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Project Title

***A Study into the Effectiveness of 'Mix' Strategies for
Male Contemporary Commercial Music Singers***

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FIGURE LIST

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WORK BASED LEARNING PROJECT PROPOSAL

Context

As a freelance vocal coach specialising in contemporary commercial music (CCM) genres of singing such as rock, pop and soul, the researcher has noticed that one of the most common challenges faced by adult male singers is negotiating the register transition (passaggio) between the lower register ('chest' voice) and upper register ('head' voice). Issues experienced by these singers include:

- high effort levels to 'reach' a high note;
- strained or 'shouty' tone;
- irregularities in pitch when gliding through the transition, presenting as an audible 'flip' or as a gap in the range, through which phonation is impossible;
- significant disparity of tone between lower and upper registers;
- significant loss of projection over the transition area.

These singers wish to sing smoothly through their entire vocal range, with no abrupt changes in tone or projection, maintaining stylistic accuracy within CCM repertoire; this approach to register transition is often referred to as 'mix' or 'mixed registration'. In order to successfully and reliably facilitate this, effective and appropriate voice training strategies must be identified.

Justification

There is a conspicuous gap in the literature for studies into male CCM 'mix', as the majority of the existing scientific and academic literature on 'mix' relates to:

- (a) classical singing, or less frequently, MT singing – very rarely to 'popular' CCM styles such as rock, pop or soul;
- (b) female singers – as despite male 'mix' dating back almost 200 years (Mayr, 2017), and despite it being ubiquitous within CCM, it is rarely used within classical or MT repertoire.

In a literature review on registers, Henrich (2006) suggests that the body of research on this topic would benefit from further studies into CCM styles such as jazz, blues and rock.

Recent quantitative research conducted into laryngeal registration (e.g. Roubeau, Henrich and Castellengo, 2009; Herbst *et al.*, 2011; Kochis-Jennings *et al.*, 2014; Titze, 2014; Echternach *et al.*, 2017) and vocal tract acoustics (e.g. Howell, 2016; Ritzerfeld and Miller, 2017) will be examined to provide a rigorous foundation; this will be drawn together with CCM vocal coach practitioner literature, in order to establish relevance to adult male

CCM singers. These elements will inform the design of pedagogical strategies, which will be trialled in order to gain insights into efficacy, thereby addressing gaps in the literature.

The aims of the research are to:

- Draw together and summarise the existing body of recent research, establishing how laryngeal function and vocal tract acoustics may contribute to the ability to sing seamlessly through the register transition
- Gain fresh insight into how adult male CCM singers experience their passaggio, in terms of:
 - kinaesthetic sensations
 - thoughts and feelings
 - perception of how their voice sounds through this part of their range
- Identify research-based teaching strategies which may facilitate 'mix' in adult male contemporary singers
- Trial these strategies, gaining insights into their efficacy via:
 - the singers' perspectives
 - CCM voice teachers' perspectives
 - spectrographic analysis
- Draw conclusions and identify areas for further research.

Intended impact

By conducting this study, the researcher aims to benefit:

- their own vocal students, by developing the researcher's professional practice as a vocal coach;
- other vocal coaches, by allowing the creation of evidence-based teacher training materials;
- the wider voice pedagogy community, by addressing gaps in research and sharing the findings through publication and/or presentation;
- to provide a pilot study that will inform a larger-scale study, which the researcher aims to conduct next year.

Outlined intention

Methodological Position

Tessellating well with the researcher's subjectivist epistemological standpoint, built on an ontology of a changing, emergent world (Gray, 2004, p.17), the problem-centred philosophy of the pragmatic paradigm will underpin this research. This will allow the researcher to cycle

between phases of reflection and action (Dewey, 1910, 1920, 1925, cited in Morgan, 2014, p.1046), mirroring the abductive nature of vocal coaching. A mixed methods research methodology will be employed, adopting a strong focus on qualitative methods, whilst incorporating quantitative aspects such as spectrographic analysis of voice recordings and Likert scale questions within the questionnaires and interviews, in order to triangulate (Berg, 2001, pp.4–5; Schwandt, 2001, pp.257–258; Denzin, 2009, pp.297–313).

A research design consisting of three individual exploratory case studies will be utilised, due to its suitability to a small-scale project such as this; if successful, the study could function as a pilot study for a larger-scale research project (Berg, 2001, p.230).

Participants

Purposive sampling, developed through application of the researcher's specialist knowledge in order to choose participants with particular attributes relevant to the study (Berg, 2001, p.32), will be utilised to select three adult male CCM singers. Singer-participants with a desire to improve their ability to transition smoothly and easily through their register transition (using a CCM-appropriate tone) will be recruited.

A purposive sample of three CCM vocal coaches will also be recruited. To ensure relevance, these teacher-participants will be selected on the basis that they specialise in CCM styles and teach 'mix'.

Methods

- After conducting a **literature review** on the topic, the researcher will design voice training strategies to facilitate 'mix'.
- Singer-participants will complete an initial **questionnaire**, exploring their perspectives on voice registration issues.
- Six online vocal lessons will be conducted with each singer-participant, in order to trial these strategies. Sessions will take place via Zoom, and **audio-visual recordings** will be made.
- **'Before' and 'after' recordings** will be made, in the first and sixth sessions respectively. In order to showcase their current ability to produce 'mix', each singer-participant will sing:
 - (i) specified vocal exercises;
 - (ii) an excerpt of a song of their choice, requiring use of their vocal transition area (to ensure relevance to CCM styles).

- A **semi-structured interview** will be conducted with each participant singer following their final lesson, in which they will reflect upon and evaluate their own progress.
- The anonymous, randomised 'before' and 'after' audio recordings of each singer-participant will be shared with each of the CCM teacher-participants, who will complete a **questionnaire** in order to provide insights into progress towards 'mix'.

Analysis

- Each singer-participant's initial questionnaire will be compared against their semi-structured interview, in order to gain qualitative and quantitative insights into their own perception of their progress. The 'before' & 'after' recordings will be played during the interview, in order to allow them to evaluate their progress from another perspective.
- Data from the three singer-participants will be compared, to see whether any common themes emerge.
- The three teacher-participants' questionnaires will be compared, to identify areas of consensus or disagreement; these will also be compared against each singers' own perceptions.
- Elements of the 'Before' and 'after' recordings will be analysed using spectrographic software, in order to gain quantitative insights into progress.

Triangulation

One way of establishing validity is to use a process of 'triangulation', using three or more approaches to create convergent 'sight lines' (Berg, 2001, pp. 4–5; Schwandt, 2001, pp. 257–258; Denzin, 2009, pp. 297–313). For each case study, the following convergent sight lines will be utilised:

- Qualitative and quantitative self-evaluation data from each singer-participant, from three different perspectives (kinaesthetic, mental/emotional, aural)
- Qualitative and quantitative evaluation data from three independent teacher-participants
- Spectrographic software analysis of 'before' and 'after' recordings.

Ethical considerations

According to Whitehead and McNiff, ethical frameworks consist of three key elements: "access, safeguarding rights and assuring good faith" (2006, p. 77).

Access to my sample will involve securing written and oral permission from each participant; as there are no plans to work with children or vulnerable adults, it will not be necessary to gain permission from a parent or guardian.

In order to safeguard participants' rights, they will be informed of their right to withdraw, and their confidentiality will be assured.

The researcher will maintain good faith by demonstrating honesty and openness throughout, assuring participants that information pertaining to them will never be shared without first seeking their explicit permission.

To safeguard the health of participants, the researcher and the wider public, all research will be conducted online via Zoom, removing the risk of Covid-19 transmission as a result of this research.

Insider Research

Whilst this study may benefit from the many advantages of insider-research, e.g. "stronger rapport, and a deeper, more readily-available frame of shared reference with which to interpret the data" (Mercer, 2007, p. 25), disadvantages such as loss of objectivity (Unluer, 2012, p. 3) and blind spots (Herrmann, 1989, p. 9; Saidin and Yaacob, 2017, p. 850) are crucial points to address in order to avoid compromising validity.

In order to mitigate these issues, the researcher will not personally evaluate the singer-participants' progress (e.g. through observations); qualitative evaluation data will be gathered from singer-participants and teacher-participants only. In order to maximise objectivity, teacher-participants will:

- not know the singer-participants' identities;
- not be involved in the training process;
- not know which recordings are from 'before' and which are from 'after' the training programme.

Proposed project timeline

	Aug					Sept				Oct				Nov				Dec				Jan			
Task	31	7	14	21	28	5	12	19	26	2	9	16	23	30	7	14	21	28	4	11	18				
Preparation																									
Complete project proposal																									
Conduct & write literature review																									
Design teaching strategies																									
Design questionnaires & interviews																									
Singer-participant research																									
Recruit singer-participant sample																									
Questionnaire given to singer-participants																									
Questionnaire collected from singer-participants																									
Deliver vocal lessons (recorded)																									
Singer-participant semi-structured interviews																									
Transcribe interviews																									
Teacher-participant research																									
Recruit teacher-participant sample																									
Questionnaire and before/after recordings given to teacher-participants																									
Completed questionnaires collected from teacher-participants																									
Report / presentation																									
Analyse results																									
Write report																									
Draft report deadline – 01/01/21																									
Redraft report																									
Final report deadline – 15/01/21																									
Prepare presentation																									
Deliver presentation - 22/01/21																									

Personal learning outcomes

- To gain in-depth insights into how adult male CCM singers experience their register transition, in terms of:
 - kinaesthetic sensations
 - emotions
 - thoughts
 - behaviours
 - perception of how their voice sounds through this part of their range
- To consolidate the researcher's knowledge of the science behind muscular and acoustic registration
- To develop voice training strategies tailored to adult male CCM singers, designed to facilitate a stylistically appropriate mixed registration

- To gain insights into the efficacy of these strategies, both from the singers' perspective and from the perspective of independent CCM voice teachers
- Deepening the researcher's professional specialism in this area, by developing knowledge, teaching experience and repertoire of teaching strategies

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WORK BASED LEARNING PROJECT REPORT

INTRODUCTION

Context

In the researcher's experience as a freelance voice teacher specialising in contemporary commercial music (CCM) genres such as pop, rock and soul, one of the most common vocal challenges faced by adult male singers is the register transition (*passaggio*) between the lower and upper registers. Registration issues experienced by these singers include:

- Struggling to 'reach' notes
- Strained or 'shouted' tone
- Pitch irregularities, 'flips' or gaps in range
- Significant disparity of tone and/or projection between registers

Their desired aim is to sing smoothly through their entire vocal range with no abrupt changes in tone or projection, maintaining stylistic accuracy within CCM repertoire. To successfully and reliably facilitate this approach to register transition, often referred to as 'mix' or 'mixed registration', effective voice training strategies must be identified.

Justification

There are currently conspicuous gaps in research for studies into male CCM 'mix', as the majority of the existing academic literature on 'mix' relates to:

- classical singing, or less frequently, MT singing – very rarely to 'popular' CCM styles such as pop, rock or soul;
- female singers – as despite male 'mix' dating back almost 200 years (Mayr, 2017), and despite it being ubiquitous within CCM, it is rarely used within classical or MT repertoire.

Henrich (2006) suggests that the body of research on registers would benefit from further studies into CCM styles such as jazz, blues and rock.

Recent quantitative research conducted into laryngeal registration (e.g. Roubeau, Henrich and Castellengo, 2009; Herbst *et al.*, 2011; Kochis-Jennings *et al.*, 2014; Titze, 2014; Echternach *et al.*, 2017) and vocal tract acoustics (e.g. Howell, 2016; Ritzerfeld and Miller, 2017) will be examined to provide a rigorous foundation. CCM vocal coach practitioner literature will also be considered, in order to establish relevance.

These elements will inform the design of pedagogical strategies, which will be trialled in order to gain insights into effectiveness, thereby addressing gaps in the literature.

Aims of the study

- To summarise the existing body of recent research, establishing how laryngeal function and vocal tract acoustics may contribute to the ability to use 'mix'
- To gain fresh insight into how adult male CCM singers experience their passaggio, in terms of:
 - kinaesthetic sensations
 - emotions, thoughts and behaviours
 - aural perception
- To design and trial research-based teaching strategies to facilitate 'mix' in adult male CCM singers, gaining insights into their effectiveness from singers, CCM voice teachers and via spectrographic analysis
- To identify areas for further research.

Intended impact

By conducting this study, the researcher aims to:

- benefit their own vocal students, by improving the researcher's own practice as a voice teacher
- benefit other voice teachers, by allowing the researcher to create research-based teacher training materials
- benefit the wider voice pedagogy community, by addressing gaps in literature, sharing this research via publication and/or presentation
- provide a pilot study informing a larger-scale study, which the researcher aims to conduct next year.

Expected personal learning outcomes

- Consolidate knowledge of the science behind laryngeal and acoustic registration
- Design research-based voice training strategies, tailored to adult male CCM singers, designed to facilitate 'mix'
- Gain insights into how adult male CCM singers experience register transition
- Deepen professional specialism, by expanding knowledge, teaching experience and repertoire of teaching strategies

LITERATURE REVIEW

This integrative literature review aims to synthesise “new frameworks and perspectives” (Torraco, 2016 p.1) on the topic. Due to apparent gaps in research around the topic of male CCM ‘mix’ registration, voice registration literature pertaining to classical or musical theatre singers will also be considered, in addition to literature relating to female voices; studies on children’s voices will be discarded. Recent primary research into laryngeal and acoustic voice registration will be prioritised for inclusion, particularly central or pivotal literature. In order to bridge the gap between ‘rigour’ and relevance’ (Schön, 1984), this scientific research will be drawn together with insights from leading pedagogues, in order to establish relevance to CCM singers; synthesis of this knowledge will influence the design of a set of teaching strategies applicable to adult male CCM singers.

Mix

Although the literature reveals a plethora of terminology used to refer to the concept of ‘mix’ (Kochis-Jennings *et al.*, 2012; Edwin *et al.*, 2014), there is agreement that the concept refers to a voice configuration facilitating seamless transition between the two primary registers, avoiding abrupt shifts in tone, projection, or pitch (Castellengo, Chuberre and Henrich, 2004; Henrich, 2006; Bozeman, 2013b; Traser *et al.*, 2013; Echternach, Traser and Richter, 2014; Mayr, 2017).

Registers

“...the topic of singing voice registers is complex” (Herbst, 2021, p.354)

Although voice scientists and practitioners agree that voice registers do exist (Doscher, 1993, p. 171; LeBorgne and Rosenberg, 2019, p. 122; Herbst, 2020), the topic of registers remains contentious. For example, there is controversy surrounding how registers should be defined, and how they should be addressed within voice teaching. There is also an overabundance of registration terminology (see figure 1), resulting in confusion and ambiguity (Sundberg, 1987, p. 50; Henrich, 2006; Miller, 2008; Edwin *et al.*, 2014; LeBorgne and Rosenberg, 2019, p. 121; Herbst, 2020).

TABLE 1. Exemplary overview of proposed register classifications.

Author	Year	Count	Terms
Zacconi	1596	2	<i>voce di petto, voce di testa</i>
Garcia	1847	3	<i>voix poitrine, registre de fausset, registre de tête</i>
Behnke	1886	5	lower thick, upper thick, upper thin, upper thin, small
Van den Berg	1963	3 (+2)	chest, head or mid, falsetto (main registers) <i>Stroh</i> bass, whistle (further registers)
Vennard	1967	3	chest, middle, head (females) Chest, head, falsetto (males)
Hollien	1974	3	pulse, modal, loft
Miller	2000	4	chest, middle, upper, flageolet (females) Chest, full head, falsetto (males)
Roubeau	2009	4	M0 (fry), M1 (chest), M2 (falsetto), M3 (whistle)*

* The terms in parentheses were added by the author in order to increase readability; see Table 5 in Roubeau for a complete list of synonyms.

Figure 1. Registration terminology (Herbst, 2020, p.175)

Although sensation-based terms such as ‘chest’ and ‘head’ voice (along with ‘chest-mix’ and ‘head-mix’) remain pervasive, they may be unhelpful, due to the (incorrect) implication that vibrations felt in these areas affect the resulting tone. Despite evidence that voice ‘placement’ sensations can be experienced by singers (e.g. Sundberg, 1979, p. 63), these do not affect vocal tone, but are caused by sympathetic vibrations resulting from formant-harmonic interactions within the vocal tract (Edwards, 2004; Miller, 2004; Bunch Dayme, 2005; McKinney, 2005; McCoy, 2013; Edwin *et al.*, 2014).

Factors deemed to influence vocal registration may be organised into two categories – **laryngeal muscle adjustments**, and **vocal tract acoustics** (LeBorgne and Rosenberg, 2019, p. 123). Furthermore, these two elements may impact upon each other (Titze, 2018).

Laryngeal muscle adjustments

Perturbation

Male register transition is associated with increased perturbation (F_0 irregularities) (figure 2), even when there are no audible pitch jumps (Echternach *et al.* 2011; Echternach and Richter, 2012); **descending vocal tasks have been shown to lower perturbation levels through the transition, therefore these may be an advantageous pedagogic tool to facilitate vocal stability** (Echternach and Richter, 2012 p.440).

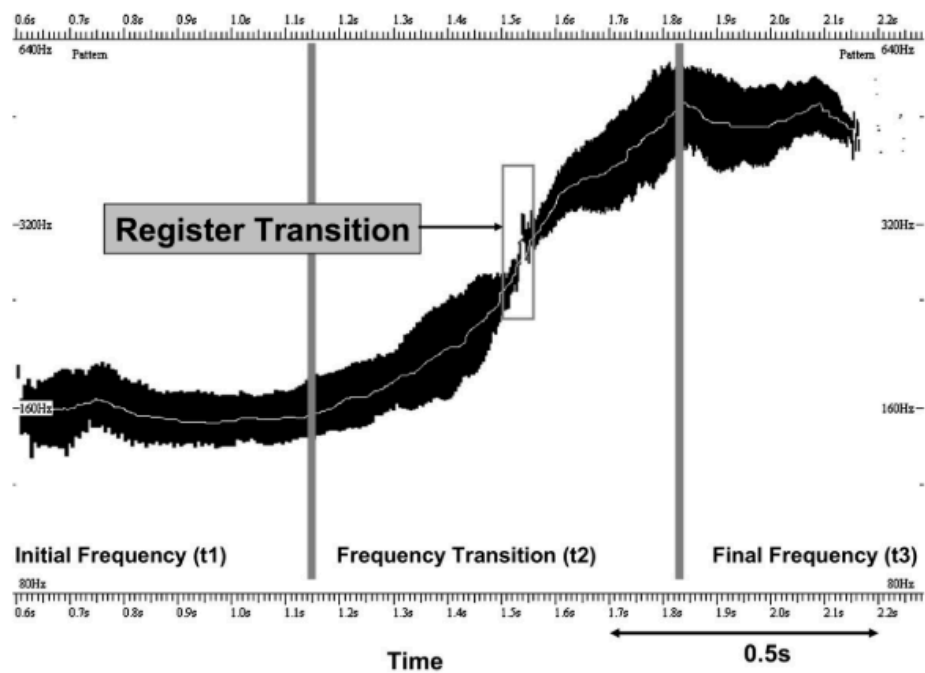


FIGURE 1. F0 data plotted against time for one of the subjects' frequency glides from modal to falsetto register. The white thin line shows the running F0 average. The heavy vertical lines separate the three sections initial frequency (t1), frequency transition (t2), and final frequency (t3). The frame marks the 50 milliseconds wide register transition part of the frequency transition section.

