (P12).

### *Required technique to achieve the sound quality*

In response to the questions 'Suppose I were a new student—how would you tell me about some of these terms?' and 'How would you teach me these techniques?' six pedagogues used some form of laugh and five used cry or sob. A pre-yawn or start of a yawn was mentioned by three, and focus by two. Three pedago-

Table 3. *Terms favoured by each pedagogue as descriptors for open throat*

Favoured term	Open throat	Retraction	Open throat or retraction interchangeably	New
Pedagogues	5, 6, 14	3, 7, 12	1, 2	4, 8, 9, 10, 11, 13, 15
%	20	20	13	47

Table 4. Sound qualities associated with open throat. Pedagogues' individual choices indicated by

Pedagogue	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	%
Balanced/coordinated	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	93
Free	<input type="checkbox"/>		<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	67
Open	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>	53
Even/consistent	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>		53
Warm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	53
With space	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>		40
Healthy/safe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>					<input type="checkbox"/>				33
Round	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>						<input type="checkbox"/>						<input type="checkbox"/>	33
Overtones/formants			<input type="checkbox"/>			<input type="checkbox"/>							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	33
Easy/flexible	<input type="checkbox"/>				<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>					<input type="checkbox"/>			33
Clear		<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>						<input type="checkbox"/>				27
Full	<input type="checkbox"/>			<input type="checkbox"/>					<input type="checkbox"/>							20
Efficient	<input type="checkbox"/>						<input type="checkbox"/>					<input type="checkbox"/>				20
With depth	<input type="checkbox"/>									<input type="checkbox"/>	<input type="checkbox"/>				<input type="checkbox"/>	20
Clean						<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>				20
Sexy/juicy/lusty		<input type="checkbox"/>									<input type="checkbox"/>					13
Natural voice					<input type="checkbox"/>						<input type="checkbox"/>					13
Relaxed				<input type="checkbox"/>												7

gues addressed the technique only through teaching breathing. These are summarized in Table 5.

Nine pedagogues (P1, 2, 3, 5, 7, 8, 10, 11, 12) believed that the action of open throat was fundamental to the consistent production of good sound. It was an important technique to maintain and monitor throughout singing: ‘Otherwise you start to use all the muscles that you shouldn’t deliberately be using’ (P5). ‘It enables the mechanism to work efficiently at source, so that you get a good sound signal’ (P7). ‘It’s very much concerned with freedom and the idea of just opening up and letting the sound flow’ (P8). ‘Basically after [freedom], you’re adjusting resonances’ (P11).

Five pedagogues (P2, 7, 8, 9, 13) believed that open throat needed to become automatic. They stated that this was possible once a student had mastered the action: ‘Yes, it’s there all the time when you’ve got it—it becomes part and parcel of your normal way of singing. But it’s part of the breathing and support function’ (P2). ‘There has to be a portion of the concentration monitoring, until it becomes natural ... every time they open their mouths, they know it’s going to happen’ (P13). ‘It is one of those things that a student can become able to do automatically and therefore it goes into the muscular memory and it’s something that once you’ve experienced, you might

only monitor when you notice that it’s not happening’ (P7).

One pedagogue (P11) highlighted the problem of actually learning to achieve the action of freedom consistently: ‘It seems to me that you actually have to have exercises that maintain that sensation, you can’t just identify it and say that’s what’s happening’ (P11).

For two pedagogues (P6, 8), open throat was valued as a tool that demanded more concentration in certain ranges of the voice and particularly singing through the passaggio: ‘I would say, particularly as one is going into the passaggio ... it helps people to have that feeling of space at the back of the throat, and almost a sensation of the voice going backwards’ (P6).

In the singing studio, three participants (P1, 8, 12) said that it was a technique they regarded as important to consider every time they taught: ‘[Retraction] is something I teach every day. And with every student, no matter how advanced’ (P1). ‘I use it all the time. I think it’s like second nature ... if I weren’t retracting, I’d be constricting’ (P12).