Figure 2. Perturbation associated with register transitions (Echternach *et al.*, 2011, p. 664)

Vocal fold adduction

The manner and level of vocal fold adduction will determine the harmonic spectrum generated at the vocal folds, and thus the level of harmonic energy available to be resonated by the vocal tract formants (Herbst, 2017, p. 2); compared to 'head voice', 'mix' phonation results in a less steep 'spectral tilt', resulting in increased high-frequency energy in the source spectrum (Kochis-Jennings *et al.*, 2012).

Voice scientist / pedagogue Christian Herbst *et al.* (2011) identifies two distinct types of glottal adduction – 'cartilaginous adduction' (of the arytenoid cartilages) and 'membranous medialization' (vocal fold bulging), concluding that these can be independently adjusted, regardless of gender or singing experience (p.2261), thereby facilitating a variety of timbres (figure 3). Participants achieved this by **mimicking the instructor's demonstration of the particular timbre, with additional guidance (where necessary) to make it 'more breathy' (aBducted) or 'more pressed' (aDducted).**

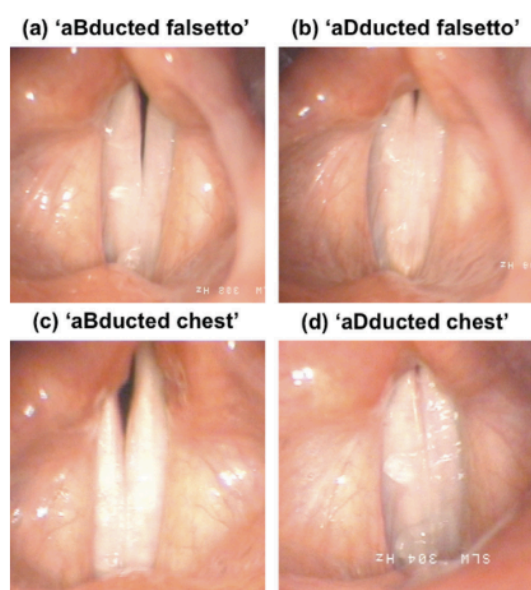


FIG. 1. (Color online) Typical laryngeal configurations for all attempted phonation types (female subject MM) as revealed by laryngeal videostroboscopy. (a) aBducted falsetto, (b) aDducted falsetto, (c) aBducted chest, and (d) aDducted chest. The images were taken at the moment of maximal vocal fold closure.

Figure 3. Laryngeal configurations
(Herbst *et al.*, 2011).

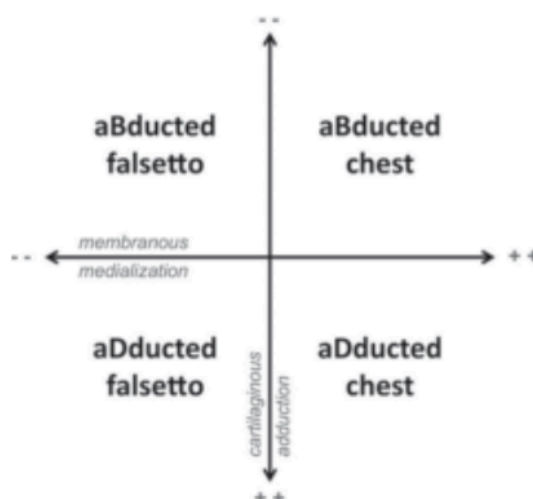


Figure 4. Relationship between the two types of adduction and the four phonation types described here. This pedagogic model is not limited to distinct and extreme phonation types; rather, it encourages gradual, fine controlled adjustments along the two major dimensions, in order to increase the singer's timbral variability for enhanced artistic expression.

Figure 4. Model of vocal fold adduction
(Herbst and Švec, 2014)

Laryngeal musculature

The pervasive theory that registration is controlled by a 'handover' of muscle 'dominance' between the thyroarytenoid (TA) and cricothyroid (CT) muscles has been discredited by recent research (Kochis-Jennings *et al.*, 2012, 2014), which concludes that CT engagement appears more related to pitch than registration. **Registration terminology such as 'CT-dominant' is therefore not as 'fact-based' as previously thought** (Edwin *et al.*, 2014).

According to Herbst and Švec's (2014) pedagogic model (figure 4), building on a previous study (Herbst *et al.*, 2011), **registration between chest and falsetto is determined by the level of 'membranous medialization' (TA engagement)**. This model proposes **that the degree of vocal fold closure is determined by 'cartilaginous adduction'**; the lateral cricoarytenoid (LCA) and interarytenoid (IA) muscles are jointly responsible for aDduction (creating pressed tone), whereas their antagonist the posterior cricoarytenoid (PCA) muscle is responsible for aBduction (creating breathy tone) (Herbst and Švec, 2014, p. 303).

Vocal fold vibratory patterns

There is debate as to whether, at the vocal fold level, 'mixed' registration is on a continuum, or comprised of distinct steps (Roubeau, Henrich and Castellengo, 2009; Titze, 2018).

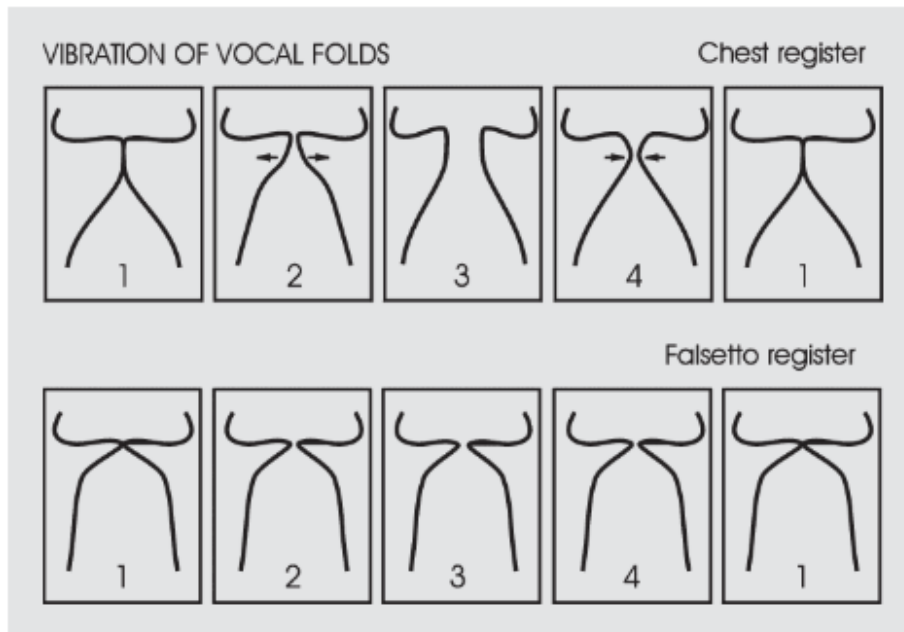


Fig. 1. Simplified sketch of the contrasting patterns of vibration of the vocal folds, designated 'chest' and 'falsetto' in this article. The deep contact of 'chest' results in vertical phase difference, with the lower margins preceding the upper margins.

Figure 5. Vocal fold vibratory patterns (Miller and Schutte, 2005, p. 279)

One theory is that **M1 and M2 vibratory patterns** (figure 5) **are distinct** (Miller and Schutte, 2005; Roubeau, Henrich and Castellengo, 2009; Titze, 2018), between which there is an abrupt switch at the vocal fold level, although this may be concealed using “vowel modification or compensatory adjustments in adduction or lung pressure” (Titze, 2018, p. 49).

However, Titze's (2014) study proposes that although vocal fold adduction is usually ‘bi-stable’, **M1 and M2 can be merged via an intermediate vocal fold shape** (see figure 6). This intermediate shape may be stabilised by **(i) reducing transglottal pressure (by using supraglottal pressure to balance subglottal pressure)** and **(ii) balancing upper/lower vocal fold stiffness**, to avoid “a sudden register ‘break’” (Titze, 2014, p.2100). The association of ‘mix’ with reduced transglottal pressure tallies with previous research into (female) ‘mix’, belt and operatic qualities (Sundberg, Gramming and Lovetri, 1993). The balancing of upper/lower vocal fold stiffness tessellates with Herbst and Švec's (2014) suggestion that gradual adjustments of cartilaginous adduction (top adduction) and membranous medialisation (bottom adduction) allow a “mixed register” (p.301).

Semi-occluded vocal tract exercises (SOVTEs) such as straw phonation may be utilised to increase supraglottal pressure, thereby reducing transglottal pressure (Guzman, Laukkanen, *et al.*, 2013).

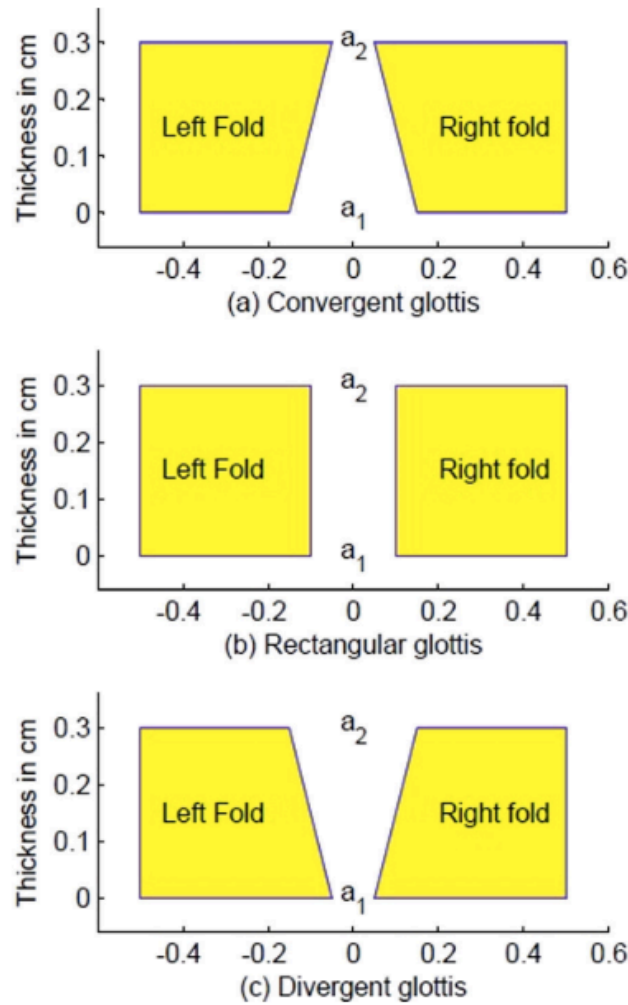


FIG. 1. (Color online) Glottal shapes. (a) Top of the vocal folds more adducted than the bottom, glottis referred to as convergent; (b) vocal fold surfaces are parallel, glottis referred to as rectangular; (c) bottom of the vocal folds more adducted than the top, glottis referred to as divergent.

Figure 6. Glottal shapes: convergent, rectangular, divergent (Titze, 2014, p. 2093)

Vocal fold oscillation may also be assisted by formant-harmonic interactions, through ‘inertive reactance; **in the tenor passaggio, vowel configuration has been shown to influence the stability of vocal fold oscillation patterns** (Echternach, Burk, Köberlein, Burdumy, *et al.*, 2017). Inertive reactance may also be increased using SOVTEs, leading to improved vocal efficiency (Hijleh and Pinto, 2021).

Vocal tract acoustics

(If the reader is unfamiliar with the concept of vocal tract formants and harmonics, please refer to appendix 3.)

Secondo passaggio

Eminent voice scientist and pedagogue Donald Gray Miller (2008, p. 61) emphasises that “the defining moment” in the ascent of the male voice through the register transition between lower and upper registers is “when the first formant falls below the second harmonic, giving up the tracking of H2 as F₀ rises” (p.61). This F1/H2 crossing is known as the ***secondo passaggio***, and usually occurs between **Eb4–Ab4 in tenors** (Bozeman, 2013a; Ritzerfeld and Miller, 2017), but may be lower for **baritones (C#4–E4)** (Bozeman, 2013b).

Vocal tract stability

Bozeman (2013, p. 47) asserts that the *secondo* passaggio is the approximate location of (i) F1/H2 ‘primary turnings’ of the open vowels, and (ii) occurrence of F1/H2 ‘whoop’ coupling of the close vowels. In order to transition smoothly up through the *secondo* *passaggio*, male singers must allow H2 to rise above F1 on open vowels, by **maintaining a relatively stable vocal tract shape** (Bozeman, 2017, p. 68; Ritzerfeld and Miller, 2017).

The male ***primo* *passaggio***, occurring a fourth or fifth below the *secondo* *passaggio* in male singers, involves an F1/H3 “lift” (Miller, 2008, p.62) or ‘mini-turning’ (Bozeman, 2017) of the open vowels; **avoiding larynx-raising at this point** is a prerequisite to successful negotiation of the *secondo* *passaggio*.

SOVTEs have been shown to lower vertical larynx position (VLP); phonation through a 3mm straw was more effective than a 6mm straw, or lip trills, and “loud voice productions also demonstrated a greater degree of change than soft and moderate loudness levels” (Guzman, Castro, *et al.*, 2013, p. 715).

Formant tuning

F1 and/or F2 may be slightly adjusted to create a more optimal formant/harmonic alignment, resulting in greater resonance (Miller, 2008 p. 114, Bozeman, 2013b p. 106). These strategies can be accomplished via slight adjustment of the vowel (i.e. ‘vowel tuning’). As different vowels have differing F1 and F2 values (figure 7), these may be used a pedagogical tool during vocal training.

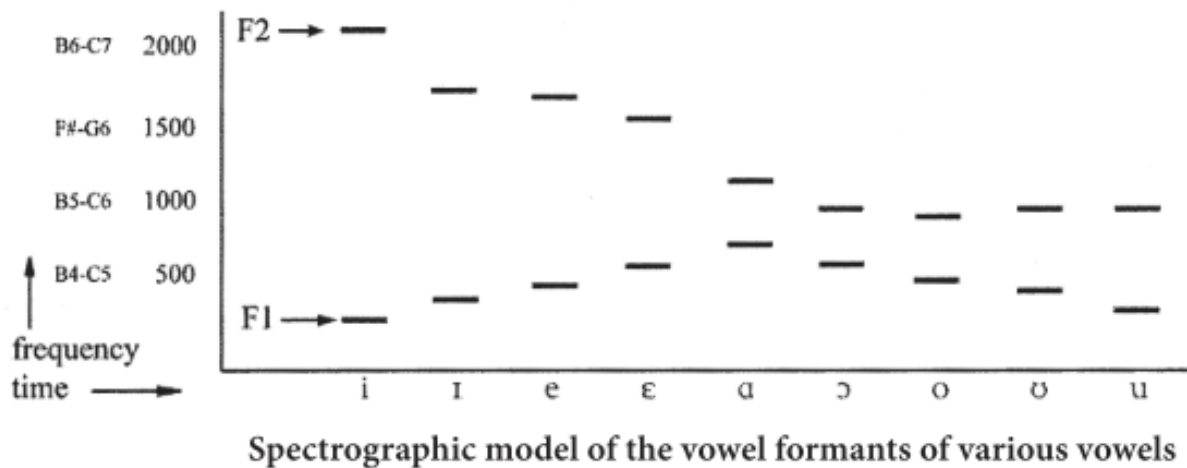


Figure 7. Spectrographic model of vowel formants (Bozeman, 2010)

Close vowels /i/ and /u/, have a low F1 value (see figure 12) and therefore ‘turn over’ lower in the range; use of these within a vocal exercise may assist a student to familiarise themselves with the kinaesthetic sensation of ‘turning over’, without needing to carefully co-ordinate laryngeal registration at the same time (Bozeman, 2013a, p. 5).

Vowel-tuning strategies using semi-close vowels discourage larynx-raising and encourage H2 to cross F1 (Miller, 2008; Bozeman, 2013a). Whilst rising through the *zona di passaggio*, close vowels such as /i/ and /u/ should be *opened* “in order to avoid whoop timbre and stay in a more virile mixed timbre” (Bozeman, 2013a p.46); conversely, “Open vowels can stay in close, speech-like posture” (Bozeman, 2017, p. 35). In the event that larynx-raising and vowel-opening persists, a slightly more ‘closed’ version of the problematic vowel may be used until the habit is retrained (Bozeman, 2013a, p. 45).

Second formant strategies (i.e. tuning F2 to one of the higher harmonics) may be utilised above the *secondo passaggio* in order to avoid a loss of projection or abrupt change in tone as H2 moves out of range of F1 (Bozeman, 2013b; Guzman *et al.*, 2014; McQuade, 2014; Ritzerfeld and Miller, 2017). In classical singers, this usually involves F2/H3 or F2/H4, depending on the vowel used (Miller, 2008; Ritzerfeld and Miller, 2017); **F2/H4** is adopted if a brighter timbre or a vowel closer to /i/ or /e/ is desired, whereas **F2/H3** is adopted for a warmer timbre or a vowel closer to /a/, /ae/, or /e/ (McQuade, 2014 p. 168).

Whilst a recent study into ‘reinforced falsetto’ high notes produced by rock singers found that F2/H2 and F2-F1/H2 were the most common second formant strategies used, the notes produced were above D5, and therefore well above the *secondo passaggio*.

SOVTEs – additional notes

According to Titze (2006), if a highly resistant SOVTE such as narrow straw phonation causes “pushing, choking or...straining” (p.458), it is recommended to begin with a medium

resistance exercise, then work up to maximum resistance; once this is comfortably achievable, gradual progression of SOVTEs towards minimum resistance is advocated.

As SOVTEs such as straw phonation created a muted sound, this can help singers to focus more on kinaesthetic sensations, and less on aural perception (along with any judgemental thoughts surrounding this). The muted sound also facilitates discreet practice, which may be useful for touring musicians (Hijleh and Pinto, 2021).

Gaps in literature

“Comparing CCM to classical music has never made sense, as classical singing may not be useful as a viable measure of the vocal production in CCM styles” (LoVetri, 2008, p. 261).

Studies on CCM singing styles are scarce (Henrich, 2006; LoVetri, 2008, p. 261; Guzman *et al.*, 2014, p. 184; Elizabeth, Benson and Ann, 2018, p. 12), and CCM ‘mix’ is no exception (Bozeman, 2017, p. 73). Research into ‘mix’ overwhelmingly relates to classical singing, and the scant research into CCM ‘mix’ is on the female voice (Sundberg, Gramming and Lovetri, 1993; Lovetri, Lesh and Woo, 1999).

There is, therefore, a conspicuous gap in the literature for research into male CCM ‘mix’.

Relevance to CCM genres

“Each CCM style needs to be taken seriously on its own terms” (LoVetri, 2008, p. 261).

CCM pedagogues such as Kim Chandler (2014) and Dr Kathryn Green (LeBorgne and Rosenberg, 2019) establish direct relevance to individual CCM styles by incorporating repertoire into vocal exercises. Exercises based on scales such as the minor pentatonic or blues scale may also be useful, due to their application to CCM genres, particularly those of African-American origin (Chandler, 2014; Benson, 2018).

TEACHING STRATEGIES

This framework of pedagogical approaches has been synthesised from the integrative literature review, and will be incorporated into the 'mix' training programme to be trialled.

Types of sound

- straw phonation (3mm diameter) – various reasons, including to lower transglottal pressure and lower VLP
 - if one straw causes “pushing, choking or...straining” (Titze, 2006 p.458), use two or more at first
- Other SOVTEs - to lower transglottal pressure and lower VLP
- Vowel exercises using:
 - Close vowels – to discourage larynx-raising and access upper register more easily
 - Semi-close vowels – to discourage larynx-raising
 - Close vowels: open slightly through the *zona di passaggio* – to maintain a vibrant tone
 - Open vowels: maintaining fairly 'close' mouth shape, through the *zona di passaggio* – to allow H3 / H2 to migrate through F1

Types of scale

- descending patterns at first – to reduce perturbation and encourage vocal stability
- glides and arpeggios
- minor pentatonic scale variations
- Each singer-participant will work on a CCM song excerpt of their choice, requiring use of their transition area; the melody of this song will also be used in combination with various SOVTEs and vowels, as a vocal exercise.

Vowel tuning

- Any problematic vowels within the chosen song excerpt may be slightly adapted
 - Open vowels which feel like a strain to reach, may be slightly closed through the *zona di passaggio* (i.e. avoid widening by maintaining a fairly close mouth as in speech)
 - Close vowels which sounds a little too 'hooty' may be opened slightly

Vocal fold adduction

- when necessary, encouraging more optimal vocal fold adduction
 - teacher demonstration (of 'cartilaginous adduction' / 'membranous medialization')
 - additional instructions if necessary (e.g. to make the sound 'more pressed')

- on melismatic phrases, avoid aspirate separation of notes with 'h' consonants

METHODOLOGY

Methodological position

The researcher approaches this study from a subjectivist epistemological standpoint, built on the Heraclitan 'becoming' ontology of changing and emergent world (Gray, 2004, p. 17); this mirrors the subjective nature of singing, which produces sensations that are unique to each vocalist (McCoy, 2013; Manternach, 2018).

However, it is acknowledged that the existing body of quantitative singing voice research, rooted in objectivism, forms a valuable framework of knowledge informing both the voice science and pedagogy communities (Howell, 2018, p. 326).

The pragmatic paradigm, in which this study is firmly rooted, provides an invaluable framework for this study precisely because it de-emphasises metaphysical considerations, in favour of placing practice-based problems at the heart of the research process (Mackenzie and Knipe, 2006, p. 4; Morgan, 2014, p. 1045).

Pragmatism allows for a research design that goes "beyond testing an idea and describing a status quo" (Feilzer, 2010, p. 13) (Feilzer, 2010, p. 13) (Feilzer, 2010, p. 13); thus facilitating this study's attempt to bridge the gap between the 'rigour' of voice science and the 'relevance' of grassroots voice practitioners (Schön, 1984), by finding evidence-based yet accessible solutions to real-world issues faced within the voice studio.

The philosophy behind John Dewey's (1910, 1920, 1925, cited in Morgan, 2014, p.1046) pragmatism, that human experience is a continual interplay between our beliefs and our actions, tessellates well with the abductive nature of vocal coaching, of which the processes of 'reflection-in-action' and 'reflection-on-action' (Schön, 1984) form an integral part. To maintain focus on the research problem, Dewey's (1910b/2008, summarised in Morgan, 2014, p. 1047) systemic approach to inquiry was used as a reflective framework throughout the study.

Methodology

A mixed methods research methodology was utilised. A strong focus on qualitative methods allowed a "greater depth of understanding" (Berg, 2001, p.2) from the perspective of singers and voice teachers. In order to establish validity, quantitative elements (such as spectrographic analysis of voice recordings and Likert scale questions within the questionnaires and interviews) were also included, providing another convergent 'sight line' for data triangulation (Berg, 2001, pp.4–5; Schwandt, 2001, pp.257–258; Denzin, 2009, pp.297–313).

A research design consisting of three individual exploratory case studies was chosen, due to its suitability to the small-scale nature of this study; if successful, this research could function as a pilot study for a larger-scale project.

Participants

Purposive sampling was utilised within this study; this was developed through application of the researcher's specialist knowledge in order to choose participants with particular attributes relevant to the study (Berg, 2001, p.32).

A purposive sample of three adult male CCM singers was selected. Singer-participants with a desire to improve their ability to transition smoothly and easily through their register transition (using a tone appropriate to CCM styles) were recruited. Singers who perform professionally were selected, in order to ensure a base-level of vocal function that would allow for deeper exploration into 'mix' within six sessions.

Potential singer-participants were identified via the researcher's existing professional network, and contacted to determine whether they may be interested in taking part. Each attended an informal online meeting with the researcher, to allow introductions and to discuss the project in more detail. Each participant was asked to select a contemporary song, requiring use of their transition area, which they were currently finding challenging. They each sent a recording of this to the researcher, so that it could be determined whether the singer was suitable to take part in the study.

Once suitability had been established, a consent form (appendix 6) was emailed for them to sign, and the first session scheduled. The researcher also ordered a box of 3mm straws from Amazon, to be delivered directly to each participant.

A purposive sample of three CCM vocal coaches was also selected. To ensure relevance, these teacher-participants were selected on the basis that they specialise in CCM styles and that they teach 'mix'. They were not involved in the design or delivery of the teaching strategies, and were not given details of what these consisted of.

Teachers within the researcher's existing professional network were considered, and three were contacted to establish whether they would consider taking part. As they are busy professionals, they were reassured that participation would not take up too much of their time.

A teacher-participant consent form (appendix 7) was emailed, along with further details of the purpose and nature of the study (appendix 8).

Methods

The researcher initially considered conducting observations of singing lessons, recording data using field notes “made on the spot or soon thereafter” (Schwandt, 2001, p.186), with the possible addition of audio / video recordings for reference purposes. However, as this would be a view through the lens of an insider-researcher, this type of data could be criticised as subjective; particularly as the training programme is comprised of strategies designed by this researcher.

It was decided that data collected from other CCM voice teachers, as well as from the singer-participants themselves, would provide a more objective insight into the effectiveness of the teaching strategies; questionnaires and semi-structured interviews were utilised in order to collect this data.

‘Before’ and ‘after’ recordings were taken of each singer, for the teachers and singer themselves to respond to. Before being shared with the teachers, these recordings were anonymised, and in order to maximise validity of the data, these ‘before’ and ‘after’ recordings were randomised so that the teachers were not aware which was which.

Overview of research undertaken

A **literature review** was conducted on the topic, informing the design of a set of training strategies to facilitate ‘mix’.

Each singer-participant completed an **initial questionnaire**, to provide insights into their perspectives on voice registration.

Each singer-participant then took part in a **training programme in which the ‘mix’ training strategies were trialled**. This consisted of six weekly 60-minute online 1:1 vocal lessons, delivered by the researcher via Zoom.

‘Before’ and ‘after’ audio recordings were created, during the first and sixth sessions. These consisted of:

- vocal exercises using an /a/ sound (a 13431 scale, and an ascending and descending pitch glide spanning a major third). These began in the lower register, ascending a semitone at a time until the vocalist was fully within their upper register.
- an excerpt of a contemporary song of their choice, requiring use of their vocal transition area (in order to ensure relevance to CCM styles).

In order to optimise audio quality, recordings were made online using ‘Cleanfeed’. Participants used headphones in order to eliminate bleed from external speakers. They each

used an external microphone, connected to their laptop via audio interface. P1 and P2 each used a condenser microphone, whilst P3 used a dynamic microphone.

A **semi-structured interview** was conducted with each singer-participant immediately following their sixth lesson, in which they reflected upon and evaluated their own progress. Part of this involved listening to their own 'before' and 'after' recordings.

Each singer-participant's anonymously-labelled pair of song excerpt recordings and pair of scale / glide recordings were **randomised** (see appendix 9) by flipping a coin six times in total, in order to decide whether each pair would be alphabetically ordered before/after (heads) or after/before (tails). These recordings were shared with the teacher-participants, who each completed a **questionnaire** in order to evaluate what they heard.

Data analysis

The questionnaire and interview data were 'split' using initial in vivo coding (Saldaña, 2016), then synthesised into categories/themes.

The codes relating to potential impact of 'mix' training were categorised into emotions, thoughts and behaviours.

The kinaesthetic and aural perception initial codes were categorised into 'before' and 'after' categories, then synthesised using pattern coding (Saldaña, 2016), allowing themes to emerge.

In order to triangulate the data, each participant's 'before' and 'after' exercises were spectrographically analysed using Voce Vista Video Pro, thus providing an additional 'sight-line' to quantify perceived phenomena reported by the teacher-participants and singer-participants. Due to the time-constraints of this small-scale project, the song-excerpt recordings were not analysed in this way.

Ethical considerations

Ethical frameworks consist of three key elements: "access, safeguarding rights and assuring good faith" (Whitehead and McNiff, 2006, p. 77).

Access to each sample involved securing oral and written permission from each participant. Informed consent, a key ethical principle defined by Diener and Crandall (1978, quoted in Cohen, Manion and Morrison, 2013, p. 52) as "the procedures in which individuals choose whether to participate in an investigation after being informed of facts that would be likely to influence their decisions" was obtained in this way, after explaining verbally and in

writing what the study would entail. As the researcher is self-employed, permission from a manager was not necessary.

In order to safeguard the rights of participants, care was taken to ensure their anonymity at all times, including to the other participants. Given that each participant was a professional in their field who showed the generosity of spirit to put themselves out of their comfort zone (vocally for the singers, and by evaluating anonymised recordings for the teachers), this was particularly important, to avoid any actual or perceived negative impact upon their careers. They were also made aware of their right to withdraw from the study without consequences.

Good faith was maintained by demonstrating honesty and openness at all times. Throughout the process, the researcher answered any questions participants had questions about the study.

Insider research

Insider-researchers may be defined as “those who chose to study a group to which they belong, while outsider-researchers do not belong to the group under study” (Breen, 2007, p. 163). Insider/outsider status is not always clearly defined; from the students’ perspective, a teacher may be seen as an outsider rather than a peer (Herrmann, 1989, p. 3). There is a growing trend amongst authors to “reject the insider/outsider dichotomy...in favour of a continuum” (Mercer, 2007, p. 5), as insider status is not characterised by a just one attribute (such as gender) but rather “the intersection of many different characteristics” (p.24). As this study involved teaching fellow professional performers, who may view the researcher as both an insider and outsider, this concept is particularly pertinent.

This study benefitted from the numerous advantages of insider-research, including familiarity with inherent values and power structures (Herrmann, 1989, p. 3; Mercer, 2007) and a “stronger rapport, and a deeper, more readily-available frame of shared reference with which to interpret the data they collect” (Mercer, 2007, p.25). There were also significant professional development benefits (Costley, 2006, p. 11).

There are also disadvantages; insider-researchers may “have to contend with their own pre-conceptions, and those their informants have formed about them as a result of their shared history” (Mercer, 2007, p.25), leading to a loss of objectivity on the part of the researcher (Unluer, 2012, p. 3); as an insider, they may be desensitised to important issues, leading to blind spots (Herrmann, 1989, p. 9; Saidin and Yaacob, 2017, p. 850).

These potential issues were mitigated in a number of ways. Objectivity was maximised by avoiding the use of lesson observations, and instead using gathering data from independent CCM voice teachers, in addition to the singers themselves.

Adverse outcomes and risk

Scenario:

Participants do not attend all 6 sessions

Solution:

If a participant is unable to attend, aim to reschedule rather than cancel.

Audio record each session, so that there is enough data to gain insights into progress in case the programme is cut short.

Scenario:

Participants withdraw from the study

Solution:

Whilst this would undoubtedly impact upon the scope of the study, enough data would be collected, even if only one singer-participant remained.

In the highly unlikely event that all three participants were to withdraw, another sample could be recruited.

No risks were anticipated. To safeguard the health of participants, the researcher and the wider public, all research was conducted online via Zoom, removing the risk of Covid-19 transmission as a result of this research.

FINDINGS AND ANALYSES

POTENTIAL IMPACT OF 'MIX' TRAINING - FINDINGS

The potential impact of 'mix' training, from the singers' perspectives, was explored in questions 28-33 of the initial questionnaire (see appendices 10 and 12), and during the coding process, these were considered through the lenses of emotions, thoughts and behaviours.

Emotions

Two out of the three singers felt that there would be an emotional impact.

- **Increased confidence** - (2/3 singers)

During performances (P1) and when selecting repertoire (P2)

- **Greater sense of freedom** - (2/3 singers)

During performances (P1), when selecting repertoire (P2) and to experiment vocally (P2)

- **Increased enjoyment** - (2/3 singers)

Thoughts

All three singers felt that there would be an impact on their thoughts.

- **Viewing self as more accomplished**

"I would feel like a more well-rounded performer" (P2)

"I'd think I had more of a clue about what I'm doing" (P3)

- **A shift from 'fixed' mindset to 'growth' mindset** (Dweck, 2006, cited in Holding, 2020)

"I'd feel like singing was an achievement rather than just natural predisposition" (P3)

Behaviours

All three singers felt that there would be a shift in their behaviour.

- **More ambitious vocal choices during performances** (P1, P2 and P3)

- **Expansion of repertoire choices**

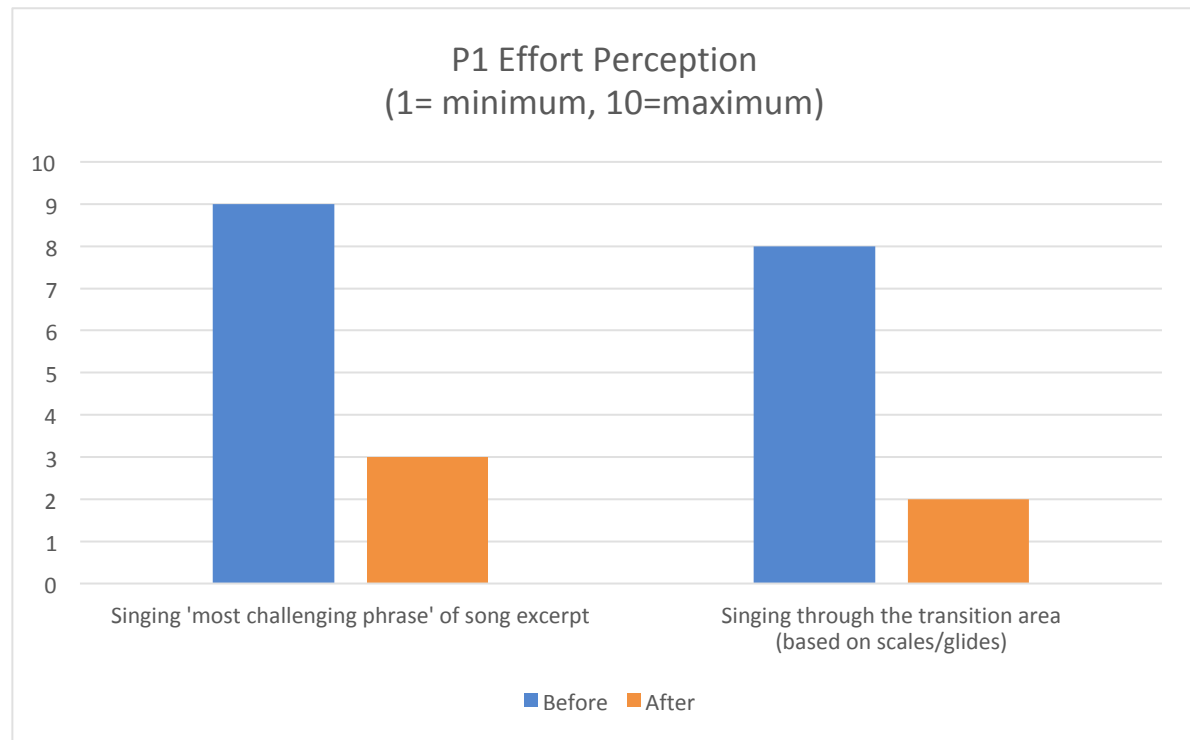
Covering specific artists (P1), a different genre of music (P3), or "a broader variety of material" (P2).

- **More ambitious career choices**

SINGER P1 - BEFORE AND AFTER FINDINGS

P1 – How did it feel?

Findings are based on P1's questionnaire and interview responses.