Two participants (P4, 9) regarded open throat and the teaching of it as a prescriptive tool or as a technique to visit only when constriction was causing a problem. They advocated addressing constriction in other ways rather than discussing open throat: ‘[Open throat] isn’t an integral concept I consciously and consistently consider ... so on a needs basis.

Table 5. Pedagogical views on techniques to achieve open throat

Technique	Laugh	Cry or sob	Yawn (start/pre)	Focus	Flow of breath	Inhalation
Pedagogues	1, 3, 7, 9, 12, 15	1, 2, 9, 10, 15	2, 4, 9	5, 6	13, 14	8
%	40	33	20	13	13	7

I don't necessarily talk about open throat that much ... it's not fundamental' (P4). '[I use open throat] as and when it matters. Some people have very little constriction ... often, if their breath is in place and if that is buoyant enough, that takes care of a lot of constriction anyway' (P9).

#### *Relationships between terms, actions and sound qualities*

Thirteen participants (80%) made a connection between breath or breathing-in and the concept of an open throat. For eight participants, it was linked with the inhalation process (P1, 2, 3, 8, 9, 10, 12, 15): 'Open throat ... is for me achieved by having a correct inhalation process ... it's a recoil diaphragmatic breath' (P2). 'We want to maximize resonance and freedom, maintaining that posture of inhalation' (P8). 'It's a physical feeling that you get on inhalation and that you maintain until the end of the phrase' (P10). 'I think space is initiated with inhalation' (P15).

Similarly, seven participants (P1, 2, 7, 8, 9, 10, 15) indicated that they would actively use the technique to prepare for producing a note and linked it to the inhalation process: 'I would use it in association with breath and taking breath because those two activities are combined' (P9). 'You set it up with the intake of breath.' (P12).

For four participants (P5, 7, 13, 14), it was an action connected with the flow of breath and the continuation of the breath throughout the phrase: 'So there is this lovely column of sound between the focus point and the support in the voice' (P5). 'I talk more about energizing the breath, energizing the voice, keeping the tone consistent, working to the end of the phrase' (P13). 'It is to do with the flow of breath. If I can perceive that the flow of breath is neither squeezed nor dissipated ... then generally the throat is open' (P14).

Instructions to achieve an open throat included actions to maximize space. Two participants (P2, 9) used a pre-yawn or pre-yawn sigh to describe this to students: 'Sometimes I add instructions to maximize the vocal tract by using, for example, the roar of a lion, to feel how big those spaces can be and the yawn-sigh effect, the pre-yawn sigh, I call it of allowing the sound to come out without constricting the walls of the pharynx' (P2).

The technique of laugh was consistently linked to the term retraction: 'I use the device of laughter because I know that that brings about the physical action [of retraction]' (P3). '[I would teach retraction] via silent laughing, but I also use achieving a silent in and out breath, so basically silent inspiration and expiration ... it's a position and it's a muscular

activity. What happens with the breath in terms of airflow for instance happens as a result of it' (P7).

For three participants (P1, 9, 15), laugh and cry or sob produced a subtle change to the sound quality: 'a different colour' (P1), 'richer' (P9) and a 'different harmonic readout within the tone' (P15). 'The other way to open the throat is to cry in tune... on the laughing basis, but I want to change the colour in the sound. So I'm doing that for an aesthetic colour' (P1).

Seven participants (P1, 2, 7, 8, 9, 10, 15) spontaneously commented on the value of open throat in classical singing. It was considered (i) as a necessary technique for making a classical sound and (ii) a quality in the sound itself.

*Classical technique:* 'Requires a degree of work taking place in the larynx, and so therefore you need to have the retracted position, the open throat, in order to make it safe' (P7). 'The aim for classical is to have the greatest sense of freedom involved, and freedom with the laryngeal tract, or the vocal tract, happens to occur with space-making.' (P15)

*Classical sound quality:* 'I think the Italian articulatory system sets up an open throat, and western classical singing came from that ... [open throat] is the difference between a national sound and an international sound' (P2). 'I think that [open throat] not only improves but in terms of classical singing, it fines the quality that one requires if you want to be a classical singer' (P8). 'It probably contributes acoustically to the sound that is most satisfying in that particular musical style' (P9). 'With depth, I will hear basically a warmer, more classical sound' (P10).