Song excerpt **after** the training programme:

- Effort perception substantially reduced
- No longer using active 'breath support', no 'build-up', not pushing.
- Focus is on maintaining a feeling of vocal fold engagement (as contrast to previous focus on breath support)
- Sensations now different
- Improved feeling of resonance
- Experienced anxiety during the 'after' recording

Transition area **after** the training programme (based on scales/glides):

- Effort perception substantially reduced
- Sensations now different
- Larynx feels lower, no longer rising, no 'reaching' for notes
- No longer felt constricted ("zero strain")
- During the 'after' recording, tension caused by anxiety "created an issue – but not a singing issue"

P1 – Aural perception of singer - song excerpt recordings

- In his 'after' recording, P1 reported hearing:
- Increased "resonance", "power" and "energy"
- Improved tone
- Reduced tension
- He noted that the 'before' and 'after' recordings sounded "quite similar"

P1 – Aural perception of singer – scales / glides recordings

In his 'before' recording, P1 reported hearing:

- a "reaching and forced sound"
- a register "break between chest and falsetto"; "no mix"
- upper register "weaker", "more breathy" and "less resonant"
- poor coordination
- "uncertainty"

In his 'after' recording, P1 reported hearing:

- "a marked difference [from the 'before' recording]"
- improved "smoothness in transition"
- tension caused by anxiety: "in today's example... due to anxiety or tension, that affected the overall sound... not especially the transition, but the overall sound itself coming out"

P1 – Aural perception of CCM teachers - song excerpt recordings

All three teachers felt that the singer's transition area was more skilfully tackled in the **before** recording.

Selected teacher comments:

	Before	After
T1	"Transition area more skilfully tackled in this recording" "more consistency of pitch, tone and projection" "a little tone inconsistency over the "never gives out," but less pronounced than in ['after' recording]"	"the second "oh" sounds slightly forced and unstable" "the following "never" cracks a little so that the tone becomes inconsistent and it loses some of the projection"
T2	"Transition area more skilfully tackled in this recording" "The transition was much less wobbly"	
T3	"Transition area more skilfully tackled in this recording" "lighter vocal production, so presumably further on in training. The vibrato sounded easier and more comfortable."	

P1 – Aural perception of CCM teachers – scales / glides recordings

All three teachers agreed that the ‘after’ recording showed at least some degree of improved smoothness in the register transitions.

- Two teachers observed a substantial improvement
- The third teacher chose the multiple choice option “notable differences between the recordings, but overall, neither is smoother”, but then commented that “parts of the bridge was smoother”.

Selected teacher comments:

	Before	After
T1	“a notable change in timbre (flip) at bridge” “tone becomes thinner and breathier” “pitch is unstable throughout as voice breaks/yodels around bridge”	“Smoother register transitions in this recording” “Much more consistency of tone and pitch” “Eliminates most of [the issues in the other recording]” “much smoother transition throughout range”
T2	“Both a little shaky in terms of fundamental frequency”	“Smoother register transitions in this recording” “Marked improvement in smoothness”
T3	“Notable differences between the recordings, but overall, neither is smoother”	“Parts of the bridge was smoother”

P1 – Scales / Glides Recordings (Spectrographic analysis)

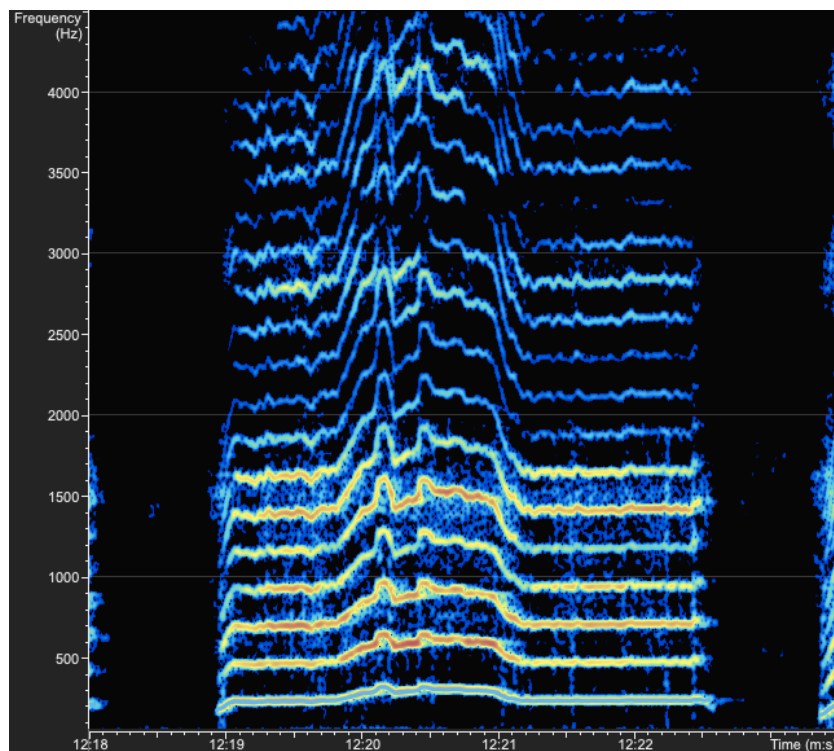


Figure 8. P1 'Before' glide starting on Bb4, showing pitch instability

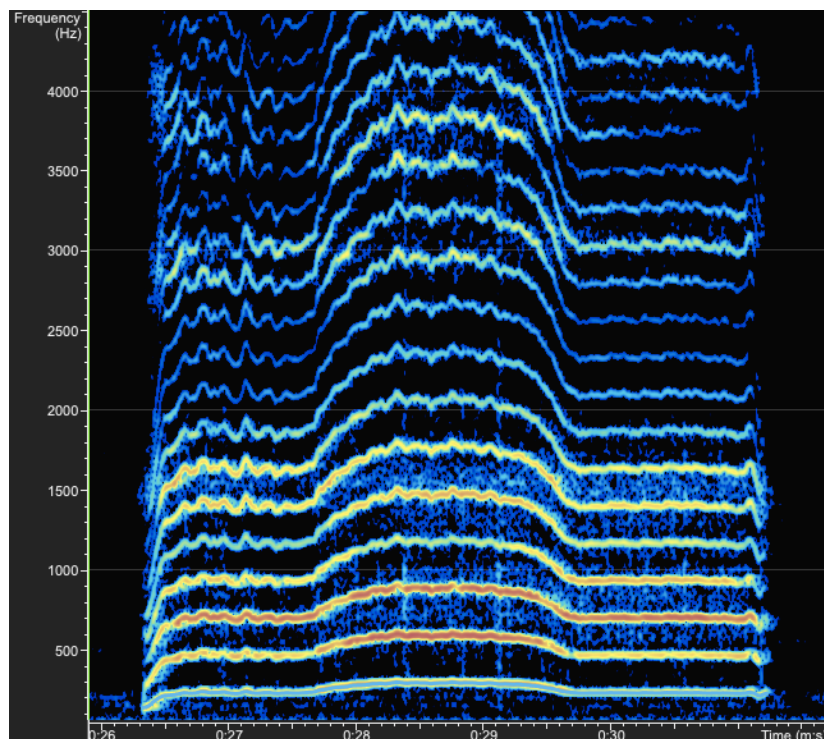


Figure 9. P1 'After' glide starting on Bb4, showing smoother glide

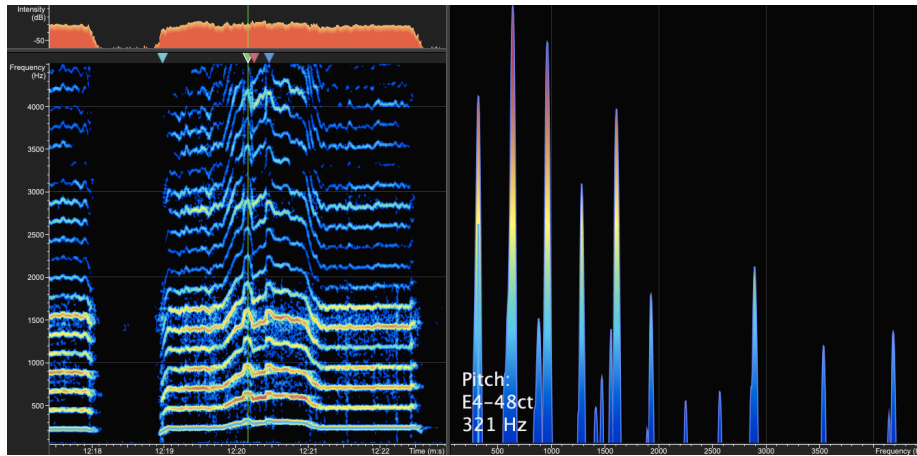


Figure 10. P1 'Before' glide starting on Bb4. Peak 1: $F_O = 321$ Hz

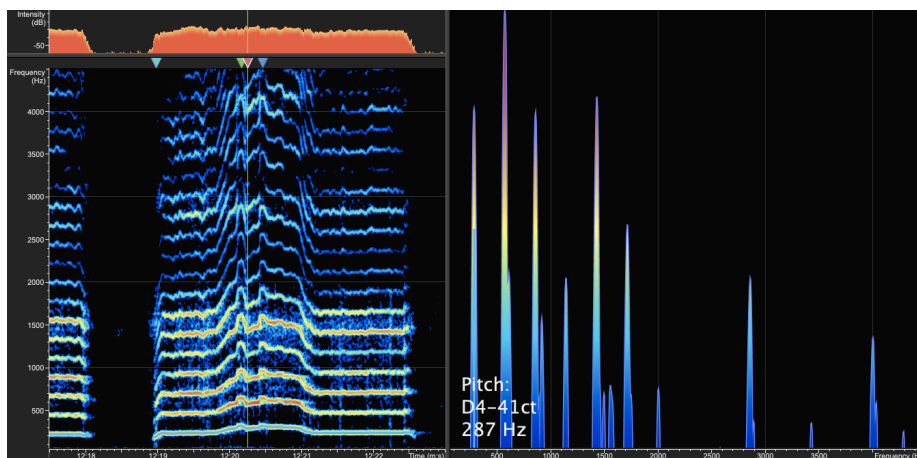


Figure 11. P1 'Before' glide starting on Bb4. Valley: $F_O = 287$ Hz

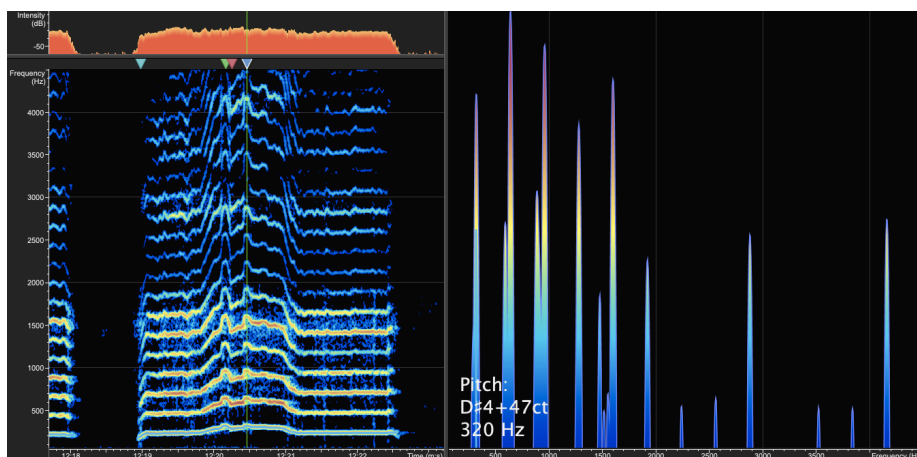


Figure 12. P1 'Before' glide starting on Bb4. Peak 2: $F_O = 320$ Hz

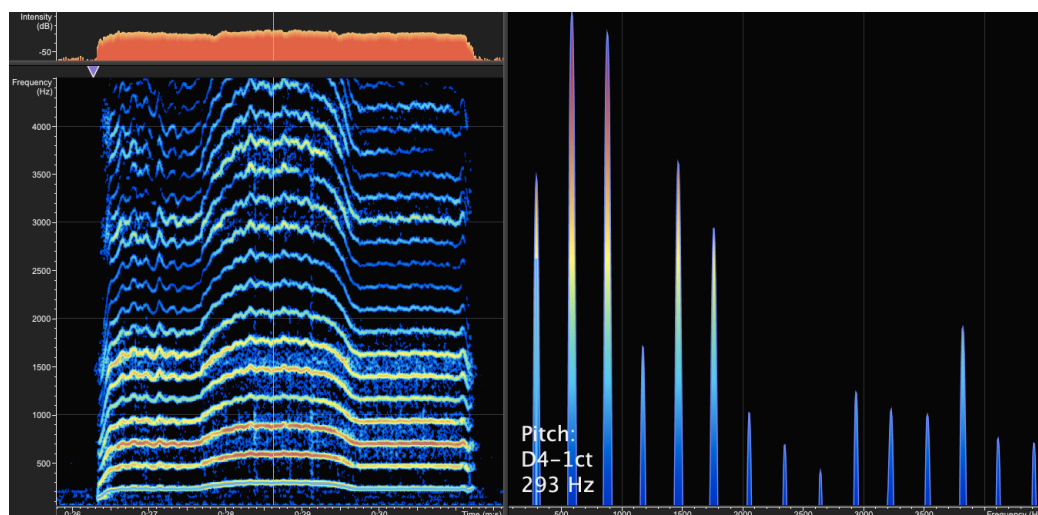


Figure 13. P1 'Before' glide starting on Bb4. Top of glide: $F_0 = 293$ Hz

P1's minor third pitch glide (beginning on Bb4) has been used as an illustrative example.

On the spectrogram of P1's 'before' glide (figure 8), pitch instability can be seen to the slight left of centre; there are two clear peaks, with a valley in between. In contrast, the spectrogram of the 'after' recording (figure 9) shows a much smoother glide.

Whilst the intended top note of the glide was D4, figures 11-13 reveal the F_0 values of the 'before' glide's peak 1, valley and peak 2, respectively:

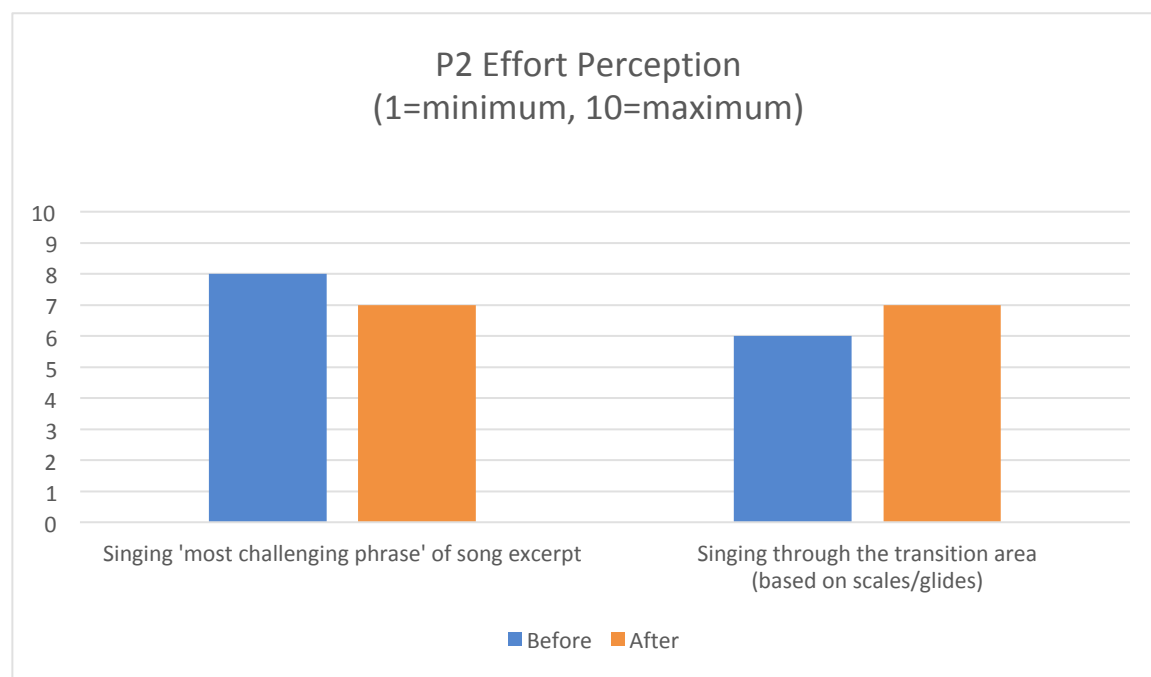
- Peak 1: $F_0 = 321$ Hz (E4 -48ct)
(2.48 semitones above the target pitch)
- Valley: $F_0 = 287$ Hz (D4 -41ct)
(0.41 semitones below the target pitch)
- Peak 2: $F_0 = 320$ Hz (D#4 +47ct)
(1.47 semitones above the target pitch)

This demonstrates a great deal of pitch instability on the 'before' glide; in contrast, figure 13 shows that in the 'after' glide, the target pitch of D4 was more smoothly reached (293Hz, D4-1ct).

SINGER P2 - BEFORE AND AFTER FINDINGS

P2 – How did it feel?

Findings are based on P2's questionnaire and interview responses.



Song excerpt *after* the training programme

- Effort perception slightly reduced
- More comfortable and confident; no longer awkward
- Improved vocal security / stability
- Feeling of greater consistency between registers
- Less pushing, less tension
- Reduced sense of uncertainty compared to beforehand

Transition area *after* the training programme (based on scales/glides):

- Effort perception slightly increased
- Sense of a “different kind of effort”
- Clearly improved sense of vocal security, strength and stability.
- Less obvious flip
- Greater comfort and less uncertainty (whilst “still being careful”)

P2 – Aural perception of singer - song excerpt recordings

In his 'after' recording, P2 reported hearing:

- reduced effort / pushing
- improved intonation
- high parts sounded less "hooty"

P2 – Aural perception of singer – scales / glides recordings

In his 'before' recording, P2 reported hearing:

- a "very clear flip" / "yodel"; "not at all smooth"
- a lack of coordination: "pretty wobbly"
- "uncertain[ty]"

In his 'after' recording, P2 reported hearing:

- "definitely noticeable" differences from the 'before' recording
- less noticeable transitions when ascending (although still flipping a little bit)
- mostly smooth transitions when descending: "it's hard to tell where the change was"
- tone was different from the 'before' recording

P2 – Aural perception of CCM teachers - song excerpt recordings

All three teachers felt that the singer's transition area was more skilfully tackled in the **after** recording.

Selected teacher comments:

	Before	After
T1	"Some parts had a 'yelly' quality which compromised pitch and transition, especially at the end of the recording"	"Transition area more skilfully tackled in this recording" "Tone quality more consistent" "pitch more consistent" "yelly" quality... wasn't present
T2	"Both recordings showed an audible shift into falsetto"	"Transition area more skilfully tackled in this recording" "[this recording] showed slightly more skilful use of 'mix' in the latter part"
T3		"Transition area more skilfully tackled in this recording" "The flips and high larynx was less prominent"

P2 – Aural perception of CCM teachers – scales / glides recordings

Two of the three teachers agreed that the register transitions in the ‘after’ recording were smoother. The third teacher felt that neither recording was smoother.

Selected teacher comments:

	Before	After
T1	“Noticeable ‘flip’ in both”	
	“Much more pronounced and disruptive [flip]”	“Smoother register transitions in this recording” “Tone quality much more consistent over the bridge” “Pitch was a little less consistent in [after recording], however”
T2	“scales were both a bit unstable in transition”	
		“Smoother register transitions in this recording” “Slides in [after recording] were noticeably smoother”
T3	“Notable differences between the recordings, but overall, neither is smoother”	
	“he self corrected more in [before recording], so was more aware of his voca[l] technique”	

P2 – Scales / Glides Recordings (Spectrographic analysis)

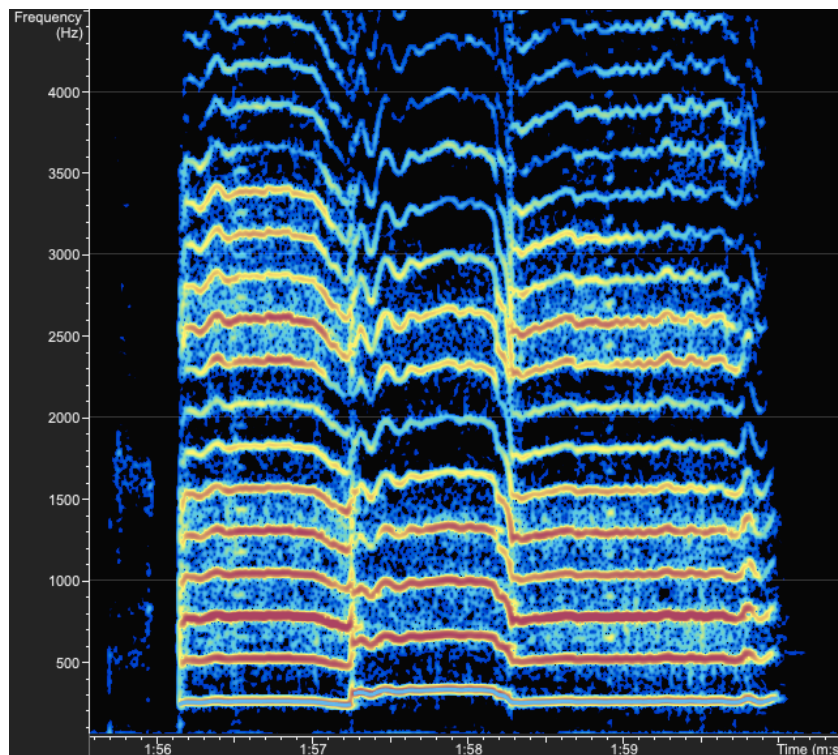


Figure 14: P2 'Before' glide starting on C4, showing pitch instability before ascent

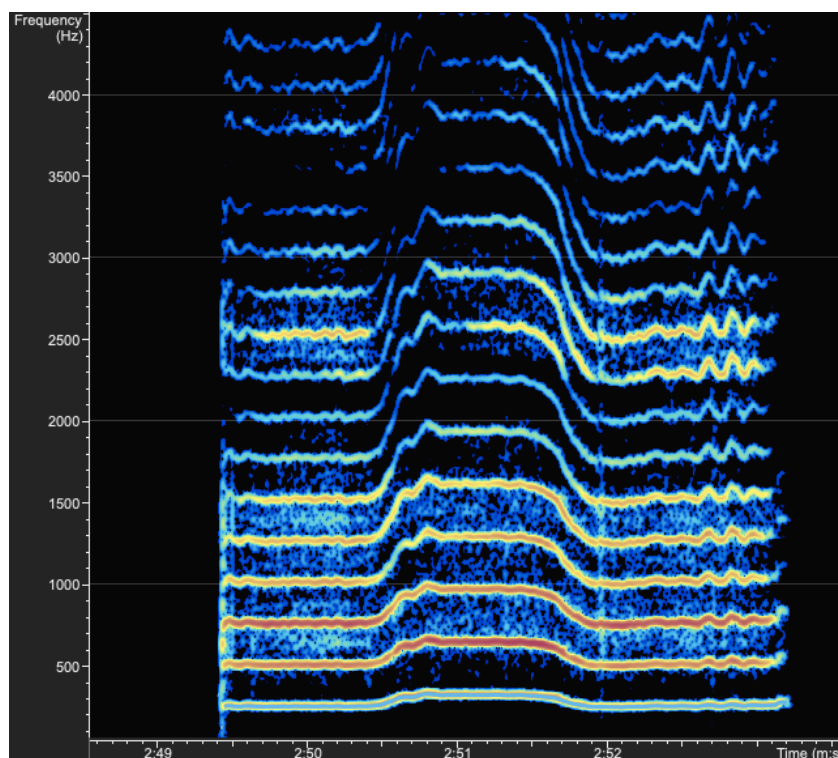


Figure 15: P2 'After' glide starting on C4, showing a smoother ascent

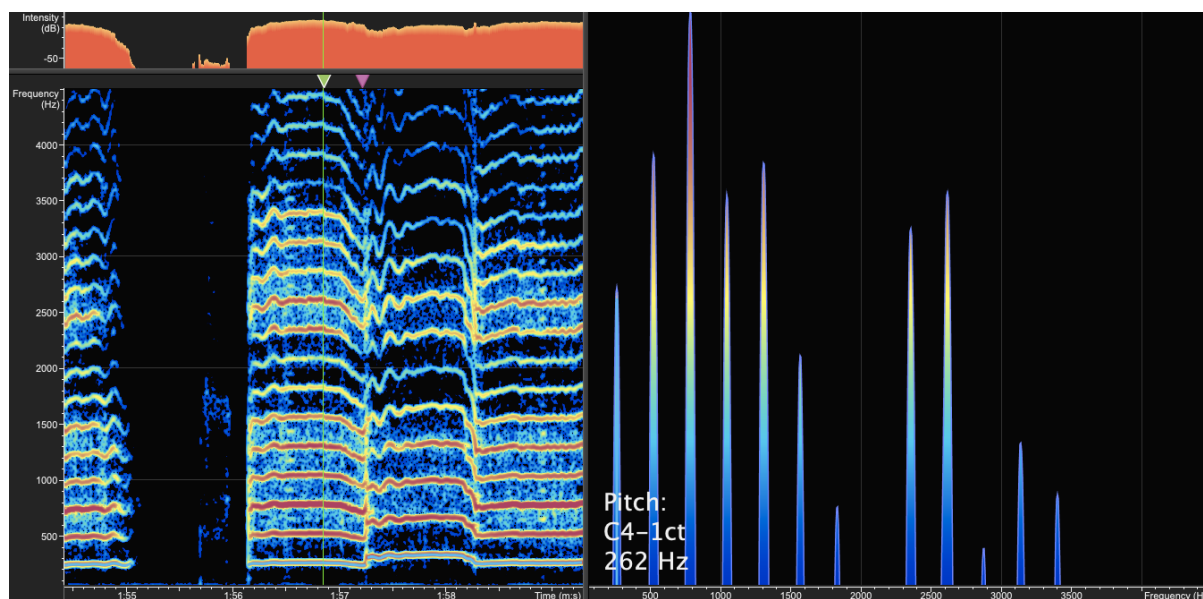


Figure 16: P2 'Before' glide starting on C4. $F_0 = 262\text{Hz}$ on initial sustain

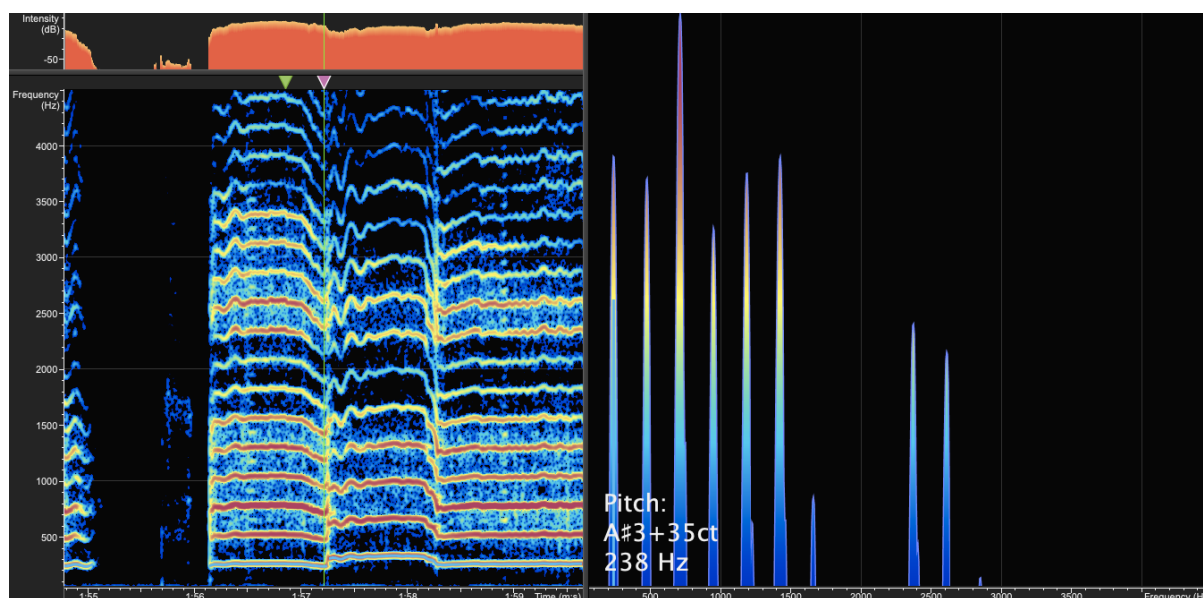


Figure 17: P2 'Before' glide starting on C4. F_0 has moved down to 238 Hz before the ascent

P2's minor third pitch glide (beginning on C4) has been used as an illustrative example.

On the spectrogram of the 'before' glide (figure 14), an abrupt register break can be seen. Instead of an ascent from the initial sustained C4 (horizontal lines, on the left) note up to the E4, there is first a brief pitch **descent** (lines slope downward), followed by pitch instability (wavy lines left of centre) on the ascent to the target pitch of E4.

In contrast, the spectrogram of the 'after' glide (figure 15) shows a C4 sustain (horizontal lines) which more smoothly ascends (smoother slope upwards) to the target pitch of E4. There is a small amount of pitch instability (wavy lines left of the centre) but not as extreme as in figure 8.

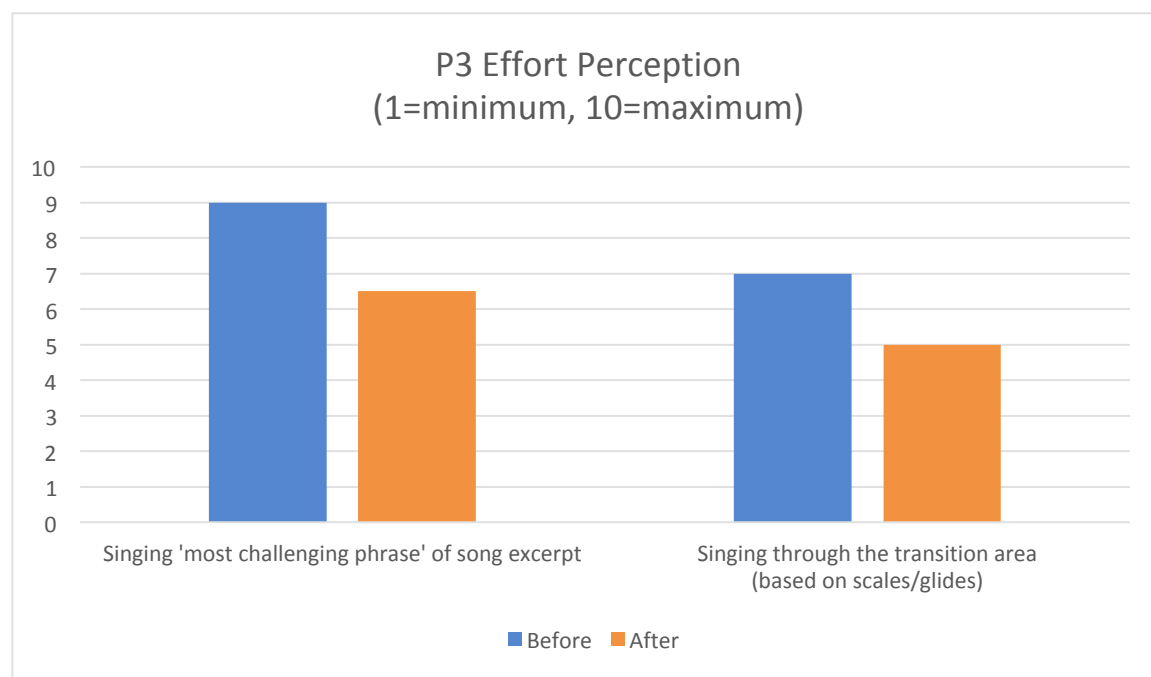
Figure 16 shows that the initial sustain on the 'before' recording is 262Hz (C4-1ct), whereas figure 17 show that the pitch has actually descended by to 238Hz (A#3+35ct), before it begins to ascend.

In other words, an abrupt register break occurs, in which pitch instability causes F_0 to decrease by 24Hz (1.65 semitones, from C4-1ct to A#3+35ct) before the singer is able to glide upwards as instructed.

SINGER P3 - BEFORE AND AFTER FINDINGS

P3 – How did it feel?

Findings are based on P3's questionnaire and interview responses.



Song excerpt *after* the training programme

- Effort perception reduced
- Much greater sense of assurance (“everything just kinda...made sense”)
- Felt more accurate
- No longer felt a need to change the melody in order to negotiate the phrase
- Felt easier to hit the notes, no longer notes he “just can’t get”
- Improved feeling of resonance

Transition area *after* the training programme (based on scales/glides):

- Effort perception reduced
- Again, much more ‘assured’, no longer feels uncertain.
- Less extrinsic effort, in contrast to the ‘reaching’ and strain felt beforehand.

P3 – Aural perception of singer – song excerpt recordings

In his 'after' recording, P3 reported hearing:

- Substantial improvement in coordination on the two melismatic passages

P3 – Aural perception of singer – scales / glides recordings

In his 'before' recording, P3 reported hearing:

- poor intonation: "struggling to hit the note properly"
- "quite an obvious flip"
- "as I... went into head voice... things got a little bit weak"

In his 'after' recording, P3 reported hearing:

- substantial improvement in smoothness: "transition pretty seamless, for the most part"
- improved control

P3 – Aural perception of CCM teachers – song excerpt recordings

All three teachers agreed that the singer's transition area was more skilfully tackled in the **after** recording.

Selected teacher comments:

	Before	After
T1	"difference wasn't as obvious between these recordings" "comparison was made a little more difficult by a slightly different phrasing in each recording"	"Transition area more skilfully tackled in this recording" "marginally more successful" "slightly lighter in attack in the bridge area, which made the overall performance more consistent" "The run on 'warm' was": "...well navigated over the bridge area" "...consistent in pitch and tone" "...cleaner than a similar run in [the before recording]"
T2	"I felt that both recordings were good"	"Transition area more skilfully tackled in this recording" "more skilful use of mix" "sweeter tone and vibrato"
T3		"Transition area more skilfully tackled in this recording" "Flexibility seems improved in riff... which suggests healthier and more balanced production"

P3 – Aural perception of CCM teachers – scales / glides recordings

All three teachers agreed that the singer demonstrated smoother register transitions in the **after** recording.

Selected teacher comments:

	Before	After
T1	“some slight pitchiness in both recordings” “As the singer approaches the bridge, the pitch begins to plateau until he switches to ‘head voice’” “as he [switches to head voice], there is an obvious change in tone and projection”	“Smoother register transitions in this recording” “transition is much smoother” “tone and pitch much more consistent as he navigates over the bridge area”
T2	“Greater pitch instability during transition”	“Smoother register transitions in this recording”
T3		“Smoother register transitions in this recording” “Less intonation issues, although a challenging vowel modification”

P3 – Scales / Glides Recordings (Spectrographic analysis)

Three illustrative examples of P3's 13431 scale pattern have been considered. Please see figures 18-24.

	Target pitch	Actual pitch BEFORE	Deviation from target pitch	Actual pitch AFTER	Deviation from target pitch
Example 1	G#4	G#4 – 37ct	– 37ct	G#4 + 14ct	+ 14ct
Example 2	A4	G#4 – 9ct	– 109ct	A4 – 9ct	– 9ct
Example 3	A#4	A#4 – 48ct	– 48ct	A#4 + 3ct	+ 3ct

Figure 18: P3 spectrogram before / after scale pitch comparison table

In contrast to the 'after' recordings (which had a deviation of between 3ct and 14ct from the target), the 'before' version of every scale example was between 37ct and 109ct flat. Example 2 was the most obvious, with an actual sung pitch more than a semitone flatter than the target pitch in the before recording.

In the 'before' recording, the note sung in example 2 was a very similar pitch to the note sung in example 1; the pitching had plateaued.