#### *Physical sensations and presumed physiology associated with the terminology*

The physical action of open throat was conceptualized by participants in two ways: in terms of anatomy or physiology, and/or as a physical sensation.

Table 6 presents the anatomical and physiological concepts mentioned in response to the question: 'In terms of physiology, which muscles would you expect to be working, that is to say, what happens when you use open throat?'

Eight participants consistently mentioned a presumed 'abduction' or retraction of the false vocal folds or ventricular folds which they linked to the term retraction. Participants who referred to false vocal fold movement reported seeing the action on endoscopy. 'The false folds are retracted and there is no interference of the false folds in the airflow or indeed that the false folds are not in any way pressing on the true vocal folds' (P3). 'What I have noticed, when I look at people under endoscopy and stroboscopy, is that when the ventricular bands are retracted the true vocal folds



have a much more symmetrical mucosal wave, and so they behave much more efficiently and you hear that efficiency in the purity of the tone' (P12).

Seven participants stated that pharyngeal space was involved in the technique they used: '[In retraction], there is some lowering [of the larynx] and I think there's some widening of the larger spaces in the laryngeal part of the pharynx' (P2). 'Open throat to me is optimizing; perhaps all your pharyngeal space, and that might involve a slight lowering of the larynx' (P4). 'I think it has more to do with pharyngeal depth than it is to do with widening. Because as the larynx descends, it comes slightly forward in the neck and if you have a high, wide tongue position that's slightly further forward and you actually gain more pharyngeal depth as well as pharyngeal length' (P10).

Six participants mentioned larynx lowering or the use of sternothyroid as having an effect on open throat or pharyngeal space: 'I think that there has to be an absence of the glossus muscles, that the muscles that push down on the larynx from above are a hindrance in getting an open throat. Sternothyroid, the true depressor of the larynx, which actually functions physiologically from below is much more valuable' (P2). 'I expect that there is a little bit of thyroid tilt, so that the muscles involved in the thyroid tilting mechanism are going to be involved [in retraction]' (P3). 'I would say the oropharynx or the middle constrictor region, certainly tongue muscles, the thyrohyoid, maybe sternothyroid as well would all work as a unit to allow laryngeal lowering. Certainly you are looking for a slackness in the muscles above the larynx' (P15).

Five participants (P2, 3, 7, 11, 12) commented that there was not adequate research, and they could not be completely sure what muscles were used or affected by the action of open throat: 'I can't tell you that really. I think that the research has just not been done' (P2). 'This is one of the things that needs more

research, we don't absolutely know what happens when you retract' (P12).

Table 7 presents data on sensations associated with the use of this technique. Participants described the sensation they had or tried to achieve when they used open throat. They named three locations of sensation they associated with this technique: (i) internally at laryngeal level; (ii) externally at laryngeal level; and (iii) in the oropharynx and laryngopharynx. Table 8 presents the participants' responses to the questions of associated physical sensations when using open throat.

Three participants described an internal sensation at laryngeal level and specifically linked this to the action of retraction: '[You feel] a widening ... right at the laryngeal area itself and also it feels much wider behind the epiglottis and down in the pharynx itself' (P1). 'You feel it right inside the vocal mechanism. It may just be that I've got a good imagination, but I feel the giggle or the sob has got a very subtle, very internal manoeuvre' (P2).

For four participants, the action was felt externally at laryngeal level. It was also visible in the movement of the thyroid cartilage: 'You can actually feel it around the sides of the thyroid cartilage, because if you're widening on the inside there, then you do actually get a widening [on the outside]. So you can feel the effects of the retraction—you can't feel the false vocal folds from outside' (P7).