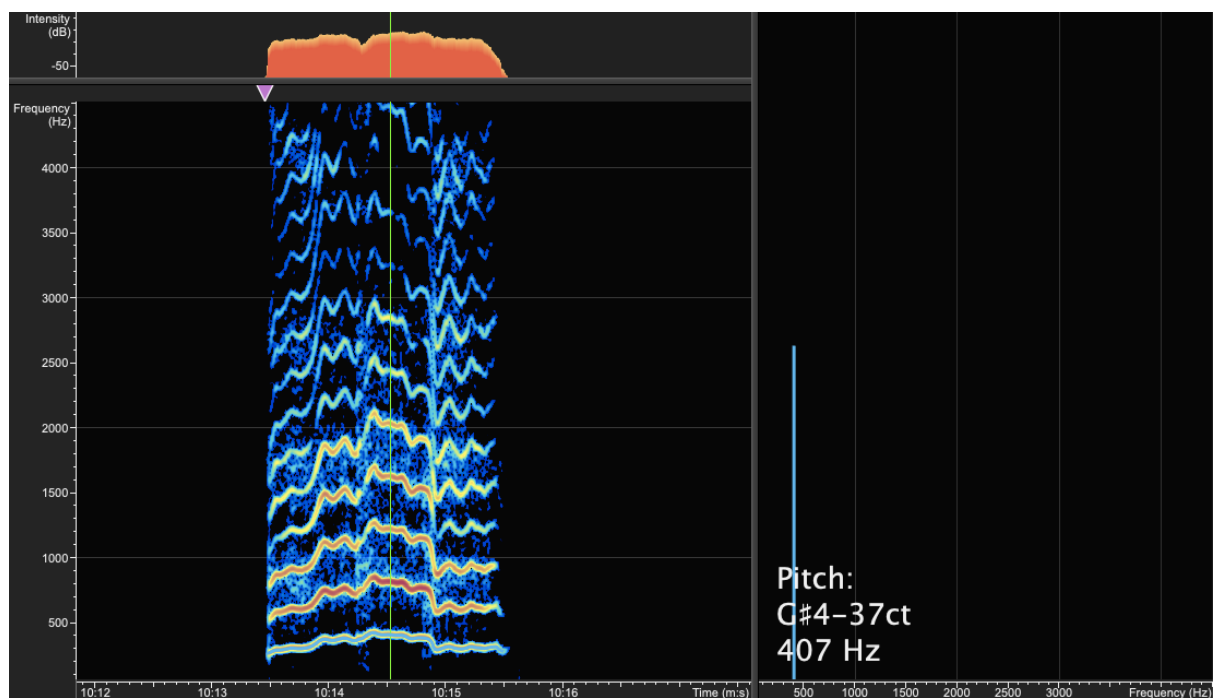


FIGURE 19. P3 Before scale example 1 – target pitch G#4

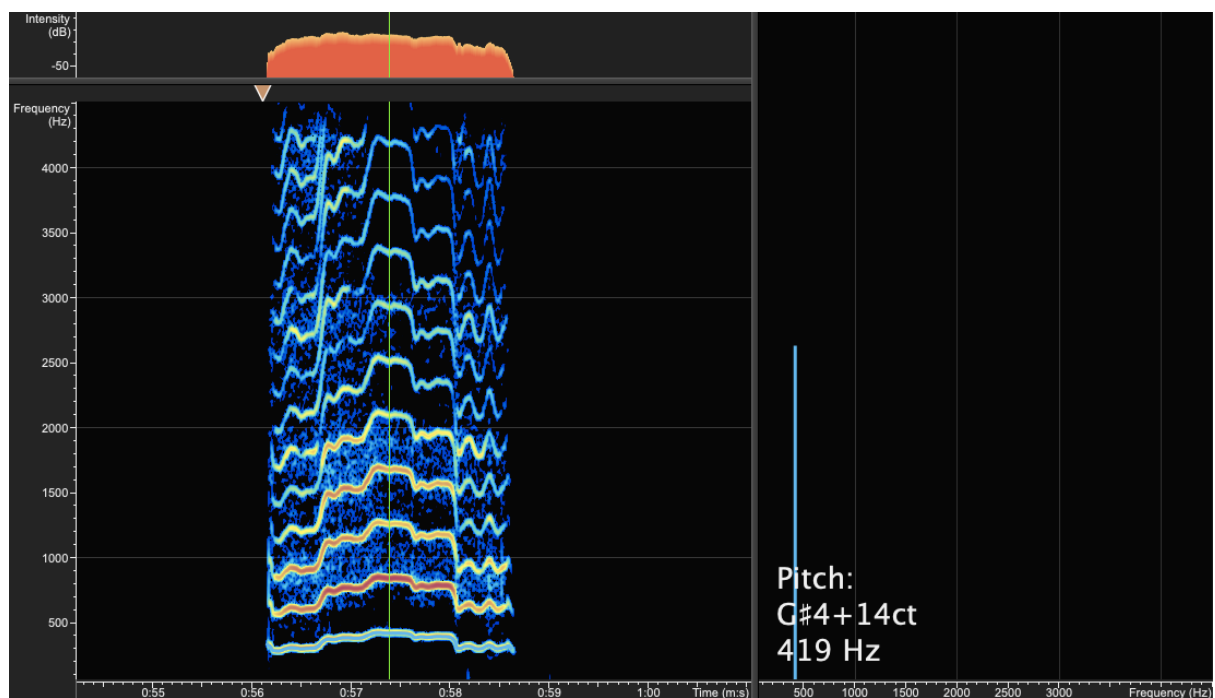


FIGURE 20. P3 After scale example 1 – target pitch G#4

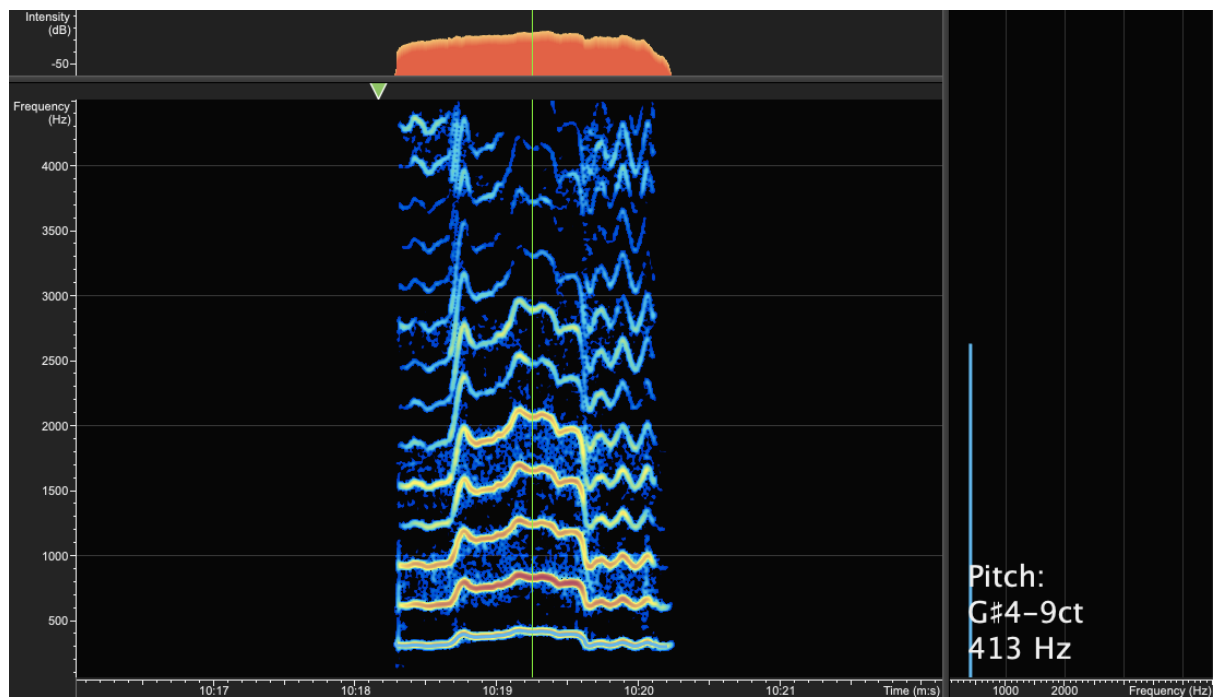


FIGURE 21. P3 Before scale example 2 – target pitch A4

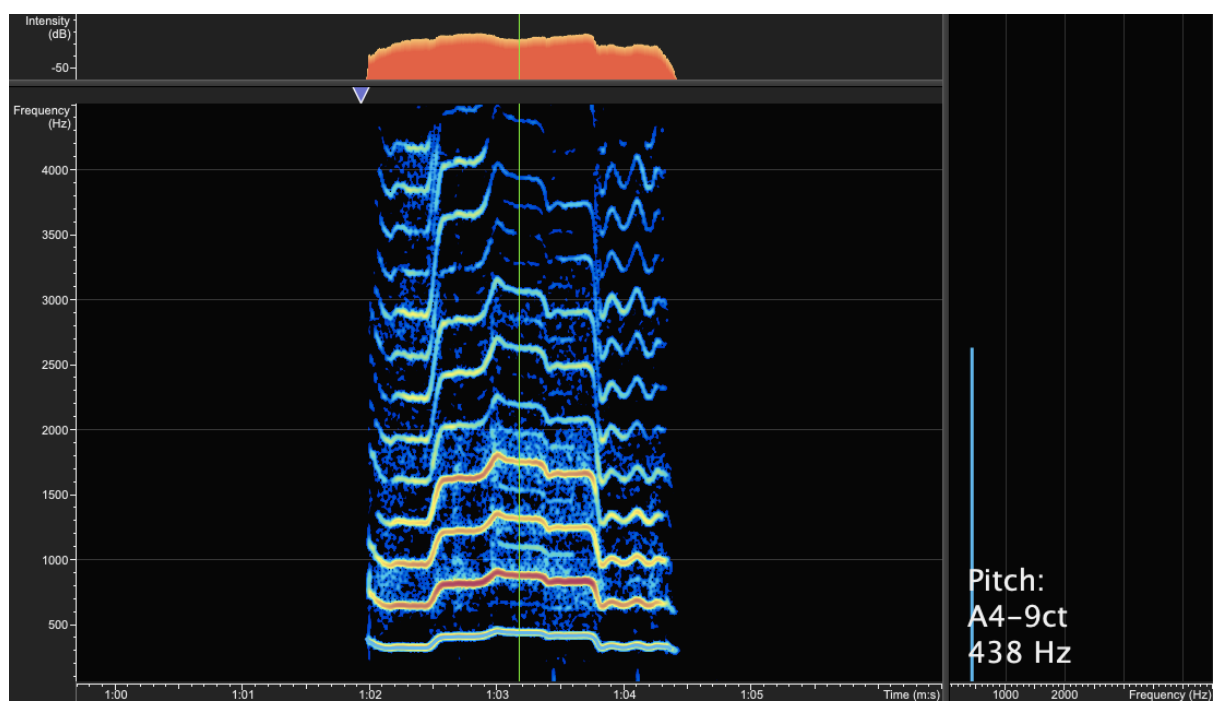


FIGURE 22. P3 After scale example 2 – target pitch A4

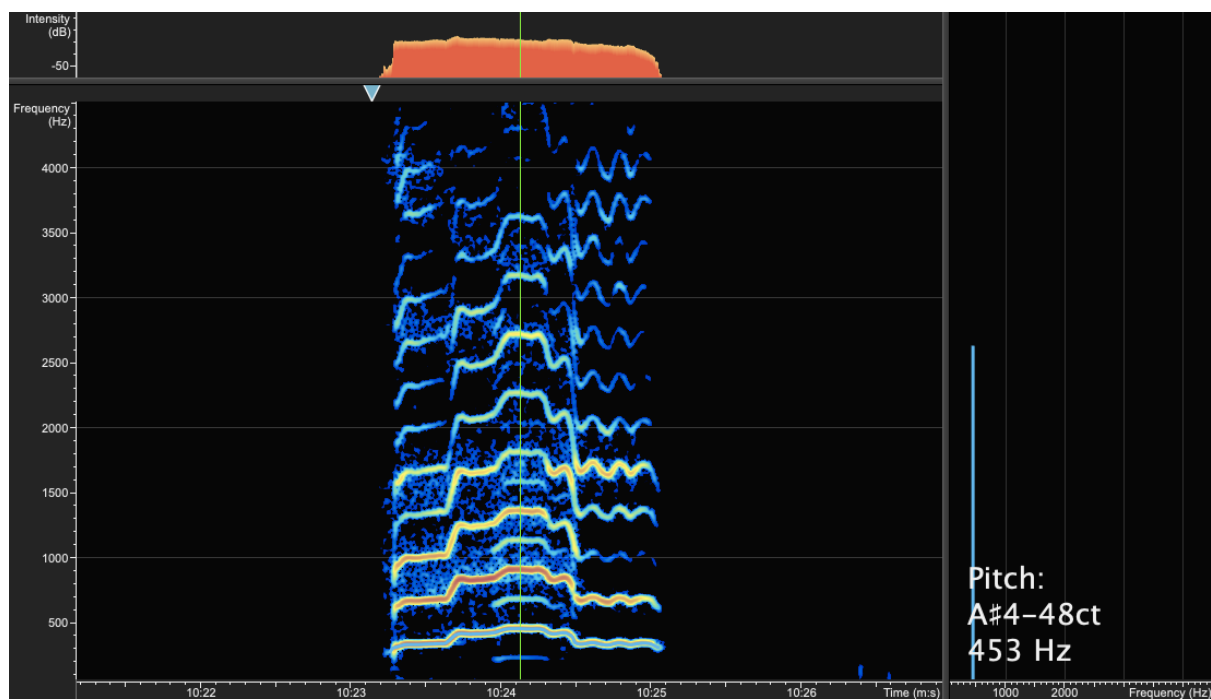


FIGURE 23. P3 Before scale example 3 – target pitch A#4

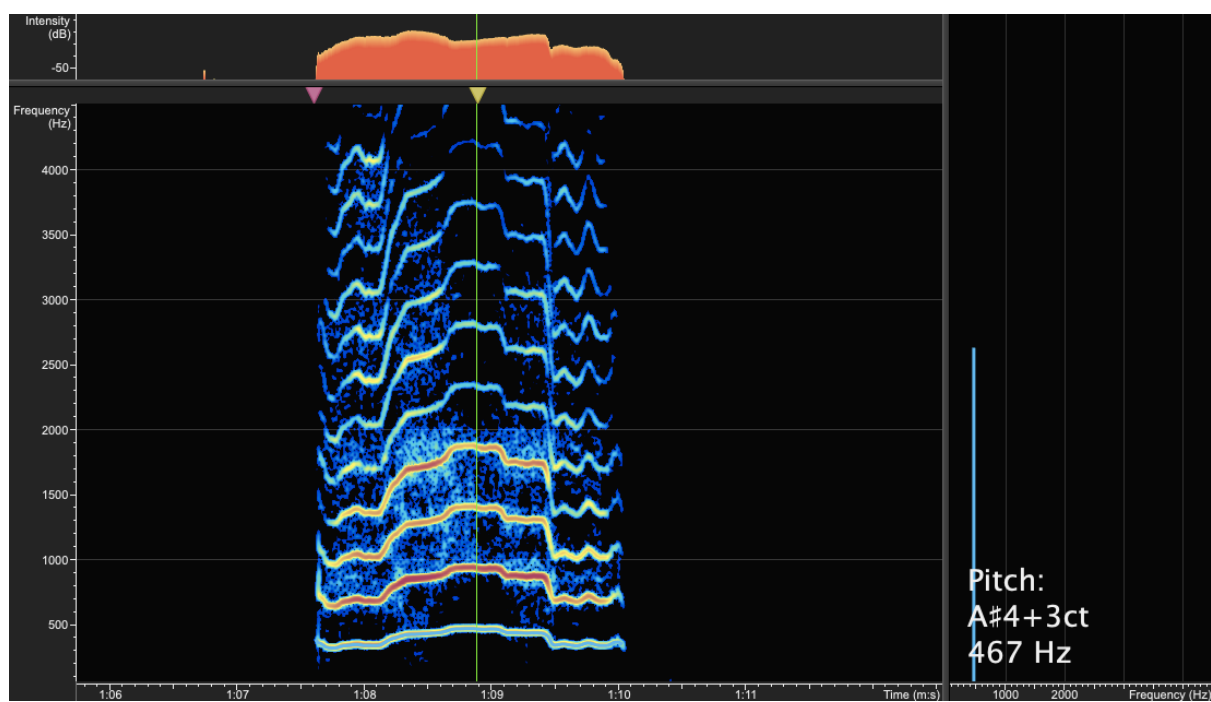


FIGURE 24. P3 After scale example 3 – target pitch A#4

SINGERS REFLECT ON THE TRAINING PROCESS - FINDINGS

All three singers feel that since session one, they have made **definite improvement towards using 'mix'**:

P1: "Very much progress. Yes"

P2: "Yeah, definitely"

P3: "Yeah, definitely"

All three singers feel positive about the progress they have made:

P1: "I'm really pleased"

P2: "It's exciting! I felt really good."

P3: "[it's] really like, quite rewarding to see."

The singers **noticed progress between sessions three and five**, identifying a **'breakthrough' moment** when they felt they achieved 'mix'.

Specific 'breakthrough' moments

For P1, this was a "sudden change in coordination" which allowed him to consistently transition "without a break".

P2 reports astonishment ("it was kind of a shock to me") and excitement when the new 'mix' coordination "started to click". The sensation was so different, that he felt "it was almost like someone else was singing". He describes the resulting sound as "head voice, but with a real chesty vibe. Chesty kind of timbre".

P3 reports that he was working on minor pentatonic scale exercises, when he found that he knew where to transition to "head voice", and was "comfortable with going to it"; he noticed that "this is what it should sound like". He also had a moment of realisation that whilst he used to "rely on natural ability", the process of voice training can produce noticeable results: "it helps tenfold".

Most helpful elements of the training

Straw phonation is identified by all three singers as a particularly helpful element of the 'mix' training programme.

P1 reports that whilst it doesn't seem useful whilst doing the exercise, he believes that this is what facilitated progress.

P2 comments how convenient it is to do alongside another activity: "something I can do just watching TV or y'know, haha"

P3 found the **minor pentatonic scale** exercises helpful and "really, really relevant", due to their direct practical application to his own band performances; this is in contrast to other scales, which he may perceive as "just warm up exercises or just practices".

P2 reports that **exploring the acoustic properties of different vowels** was a helpful and interesting part of the 'mix' training.

ANALYSIS OF FINDINGS

POTENTIAL IMPACT - ANALYSIS

These findings suggest that the potential impact of 'mix' training may be more wide-ranging and profound than the researcher initially expected.

For example, P3's comment that "I'd feel like singing was an achievement rather than just natural predisposition" reveals that developing the ability to use 'mix' may cause him to re-evaluate a fundamental belief. As human experience can be seen as a continual interplay between our beliefs and our actions (Dewey, 1910, 1920, 1925, cited in Morgan, 2014, p.1046), it follows that a change in belief is likely to lead to a change in behaviour. In P3's case, the belief that singing is a skill that can be successfully developed through training (as opposed to a 'natural talent') might provide motivation to develop his voice further through vocal training, and perhaps attempt skills that are currently out of his comfort zone.

These insights, into the various benefits that male CCM singers believe 'mix' training would afford them, may assist voice teachers in (a) motivating singers to undertake 'mix' training in the first place, and (b) motivating singers to fully engage during the training process.

P1 BEFORE AND AFTER - ANALYSIS

At the beginning of the study, P1 reported sensations of '**pushing**', '**straining**' along with a focus on breath 'support'. This suggests a high level of **transglottal pressure**.

In the 'before' vocal exercises recording, P1 reports hearing an **abrupt register break**, "**no mix**" and **poor coordination**. These comments are supported by T1's reports of a "notable change in timbre (flip)", above which the "tone becomes thinner and breathier", and that "pitch is unstable throughout as voice breaks/yodels around bridge". This **pitch instability** is supported by the spectrographic analysis on the before glide recording.

As high transglottal pressure may exacerbate the bi-stable tendency of the vocal folds (Titze, 2014), It may be hypothesised that **the flip could be caused by the vocal folds switching between M1 and M2 patterns of vocal fold vibration**. 'Mix', on the other hand, is associated with a low transglottal pressure (Sundberg, Gramming and Lovetri, 1993; Titze, 2014); it may allow for more gradual adjustments of top and bottom adduction of the vocal folds, thereby avoiding an abrupt register break.

After the training programme, P1 reports that he no longer feels he is ‘pushing’, and that rather than focusing on breath support, his focus is on maintaining the feeling of vocal fold engagement. **This suggests that he is using less breath pressure, thus reducing transglottal pressure; this, along with his focus on glottal adduction may allow him to achieve a coordination more conducive to ‘mix’.**

Allowing H2 to rise above F1 is essential for successful negotiation of the *secondo passaggio* (Miller, 2008, p.61). At the beginning of the training programme, P1 reported that his **larynx would rise** as he ‘reached’ for notes over his transition, combined with a feeling of **constriction or ‘strain’**; this suggests that he may have adopted a **‘yell’** configuration, raising F1 in order to maintain an F1/H2 coupling when ascending in pitch. This may have exacerbated the aforementioned intonation issues and disparity of tone between registers.

After taking part in the study, P1 reports that his larynx stays low, he no longer ‘reaches’ for notes and there is “zero strain”. He also reports substantially reduced effort perception levels through the transition, which **implies that extrinsic muscle tension is now reduced; he may now be allowing H2 to pass through F1 without resorting to larynx-raising.**

P1 reveals that during the session 6 recordings, he was experiencing **anxiety**, resulting in some tension that may have impacted on his performance slightly. **This may explain why all three teachers feel P1’s ‘before’ song recording was the one most skilfully tackled.**

In the scales / glides recordings, however, **all three teachers identify the ‘after’ recording as smoother**, this verdict is supported further by the spectrographic analysis. P1’s perception that this recording showed a “marked difference” in smoothness” is supported by T1 (“much smoother transition”) and T2 (“marked improvement in smoothness”).

P2 BEFORE AND AFTER - ANALYSIS

At the end of the study, P2 reports **less “pushing” and less tension**. Teacher T1 observes that there is a **“yelly quality”** in the ‘before’ recording that was not present in the ‘after’ recording; T3 observed that **“flips and high larynx”** are “less prominent” in the after recording.

These comments suggest that before the study, P2 may have been raising his larynx into a **‘yell’** posture, in order to maintain F1/H2 coupling (Miller, 2008, p. 54). This would have created increased breath pressure (Miller, 2008, p. 54) and extrinsic tension, and

contributed to the disparity of tone between upper and lower registers. The comments imply that these issues have been rectified somewhat; this would suggest that P2 is now allowing H2 to rise above F1, a crucial prerequisite of successful transition through the *secondo passaggio* (Miller, 2008, p.61).

P2 also highlights a perceived difference in tone quality between the recordings. In his song excerpt, he notes that the high parts were less “**hooty**”. This suggests that above the *passaggio*, the singer was **tuning F1 to H1(F₀)** (Miller, 2008, p. 52). T2 observes that the “tone quality” was “more consistent” on the ‘after’ song excerpt, and “much more consistent” in the ‘after’ exercises, compared to the ‘before’ recordings; the previously discussed decrease in “yelly quality” (T1), combined with a reduction in ‘hootiness’ may have contributed to this.

Overall, this suggests that, rather than switching from F1/H2 to F1/H1, P2 could now be using a different resonance strategy, which may be more synonymous with ‘mix’.

Singer P2 and all three teachers agree that **register ‘flips’** are present in both recordings, but that these are more “much more pronounced and disruptive” (T1) in the ‘before’ recording. It may be hypothesised that P2 was **flipping abruptly between M1 and M2 patterns of vocal fold vibration**; the “pushing” he described would have increased transglottal pressure and exacerbated this flip (Titze, 2014).

The effort perception levels reported by P2 are very similar to before the study (slightly reduced on the song, slightly increased on the scales); however, he emphasises that this is “a different kind of effort”. As he reports less “pushing” and tension after the study, this new type of effort may be associated with the gradual muscle adjustments required for balancing ‘top’ and ‘bottom’ vocal fold adduction (Herbst & Švec, 2014; Titze, 2014). The reduction in “pushing” would lower transglottal pressure, thereby helping to facilitate this new coordination, which may be more synonymous with ‘mix’.

The teachers’ unanimously agreed that in the song excerpt, the transition area was more skilfully tackled in the ‘after’ recording.

On the vocal exercises, **whilst T3 felt that neither was smoother, T1 and T2 felt that the register transitions were smoother in the ‘after’ recording. The spectrographic analysis appears to support this**; on the ‘before’ glide example, pitch instability causes the F₀ to move down substantially, before the singer is able to glide up. In the ‘after’ example, there is a much smoother ascending glide.

P3 BEFORE AND AFTER - ANALYSIS

Before taking part in the study, P3 reported that singing through his transition area felt “**slightly strained**”, and that he was sometimes unable to “**reach**” certain notes, despite being able to “hit higher notes”. In the ‘before’ exercises recording, P3 reports hearing that he was “**struggling to hit the note properly**”, there was “**quite an obvious flip**”, and as he “went into head voice... things got a little bit **weak**”

All three teachers report hearing intonation issues in the ‘before’ exercises. T1 comments: “as the singer approaches the bridge, the **pitch begins to plateau** until he switches to ‘head voice’”.

This ‘plateau’ in pitch is supported by the spectrographic analysis, which demonstrates that P3’s ‘before’ scale example flattened substantially in pitch, reaching a plateau before a slight improvement; the ‘after’ example is much more accurate and does not plateau.

These findings suggest that P3 was **raising his larynx into a ‘yell’ posture**, in an attempt to “reach” notes. This would raise F1 and maintain F1/H2 coupling, until the point when F1 can move no higher and H2 inevitably moves out of range (Bozeman, 2013; Miller, 2008), resulting in a shift to a weaker tone.

All three teachers agreed with P3 that intonation was more accurate on the ‘after’ exercises. Additionally, P3 reports reduced ‘afterwards’ effort perception levels, in addition to a greater sense of assurance on the vocal exercises: “there was less guesswork and less kind of like physical prompting, and it was more just like... I knew.... how to do it” (P3).

These findings suggest that P3 may now be allowing H2 to move above F1 without raising his larynx; this type of coordination would be more in keeping with ‘mix’ configuration.

The voice teachers unanimously agree that P3 demonstrates smoother register transitions in the ‘after’ exercises recording, supporting P3’s perception that “transitions were pretty seamless, for the most part”.

All three teachers also agree that P3’s transition area is more skilfully tackled in the ‘after’ song recording, supporting P3’s aural perception that there is a substantial improvement in the two melismatic passages. T2 observes a “**more skilful use of ‘mix’** in this recording.

SINGERS REFLECT ON THE TRAINING PROCESS - ANALYSIS

Insights into the singers’ own experiences of the training programme provide yet another convergent ‘sight-line’, helping to further establish the effectiveness of the training

programme. These insights also provide valuable feedback on the specific aspects of the training, which may be utilised in order to make further improvements to the programme.

The fact that all three singers believe they have made definite progress, and that they all feel positive about this progress, suggests that the training programme has been helpful overall.

The singers noticed progress between sessions three and five; the six-session programme duration, chosen within the research design, was therefore an effective timescale to be able to observe initial progress. As the singer-participants all sing professionally, this may have allowed quicker progress than would have occurred for a sample of amateur singers.

All three participants noticed sudden, rather than gradual, initial progress. Whether these breakthroughs were caused by laryngeal factors (balancing top and bottom vocal fold adduction) or acoustic factors (for example by allowing H2 to rise above F1, and perhaps tuning F2 to one of the higher harmonics), or an alignment of the two, is impossible to conclude based on this data.

P3's moment of realisation suggests that he has had a shift from "*fixed mindset* (my nature is due to heredity and the talent account)" to "*growth mindset* (through nurture in my environment and my own effort, I can grow and change)" (Dweck, 2006, summarised within Holding, 2020 p.190). This links with P3's comments before the training programme, that successful 'mix' training would make him "feel like singing was an achievement rather than just natural predisposition" (P3). As human experience could be described as a continual interchange between beliefs and actions (Dewey, 1910, 1920, 1925, cited in Morgan, 2014, p.1046), P3's paradigm shift is likely to result in a change of behaviour, for example he may practise more regularly in future.

Straw phonation was recognised by all three singers as one of the most helpful elements of the 'mix' training. This is perhaps unsurprising, given the multitude of benefits it provides, including lowering vertical larynx position (Hijleh & Pinto, 2021), which may have assisted each singer to avoid the 'yell' posture and instead allow H2 to rise above F1.

P3's comments about the direct relevance of the minor pentatonic scale, and how he fundamentally views this differently to other scales ("just warm up exercises or just practices") reinforces the importance of incorporating CCM-specific scales into voice training (Chandler, 2014).

CONCLUSIONS & RECOMMENDATIONS

The literature review elucidated the laryngeal and acoustic factors impacting registration, and their implications for 'mix', enabling the design of set of research-based teaching strategies to facilitate male CCM 'mix'; these were trialled with three singers.

Fresh insights were gained into how adult male singers experience the *passaggio*, from a number of perspectives. The singers' insights suggest that successful 'mix' training is likely to impact positively on emotions, thoughts and behaviours. This knowledge may assist voice teachers in motivating both current and prospective CCM voice students.

Overall, the findings suggest that all three singer-participants made noticeable progress towards achieving 'mix' (The only exception to this was P1s song recording; the singer's comments suggest that the effects of anxiety may have compromised his 'after' performance). Whilst the results of such a small-scale study cannot be generalised beyond this particular sample of singers, they do suggest that this set of strategies have been helpful for these singers.

The most common recurring theme related to acoustic registration; all three singers appeared to be adopting a 'yell' posture before the training programme, which appear to no longer be an issue afterwards, suggesting that a more stable larynx positioning has been adopted. All three singers found straw phonation to be a particularly helpful aspect of training; this may have assisted them in maintaining a lower VLP in order to avoid 'yelling'.

The singers' kinaesthetic sensations and aural perceptions were both considered when evaluating progress. Potential insider-research issues were mitigated by the incorporation of numerous 'sightlines', allowing triangulation of the data; it could be argued that this was a strength of the study. Each singer's perceptual data elements were combined with the aural perceptions of three expert listeners (independent CCM teachers); as each pair of 'before' / 'after' recordings were randomised, this further maximised objectivity. Finally, an element of each participant's voice exercise recordings was spectrographically analysed, in order to quantify this perceptual data.

There were however, limitations. For example, as Covid restrictions necessitated online research, use of a flat-response measurement microphone in a more controlled studio environment was not possible; each participant used their own microphone and was responsible for setting this up, meaning that the researcher was less able to maintain control

over factors such as input gain control and microphone distance. It is unlikely that this had a significant impact upon the study, as all three participants were professional or semi-professional singers with experience in microphone use. However, in future research, further consideration should be given to these technical elements; particularly if using more subtle aspects of spectrographic analysis (such as measuring dominant harmonics or formant frequencies), or if working with non-professional singers.

In future research, in order to reduce any potential anxiety associated with the creation of 'after' recordings, recording the exercises at the end of every session could be considered; this may give a more accurate picture of progress.

As all three participants experienced a sudden 'breakthrough' moment during training, analysis of recording excerpts of these breakthrough moments could be conducted, in order to gain insights into what exactly has changed.

This study has allowed consolidation of the researcher's knowledge and a deepened professional specialism; this has already had a positive impact on their own teaching practice. The researcher aims to share these findings by presentation and publication, and to use them as a springboard to develop research-based, yet relevant, CCM teacher-training strategies.

The literature review revealed significant gaps in research into CCM styles in general, and particularly into male CCM mix. Conducting further research into this area would be of benefit to the voice pedagogy community, and therefore the researcher aims to expand this study into a larger-scale research project.

A longer time-scale would allow a broader variety of CCM-specific scales to be incorporated, such as the blues scale and modes of the major scale (Chandler, 2014), further reinforcing relevance to CCM singers. It would also allow deeper exploration into CCM singers' formant harmonic interactions; for example, second formant strategies could be investigated via spectrographic analysis.

Finally, further research will be conducted into mindset, so that this element may be woven into the set of 'mix' training programme to be trialled in the larger-scale study. This more holistic approach may optimise the pedagogical approach to 'mix', embodying a central tenet of philosophical pragmatism; that human experience consists a continual interplay between our beliefs and our actions (Dewey, 1910, 1920, 1925, cited in Morgan, 2014, p.1046).

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APPENDICES

APPENDIX 1 - ETHICS FORM



APPLICATION FOR ETHICAL APPROVAL

In order for research to result in benefit and minimise risk of harm, it must be conducted ethically. A researcher may not be covered by the University's insurance if ethical approval has not been obtained prior to commencement.

The University follows the OECD Frascati manual definition of **research activity**: "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications". As such this covers activities undertaken by members of staff, postgraduate research students, and both taught postgraduate and undergraduate students working on dissertations/projects.

The individual undertaking the research activity is known as the "principal researcher".

Ethical approval is not required for routine audits, performance reviews, quality assurance studies, testing within normal educational requirements, and literary or artistic criticism.

Please read the notes for guidance before completing ALL sections of the form.

This form must be completed and approved prior to undertaking any research activity. Please see Checklist for details of process for different categories of application.

SECTION A: About You (Principal Researcher)

Full Name:	Emily Jackson				
Tick all boxes which apply:					
Member of staff:	☐	Student:	☒	Honorary research fellow:	☐
Faculty/School/Centre:	WIWBL				
Campus:	Camarthen				
E-mail address:	emily.rj.jackson@gmail.com				
Contact Telephone Number:	07891 374679				
For students:					
Student Number:	1807587			Undergraduate	☐

Programme of Study:	MA in Professional Voice Practice (Voice Pedagogy)	Taught Postgraduate	☒
Director of Studies/Supervisor:	Debbie Winter	Research	☐

SECTION B: Approval for Research Activity

Has the research activity received approval in principle? (please check the Guidance Notes as to the appropriate approval process for different levels of research by different categories of individual)		YES	☒	NO	☐
					Date
If Yes, please indicate source of approval (and date where known):	Research Degrees Committee		☐		
	Faculty Research Committee		☐		
	Other (write in) WIWBL Ethics Board Representative		☒		

Approval in principle **must** be obtained from the relevant source prior to seeking ethical approval.

SECTION C: External Ethical Guidance Materials

Please list the core ethical guidance documents that have been referred to during the completion of this form (including any discipline-specific codes of research ethics, and also any specific ethical guidance relating to the proposed methodology). Please tick to confirm that your research proposal adheres to these codes and guidelines.	
ESRC Ethical guidelines for research	☒
WIWBL Ethical guidelines	☒
	☐

SECTION D: External Collaborative Research Activity

Does the research activity involve collaborators outside of the University?	YES	☐	NO	☒
If Yes, please provide the name of the external organisation and name and contact details for the main contact person:				
Institution				
Contact person name				
Contact person e-mail address				

Where research activity is carried out in collaboration with an external organisation

Does this organisation have its own ethics approval system?	YES	☐	NO	☐
If Yes, please attach a copy of any final approval (or interim approval) from the organisation				

SECTION E: Details of Research Activity

Indicative title:	An Investigation into the Efficacy of 'Mix' Registration Strategies for Adult Male Contemporary Singers		
Proposed start date:	23/08/2020	Proposed end date:	2020

Purpose of research activity (including aims and objectives)
Outline the purpose, aims and objectives of the research activity, including key research questions. Show briefly how existing research has informed the proposed activity and explain what the research activity will add and how it addresses an area of importance. (Maximum 300 words)

Background
As a freelance vocal coach specialising in contemporary commercial music (CCM) genres of singing (such as rock, pop and soul), I have noticed that one of the most common challenges faced by adult male singers is negotiating the register transition between the lower register ('chest' voice) and upper register ('head' voice). Issues experienced by these singers when attempting to negotiate the register transition include:

- high effort levels to 'reach' a high note;
- strained or 'shouty' tone;
- irregularities in pitch when gliding through the transition, manifesting either as an audible 'flip' or as a gap in the range, through which phonation is not possible;
- significant disparity of tone between lower and upper registers;
- significant loss of projection over the transition area.

These singers would like to be able to sing smoothly through their entire vocal range, with no abrupt changes in tone or projection, in a way that is stylistically appropriate for the CCM styles they sing; this approach to register transition is often referred to as 'mix' or 'mixed registration'. In order to successfully and reliably facilitate this, effective and appropriate voice training strategies must be identified.

I recently conducted an Independent Study entitled "A Study into 'Mix' Registration Strategies for Male Contemporary Commercial Music Singers", in which I reviewed the existing literature on the topic and evaluated the existing body of recent research on laryngeal and acoustic registration.

I aim to build on this research by conducting primary research into the efficacy of voice training strategies, applicable to adult male contemporary singers, designed to assist the development of 'mix'.

Aims
The aims of the research are to:

- Draw together and summarise the existing body of recent research, establishing how laryngeal function and vocal tract acoustics may contribute to the ability to sing seamlessly through the register transition;
- Listen to adult male singers describe their experience of how attempting to sing

through their transition feels (in terms of kinaesthetic sensations, and in terms of their thoughts and feelings), and how they think their voice sounds through this part of their range;

- Identify voice training strategies, with a rationale supported by the existing body of research, to facilitate a mixed registration stylistically appropriate to CCM styles, suitable for adult male voices;
- Gain insights into the efficacy of these strategies from a number of perspectives, including the singers' own perspectives and the perspectives of other CCM voice teachers;
- Draw conclusions and identify areas for further research.