One participant (P10) was more explicit about this external action, and linked it to vertical movement of the larynx: 'I feel it in the base of my neck ... which is actually sternothyroid having to kick in to pull the larynx low enough so that you can get a thick enough edge of vocal fold together for a slower vibratory rate' (P10).

Six participants explained that the action of open throat was felt throughout the oropharynx and laryngopharynx: 'One feels a kind of opening and a

Table 6. *Pedagogues' perceptions on anatomical and structures involved when using open throat*

Structure	False vocal folds	Pharynx	Sterno-thyroid	Larynx lowering	Other structure
Pedagogues	1, 2, 3, 7, 11, 12, 13, 15	1, 2, 4, 8, 9, 10, 15	2, 10, 12, 15	2, 3, 4, 10, 15	7
%	53	47	27	33	7

Table 7. *Pedagogues' report of perceived sensation when they used open throat*

Sensation	Internally at laryngeal level	Externally at laryngeal level	In oropharynx and laryngopharynx
Pedagogues	1, 2, 3	3, 7, 10, 12	4, 6, 8, 9, 11, 15
%	20	27	40

Table 8. *Pedagogues' view on degree to which open throat was voluntary, involuntary, could be isolated or was part of a coordinated action*

Control	Voluntary	Involuntary	Isolated action	Coordinated action
Pedagogues %	1, 2, 3, 4, 6, 7, 9, 10, 11, 12, 13, 14, 15 87	5, 8 13	2, 3, 7, 8, 9, 11, 12 47	4, 5, 6, 13, 15 33

rising feeling at the back of the throat' (P6). '[The sensation] is all about pharyngeal muscles' (P8). 'Mainly, the sensation is within the throat region' (P15).

Table 8 presents responses to the questions 'Do you think it is possible to have voluntary control of muscles responsible for open throat, throat widening, retraction and space at the back?' and 'Do you believe it is possible to isolate and control the muscles used in open throat, throat widening, retraction and space at the back?'

Thirteen participants (87%) considered that it was possible to have voluntary control of the action of open throat: 'Conscious control of constriction or retraction, nothing's new really... my experience is that of course it is' (P11). 'I certainly think you have voluntary control of open throat, in that you can optimize space' (P4). 'I think there is, up to a point, voluntary control' (P6). 'It can take a long time, but yes, you can.' (P10). 'I think to a certain extent... I don't know how efficiently [the muscles] work to sustain that. I think you can generate a response, particularly on the point of inhalation, but I'm sure that there are postural considerations such as head and neck alignment that help to maintain that positioning' (P9).

Two participants considered open throat as part of a greater whole of singing technique, rather than a single action: 'The muscles controlling the larynx work of their own accord' (P5). 'If a singer thought that they had to have voluntary control every time they went out on stage, they'd be in a mess. No they don't have voluntary control, but you do it, you get to the point where... once you put the message into the subconscious, it becomes habitual and then we just do it' (P8).

Seven participants believed that it was possible to isolate and control the action. These comments were specific to retraction: 'I'm primarily looking for the isolation simply of getting the false folds retracted so that we have a de-constricted space at vocal fold level' (P3). 'Yes, I believe so, it has certainly been my experience' (P7). 'I feel as though you can [isolate]. I don't know that I can actually control that, it may be something else that's moving' (P9). '[Isolation] definitely, yes. However, I don't know if anyone could feedback accurately exactly what muscles they were working with at any given point in time' (P15).

Five participants believed that isolation of open throat was not possible and that the action was a component of a larger action or gesture in singing: '[A whole motion] would certainly be my approach, rather than trying to isolate elements' (P6). 'I don't think you can isolate one little thing. It's part of a bigger picture, and I think sometimes, when you try to isolate bits, it can become too compartmentalized and a student actually ends up thinking about bits and forgets about singing' (P13). 'I don't think that one can take one muscle and say, exercise it, for example. They all work in a greater union' (P15).

## DISCUSSION

The majority of participants interviewed for this study agreed that open throat was essential to good singing and more specifically to classical singing. Specific sound qualities in good singing were identified and some were linked directly to open throat technique. Participants acknowledged the complex nature of interdependent techniques needed in good singing. Good breathing, balance or coordination, and freedom or ease of sound were considered essential to the production of a good sound in singing. These concepts have often been linked in the literature; for example, Miller (24) believed that freedom in sustained singing is produced by balanced breathing.

With respect to terminology regarding open throat, open throat and retraction were preferred, from the given terms, to describe the phenomenon. Other terms such as freedom, collar and depth were suggested as better terms. Individual participants preferred one of these terms to describe their concept of open throat, although some used terms interchangeably. Reasons for preferences given include: clarity of meaning; preference for a specific pedagogy's terminology; or reference to the type of action used to achieve the technique.

Different pedagogues preferred different terminologies: the descriptors used reflected preferences to current and historical singing pedagogy or pedagogues. For example, Miller (24) referred to open throat, Estill referred to retraction (16) and Chapman to collar, and the use of these terms were reflected in the comments of this sample. However, the sound qualities associated with all these terms were very similar.

Singing teachers associated open throat with both a sound quality that was characterized by freedom, warmth and openness and an action that produced balance, coordination, evenness and consistency. The terms related to vocal quality such as 'warm', 'full' or 'round', as well as the functional terms such as 'easy' or 'clean', were used interchangeably by participants in this study. The use of function and quality descriptors was addressed in Wapnick and Ekholm (26), who found that there were differing preferences for use of quality or function terms. Although experts tended towards one category of descriptor, the high correlations of all descriptors suggest that sound quality and function are a unitary concept in evaluating good sound. The participants in this study did not separate these types of terms and seemed comfortable with their use in the studio.

Participants in this sample demonstrated an understanding and interest in anatomical and physiological relationships between sound quality and technique, citing presumed muscle action such as ventricular fold abduction or pharyngeal widening and associated physical sensations. Most considered it feasible to have voluntary control over the action of open throat, but did not achieve consensus over the ability to isolate the action from good singing technique. The techniques used by participants in this sample involved laughing, crying, conscious maintenance of inhalation postures and (pre-) yawn. Scientific investigations related to each of these vocal actions provide interesting hypotheses for what may happen physiologically when participants teach open throat technique (25, 35–9).

Laughing is advocated by pedagogues such as Estill (16) and Miller (24) as a fundamental tool in each pedagogical style for (i) the achievement of false vocal fold retraction and (ii) for the balance of onset and release respectively. The majority of those who advocated false vocal fold retraction (ventricular fold abduction) said that isolation of this action was possible. This view is consistent with Estill (16, 25) who recommends independent control of components of the vocal mechanism. It is important to note that no studies have been published providing evidence of voluntary control of movement of the ventricular folds laterally away from the midline. Current thinking is divided as to whether retraction (25) occurs in open throat and if there is a response to an instruction to 'retract your ventricular folds' or 'retract' from a rest position.

Participants who used laugh as a technique did so to achieve retraction. Although the use of this term has been absorbed into singing pedagogy, it lacks anatomical validity. The anatomical term 'abduction' refers to a lateral movement away from the body midline

with the opposite term, 'adduction' referring to a lateral movement towards the body midline. The term abduction appears to be the movement that some pedagogues referred to as retraction which is not usually used anatomically in that sense. However, the use of the term retraction by the participants interviewed here clearly meant more than a relaxation to a rest position from a constricted vocal pattern; it also implied a lateral movement away from the approximation to the midline. What is not known is whether there is any voluntary control of the lateral position of the ventricular folds as advocated by Estill. Those participants who used the term and technique of retraction did so to reduce constriction or tension to achieve a healthier sound quality as well as to achieve a specific sound quality.

Physiologically, abduction of the ventricular folds presents a puzzle as they are 'incapable of becoming tense' (40, p. 117). Histological reports have described a rostral extension of the thyroarytenoid muscle up to 13 mm above the glottis, which at the level of the ventricle, 2–3 mm above the glottis, lies lateral to it, and at this level it is referred to as the ventricular muscle (41). The thyroarytenoid muscle is an adductor of the vocal folds, and will have the same action on the ventricular folds and so cannot be responsible for abduction of the ventricular folds. There is voluntary control over constriction of the ventricular and vocal folds with adduction of the ventricular folds, and changes in the vocal vibratory waveform are observed in strained/tense and also in pressed phonation. Reduced tension of the larynx and a degree of expansion in the laryngeal ventricle was reported in 'covered singing', a technique used when singing through the *passaggio* (42).

Changes in the lateral position of the ventricular folds may alter the shape and position of the ventricle, which could be responsible for other resonator characteristics or even the vibratory pattern of the vocal folds. In studies of specific vocal register by Welch *et al.* (38), they found that male falsettists demonstrated a systematic increase in pharyngeal and ventricular area as well as shape and position of the laryngeal ventricle across a series of octaves. They suggested that darkening or covering was achieved while still maintaining 'singer's formant', by opening the ventricular space and lowering the larynx. Reference to the ventricle and its perceived role in singing were made by the Bel Canto school, and interpreted in the twentieth century by practitioners such as Manén (19) to include direct reference to the ventricular folds, and she concluded that they are altered in length and width, which directly affected the ventricle of Morgagni and produced the 'specific timbres of Bel Canto' (19, p. 34).

However, it is not yet established whether the opening of the ventricular space and lowering the larynx is influenced by instruction and adjustments made for the technique of open throat. Sundberg (39) proposed that the observed distinctive high-energy spectrum in singer's formant is present when a specific size relationship occurs between the diameter of the pharynx and the opening of a narrowed laryngeal inlet or tube (size ratio pharynx to larynx opening areas = 6:1), which is more likely to occur when the larynx is lowered. Participants in this study did not specifically link the use of an open throat with 'ring', terms which have previously been linked (43), although they did suggest it facilitated a better balance or more desirable distribution of harmonics.

Some participants in this sample advocated cry as an instruction and discussed larynx lowering as an action in open throat. Certain participants speculated that the contraction of the sternothyroid muscle might influence space created in the pharynx, larynx lowering or other associated movements in the vocal mechanism. There is some support for this hypothesis. Sternothyroid contraction is believed to influence the thickening of the vocal folds in low pitches, but it is uncertain as to its effect on higher pitches in trained singers (44). The sternothyroid muscle attaches to the thyroid cartilage, and it is possible that on shortening, it makes some impact on the vocal fold configuration. Roubeau *et al.* (44) found that the activity of the strap muscles, including the sternothyroid, varied according to fundamental frequency, with most activity occurring at the extremes of range. Hong *et al.* (10, 45) concurred that the strap muscles did affect fundamental frequency through the mechanism of laryngotracheal pulling or bending. These studies support the views of the participants' interviewed that contraction of the sternothyroid muscle has some effect on the laryngeal configuration.

Vilkman *et al.* (46) agreed that changes to the vertical position of the larynx had effects not only on fundamental frequency but also may contribute to abduction and adduction functions within the larynx. This supports the benefits of lowered larynx as used in classical singing. Shipp (47) determined that thyrohyoid and sternothyroid muscles were responsible for subjects' vertical laryngeal positioning while singing, which matches the participants' beliefs of laryngeal control and manipulation.

Pedagogical methods linking breath, or the intake of breath, was deemed by pedagogues in this sample to be vital in the production of open throat, and achieved using a variety of images or gestures in order to locate a sound quality and sense of space or freedom (5). Sonninen's (48) pioneering study into external laryngeal frame musculature supported this pedagogical

theory, and identified anterior and inferior displacement of the thyroid cartilage by sternothyroid and tracheal exertion via inhalation, which may account for vibratory changes in the vocal folds and acoustic changes in fundamental frequency.

Many participants in this sample talked about widening of the pharynx or a sensation of space within the pharynx. They also associated this with breath, and an action initiated through inhalation. Anatomically, there is evidence that the pharynx can widen or lengthen during singing. The pharynx is comprised of three constrictors so, anatomically, only lengthening of the vocal tract, or protrusion of the tongue, should enlarge the pharyngeal resonator. The yawn/yawn-sigh has been used to encourage open throat, but has been questioned as a tool for achieving it, as it may add unnecessary tensions (24). Pre-yawn or yawn-sigh was named in this study as other pedagogical devices to achieve open throat. Boone and McFarlane (49) studied the yawn-sigh under nasendoscopy and identified characteristic lowered larynx and widened pharynx across subjects, as well as retracted elevation of the tongue which supports the participants' application of yawn or pre-yawn to enlarge the pharyngeal resonator. Acoustically, this yawn-sigh produced lower second and third formants. The notion of pharyngeal size and its impact on the increased intensity in sound was reported by the participants interviewed in this study. Sonninen *et al.* (50) investigated the size of the pharynx during open and covered singing, in loud and quiet examples, and proposed that the lower pharynx was in fact narrower during the loud covered condition than in the open condition. However, it is qualified by its restriction to the low level of pharynx area studied. Although pedagogues here referred to wide pharynx, they also quantified depth via laryngeal lowering as important to open throat. The narrowing of epiglottal area, and its role in the production of singer's formant is investigated by Titze (9), who proposed the benefits of adopting a wide pharynx, to achieve a lower first formant to enhance the sound, and increase the singer's formant with a narrowed laryngeal inlet or tube (39).

Recent studies (10, 36) investigated various voice qualities including the 'yawny' voice quality and concluded that this vocal tract manipulation resulted in a distinctive increase in vocal tract volume, through lengthening the vocal tract and widening the oral cavity, which resulted acoustically in a closer grouping of the first two formants. These findings confirm pedagogical statements in this study related to the perceived impact of the use of the sob/cry/yawn manipulations to achieve greater space and lower the larynx, but do not investigate the concept of tension.

Studies of control of different sound qualities, focusing on different vocal genres have identified different vocal ‘postures’ in singing (35, 37). Physiological movements were different across singing styles and were believed to account for changes to the sound quality. When the vocal tract was compared across a single singer, operatic technique versus belting technique elicited a lower larynx, wider larynx tube and more separated ventricular folds. Interestingly, the instruction to change the sound quality produced the physiological variations.

## CONCLUSIONS AND RECOMMENDATIONS

This study assessed the use of language about sound quality associated with the technique of open throat. Although the 15 participants offered 18 terms to describe sound quality, clear associations or similarities in their usage and application were apparent. This study advances previous work in clarifying terminology related to open throat (51, 52). Communication of techniques in singing pedagogy can be improved by attempts to inform the use of terminology. Consensus of pedagogues is displayed in the evaluations of singing performance (33), although the way in which pedagogues interpret a sound is often difficult to define verbally.

It also expands Wapnick and Ekholms’ (26) attempts at matching pedagogical evaluation with perceptual descriptors. Singing pedagogues rely on their perceptions of sound qualities to determine the physiological processes at work in the production of the sound quality. The human ear must complement acoustical study in integrating the complex dimensions of the human voice. Language in singing pedagogy, despite Seashore’s (2) ideals, is destined to remain subjective. However, in order to spread information more effectively, we would make the following recommendations:

1. Singing pedagogy and voice research need to become more integrated. De-constriction is a more anatomically correct term than retraction. This would help to convey meaning more effectively between science and art.
2. Qualitative research is a useful tool for the generation of research questions and elucidation of study related to the voice, in particular, to the sound quality.
3. Subsequent research needs to establish the associated characteristics of open throat and the perceptual quality accompanying this technique (26, 27).
4. In this study, open throat was considered important in current pedagogy. Pedagogues were aware

of the technique’s value as well as the need to tailor their terminology and instructions in the singing studio to each student’s vocal needs and learning styles.

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