Previous Research

Most of the scientific and academic literature on 'mix' relates to:

- (a) classical singing, or less frequently, MT singing – very rarely to 'popular' CCM styles such as rock, pop or soul;
- (b) female singers – as despite the male use of 'mix' dating back almost 200 years, and despite it being a common feature within CCM, it is rarely used within classical or MT styles.

There is therefore a large gap in the literature for studies on male CCM mix. Bozeman (2017) notes that "the acoustic characteristics of higher belt and 'mix' strategies need further study by scientists collaborating with specialists in those styles" (p. 73). In a literature review on registers, Henrich (2006) suggests that the body of research on this topic would benefit from further studies into CCM styles such as jazz, blues and rock.

There has been recent quantitative research conducted into laryngeal registration and modes of vocal fold vibration (e.g. Roubeau, Henrich and Castellengo, 2009; Kochis-Jennings *et al.*, 2014; Titze, 2014; Echternach *et al.*, 2017). There has also been research into vocal tract acoustics; particularly in relation to classical singers (e.g. Howell, 2016; Ritzerfeld and Miller, 2017).

However, there appears to be a lack of research into the efficacy of 'mix' voice training strategies applicable to adult male CCM singers.

References

- Bozeman, K. (2017) *Kinesthetic Voice Pedagogy: Motivating Acoustic Efficiency*. Gahanna, OH: Inside View Press.
- Echternach, M., Burk, F., Köberlein, M., Herbst, C. T., *et al.* (2017) 'Oscillatory Characteristics of the Vocal Folds Across the Tenor Passaggio', *Journal of Voice*. Elsevier Inc., 31(3), pp. 381.e5-381.e14. doi: 10.1016/j.jvoice.2016.06.015.
- Henrich, N. (2006) 'Mirroring the voice from Garcia to the present day: some insights into singing voice registers.', *LPV (Logopedics Phoniatrics Vocology)*, 31(1), pp. 3–14. doi: 10.1080/14015430500344844.
- Howell, I. (2016) 'Toward a General Theory of Vocal Tone Color', (October).
- Kochis-Jennings, K. A. *et al.* (2014) 'Cricothyroid muscle and thyroarytenoid muscle dominance in vocal register control: Preliminary results', *Journal of Voice*. Elsevier, 28(5), pp. 652.e21-652.e29. doi: 10.1016/j.jvoice.2014.01.017.

Ritzerfeld, W. G. J. and Miller, D. G. (2017) 'Formant Tuning and Feedback in the Male Passaggio', *Journal of Voice*. Elsevier Inc., 31(4), pp. 506.e7-506.e17. doi: 10.1016/j.jvoice.2016.10.006.

Roubeau, B., Henrich, N. and Castellengo, M. (2009) 'Laryngeal Vibratory Mechanisms: The Notion of Vocal Register Revisited', *Journal of Voice*, 23(4), pp. 425–438. doi: 10.1016/j.jvoice.2007.10.014.

Titze, I. R. (2014) 'Bi-stable vocal fold adduction: A mechanism of modal-falsetto register shifts and mixed registration', *The Journal of the Acoustical Society of America*, 135(4), pp. 2091–2101. doi: 10.1121/1.4868355.

Proposed methods

Provide a brief summary of all the methods that **may** be used in the research activity, making it clear what specific techniques may be used. If methods other than those listed in this section are deemed appropriate later, additional ethical approval for those methods will be needed. (Maximum 600 words)

Methodological Position

As a freelance vocal coach based in my own teaching studio, I am satisfied that the problem-centred philosophy of the pragmatic paradigm will provide a strong yet dynamic framework for this research. This tessellates well with my subjectivist epistemological standpoint, built on an ontology of a changing, emergent world. Pragmatism's abductive approach will allow me to cycle between phases of reflection and action, which I feel is representative of the nature of my work as a vocal coach. I will employ a mixed methods research methodology, with a strong focus on qualitative methods, but also incorporating quantitative aspects such as Likert scale questions within questionnaires.

I plan to conduct a set of 3 individual exploratory case studies. I feel that this type of research design would be well-suited to a small-scale project such as this, and if successful, it could function as a pilot study which I could build on in the future in order to develop a larger-scale research project.

Participants

I aim to select a purposive sample of three adult male CCM singers; I plan to select individuals who would like to improve their ability to transition smoothly and easily through their register transition, using a tone appropriate to CCM styles.

Methods

1. Literature review

I will firstly conduct a literature review in order to summarise the existing research on the science behind voice register transition, in addition to the pedagogical insights of leading voice practitioners; in particular, I will explore the role of laryngeal function and vocal tract acoustics. I will allow the science to guide me as I select a combination of voice training strategies for eliciting 'mix'; it will also give valuable context when it comes to interpreting the data gathered.

2. Audio / visual recordings

Each session will be recorded on Zoom, both by myself and by the participant. The participant may use this recording as an aid to their personal practice, in between sessions. I may use excerpts of session recordings to play back to students in subsequent sessions.

Each participant will also be asked to make additional audio recordings of themselves singing specified vocal tasks, either on their phone or using a microphone and recording software; this will be recorded during our Zoom sessions, with recordings emailed to me immediately. The purpose of this is to create more accurate recordings, in case of any issues with internet connectivity. Recordings from sessions one and six will form the basis of 'before' and 'after' recordings. Interim recordings (from sessions 2-5) may also be utilised, either to evaluate progress in more depth, or as an 'after' recording if a participant is unable to complete all 6 sessions for any reason.

3. Questionnaires

I will ask each participant to complete a questionnaire prior to their first singing lesson. Through a mixture of closed and open questions, I aim to explore the participants' own perspectives on their voice registration issues, in terms of kinaesthetic sensations, in terms of their thoughts and feelings, and in terms of how they think their voice sounds through this part of their range.

I will also ask a panel of voice teachers to complete a questionnaire after listening to the 'before' and 'after' recordings, to evaluate to what extent progress was achieved.

4. Semi-structured interviews

Immediately after their sixth (i.e. final) lesson, I will conduct an interview with each participant to allow them to evaluate their own progress, identify which strategy they found most helpful, and gain qualitative insights into how singing through their transition now feels and sounds to them. I will play the 'before' and 'after' recordings, to help them evaluate how they feel the sound of their voice has developed. These interviews will be recorded and subsequently transcribed.

Analysis

1. Literature review – the conclusions I draw will be used in order to (a) provide a detailed overview of the existing scientific research and practitioner insights on the topic; (b) identify appropriate voice training strategies to be utilised within this study; (c) give valuable context in order to facilitate effective data analysis.
2. Audio / visual recordings – each participant's 'before' and 'after' recordings will be evaluated by the participant themselves. All participants' 'before' and 'after' recordings will also be evaluated by a panel of voice teachers (which will not include myself). Interim recordings may also be evaluated.
3. Questionnaires – the initial participant questionnaires will produce a

combination of quantitative and qualitative data, which can be compared with the results of the semi-structured interviews in order to assess progress and gain insights into any emerging themes or trends.

The voice teacher questionnaires, conducted after each teacher listens to the 'before' and 'after' recordings, will produce a combination of quantitative and qualitative data. This will provide insights into the efficacy of the overall voice training programme, through the teachers' evaluation of what (if any) progress has been made.

4. Semi-structured interviews – these will produce a combination of quantitative and qualitative data, which will allow a direct comparison with the data produced by the initial participant questionnaire. Participants will also evaluate their progress and give their perspective on which strategy they found most helpful.

Location of research activity Identify all locations where research activity will take place.
All research will be conducted online; sessions will be conducted via Zoom. I will be based in the teaching studio within my own home (9A Grove Park, Liverpool, L8 0TL). (this box should expand as you type)
Research activity outside of the UK If research activity will take place overseas, you are responsible for ensuring that local ethical considerations are complied with and that the relevant permissions are sought. Specify any local guidelines (e.g. from local professional associations/learned societies/universities) that exist and whether these involve any ethical stipulations beyond those usual in the UK (provide details of any licenses or permissions required). Also specify whether there are any specific ethical issues raised by the local context in which the research activity is taking place, for example, particular cultural sensitivities or vulnerabilities of participants.
N/A (this box should expand as you type)

SECTION F: Scope of Research Activity

Will the research activity include:	YES	NO
Use of a questionnaire or similar research instrument?	☒	☐
Use of interviews?	☒	☐
Use of diaries?	☒	☐
Participant observation with their knowledge?	☒	☐
Participant observation without their knowledge?	☐	☒
Use of video or audio recording?	☒	☐
Access to personal or confidential information without the participants' specific consent?	☐	☒
Administration of any questions, test stimuli, presentation that may be experienced as physically, mentally or emotionally harmful / offensive?	☐	☒
Performance of any acts which may cause embarrassment or affect self-esteem?	☐	☒
Investigation of participants involved in illegal activities?	☐	☒
Use of procedures that involve deception?	☐	☒
Administration of any substance, agent or placebo?	☐	☒
Working with live vertebrate animals?	☐	☒
Other primary data collection methods, please explain in this box	☐	☒

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If NO to every question, then the research activity is (ethically) low risk and **may** be exempt from **some** of the following sections (please refer to Guidance Notes).

If YES to any question, then no research activity should be undertaken until full ethical approval has been obtained.

SECTION G: Intended Participants

Who are the intended participants:	YES	NO
Students or staff at the University?	☐	☒
Adults (over the age of 18 and competent to give consent)?	☒	☐
Vulnerable adults?	☐	☒
Children under 18?	☐	☒
Prisoners?	☐	☒
Young offenders?	☐	☒
Those who could be considered to have a particularly dependent relationship with the investigator or a gatekeeper?	☐	☒
People engaged in illegal activities?	☐	☒
Others (please identify):	☐	☒

Participant numbers and source

Provide an estimate of the expected number of participants. How will you identify participants and how will they be recruited?

I aim to recruit three participants to take part in the study, and aim to identify adult male CCM singers who would like to improve their ability to sing seamlessly through their register transition. I plan to recruit these participants through word of mouth, via networks of musicians I have previously worked with.

Information for participants:	YES	NO	N/A
Will you describe the main research procedures to participants in advance, so that they are informed about what to expect?	☒	☐	☐
Will you tell participants that their participation is voluntary?	☒	☐	☐
Will you obtain written consent for participation?	☒	☐	☐
Will you explain to participants that refusal to participate in the research will not affect their treatment or education (if relevant)?	☒	☐	☐
If the research is observational, will you ask participants for their consent to being observed?	☒	☐	☐
Will you tell participants that they may withdraw from the research at any time and for any reason?	☒	☐	☐
With questionnaires, will you give participants the option of omitting questions they do not want to answer?	☒	☐	☐
Will you tell participants that their data will be treated with full confidentiality and that, if published, it will not be identifiable as theirs?	☒	☐	☐
Will you debrief participants at the end of their participation, in a way appropriate to the type of research undertaken?	☒	☐	☐

If NO to any of above questions, please give an explanation

Information for participants:	YES	NO	N/A
Will participants be paid?	☐	☒	☐
Is specialist electrical or other equipment to be used with participants?	☐	☒	☐
Are there any financial or other interests to the investigator or University arising from this study?	☐	☒	☐
Will the research activity involve deliberately misleading participants in any way, or the partial or full concealment of the specific study aims?	☐	☒	☐
If YES to any question, please provide full details			
(this box should expand as you type)			

SECTION H: Anticipated Risks

Outline any anticipated risks that may adversely affect any of the participants, the researchers and/or the University, and the steps that will be taken to address them.

If you have completed a full risk assessment (for example as required by a laboratory, or external research collaborator) you may append that to this form.

Full risk assessment completed and appended?

Yes ☐

No ☒

Risks to participants

For example: emotional distress, financial disclosure, physical harm, transfer of personal data, sensitive organisational information

No risks anticipated

(this box should expand as you type)

If research activity may include sensitive, embarrassing or upsetting topics (e.g. sexual activity, drug use) or issues likely to disclose information requiring further action (e.g. criminal activity), give details of the procedures to deal with these issues, including any support/advice (e.g. helpline numbers) to be offered to participants. Note that where applicable, consent procedures should make it clear that if something potentially or actually illegal is discovered in the course of a project, it may need to be disclosed to the proper authorities

No such issues anticipated

(this box should expand as you type)

Risks to investigator

For example: personal safety, physical harm, emotional distress, risk of accusation of harm/impropriety, conflict of interest

No risks anticipated

(this box should expand as you type)

University/institutional risks

For example: adverse publicity, financial loss, data protection

No risks anticipated

(this box should expand as you type)

Adverse outcomes

List measures put in place to limit any adverse effects or outcomes of research activity where appropriate. Include any emergency protocols.

Participants do not attend all 6 sessions – if possible, if a participant is unable to attend a particular

session, I will aim to reschedule rather than cancelling. If rescheduling is not possible, I should still have enough data to gain insights into progress due to the fact that recordings will be made during every session.

Participants withdraw from the study – if this occurs, then it will undoubtedly impact upon the scope of the study. However, I will still be able to gain valuable data, even if I am left with just one participant. In the highly unlikely event that all three participants were to withdraw, I would still have time to recruit another purposive sample, or even a convenience sample, and conduct the research with new participants.

(this box should expand as you type)

Disclosure and Barring Service			
If the research activity involves children or vulnerable adults, a Disclosure and Barring Service (DBS) certificate must be obtained before any contact with such participants.	YES	NO	N/A
Has a DBS certificate been obtained?	☐	☐	☒

SECTION I: Feedback, Consent and Confidentiality

Feedback
What feedback will be provided to participants, how will this be done and when?
Feedback on outcomes of the research will be made available to participants upon request, this will be made clear to each participant when they give their written consent to take part in the study.
(this box should expand as you type)
Informed consent
Describe the arrangements to inform potential participants, before providing consent, of what is involved in participating. Describe the arrangements for participants to provide full consent before data collection begins. If gaining consent in this way is inappropriate, explain how consent will be obtained and recorded.
The purpose of the research will be explained to participants in an introductory email. It will be clearly indicated that participation in the study is voluntary, and that they retain the right to withdraw at any time. Each participant's informed consent will be given via email.
(this box should expand as you type)
Confidentiality / Anonymity
Set out how anonymity of participants and confidentiality will be ensured in any outputs. If anonymity is not being offered, explain why this is the case.
Students will be codified, to ensure that their experiences and responses will be anonymised before analysis.
(this box should expand as you type)

SECTION J: Data Protection and Storage

In completing this section refer to the University's Research Data Management Policy and the extensive resources on the University's Research Data Management web pages (<http://uwtsd.ac.uk/library/research-data-management/>).

	YES	NO
Does the research activity involve personal data (as defined by the Data Protection Act)? “personal data” means data which relate to a living individual who can be identified— (a) from those data, or (b) from those data and other information which is in the possession of, or is likely to come into the possession of, the data controller, and includes any expression of opinion about the individual and any indication of the intentions of the data controller or any other person in respect of the individual.	☐	☒
If YES, provide a description of the data and explain why this data needs to be collected: (this box should expand as you type)		
Does it involve sensitive personal data (as defined by the Data Protection Act)? “Sensitive personal data” means personal data consisting of information as to – (a) the racial or ethnic origin of the data subject, (b) his political opinions, (c) his religious beliefs or other beliefs of a similar nature, (d) whether he is a member of a trade union (within the meaning of the Trade Union and Labour Relations (Consolidation) Act 1992), (e) his physical or mental health or condition, (f) his sexual life, (g) the commission or alleged commission by him of any offence, or (h) any proceedings for any offence committed or alleged to have been committed by him, the disposal of such proceedings or the sentence of any court in such proceedings.	☐	☒
If YES, provide a description of the data and explain why this data needs to be collected: (this box should expand as you type)		

	YES	NO
Will the research activity involve storing personal data on one of the following:		
Manual files (i.e. in paper form)?	☐	☒
University computers?	☐	☒
Private company computers?	☐	☒
Home or other personal computers?	☐	☒
Laptop computers/ CDs/ Portable disk-drives/ memory sticks?	☐	☒

"Cloud" storage or websites?	☐	☒
Other – specify:	☐	☒
For all stored data, explain the measures in place to ensure data confidentiality, including details of password protection, encryption and anonymisation:		
(this box should expand as you type)		
Will the research activity involve any of the following activities:	YES	NO
Electronic transfer of data in any form?	☐	☒
Sharing of data with others at the University?	☐	☒
Sharing of data with other organisations?	☐	☒
Export of data outside the European Union or importing of data from outside the UK?	☐	☒
Use of personal addresses, postcodes, faxes, emails or telephone numbers?	☐	☒
Publication of data that might allow identification of individuals?	☐	☒
Use of data management system?	☐	☒
Data archiving?	☐	☒
If YES to any question, please provide full details, explaining how this will be conducted in accordance with the Data Protection Act (and/or any international equivalent):		
(this box should expand as you type)		

List all who will have access to the data generated by the research activity:
The researcher will have access to all data. Each participant will be allowed to make recordings of their own singing lessons. The voice teachers within the panel will each have access to anonymised 'before' and 'after' voice recordings. (this box should expand as you type)
List who will have control of, and act as custodian(s) for, data generated by the research activity:
The researcher only. (this box should expand as you type)
Give details of data storage arrangements, including where data will be stored, how long for, and in what form. Will data be archived – if so how and if not why not.

Data generated by this research will be stored on my own laptop computer only (password-protected). Data will be anonymous and used only for the research purposes outlined. All data will be erased/destroyed once analyses are complete.

(this box should expand as you type)

SECTION K: Declaration

The information which I have provided is correct and complete to the best of my knowledge. I have attempted to identify any risks and issues related to the research activity and acknowledge my obligations and the rights of the participants.

In submitting this application I hereby confirm that I undertake to ensure that the above named research activity will meet the University's [Research Ethics and Integrity Code of Practice](#)

Signature of applicant: *Emily Jackson*

Date: 03/08/2020

For students:

Director of Studies/Supervisor:	Debbie Winter
Signature:	
Date:	

For staff:

Head of School/Assistant Dean:	
Signature:	
Date:	

Checklist: Please complete the checklist below to ensure that you have completed the form according to the guidelines and attached any required documentation:

☒	I have read the guidance notes supplied before completing the form.
☒	I have completed ALL RELEVANT sections of the form in full.
☒	I confirm that the research activity has received approval in principle
☐	I have attached a copy of final/interim approval from external organisation (where appropriate)
☐	I have attached a full risk assessment (and have NOT completed Section H of this form) (where appropriate)
☒	I understand that it is my responsibility to ensure that the above named research activity will meet the University's Research Ethics and Integrity Code of Practice.
☒	I understand that before commencing data collection all documents aimed at respondents (including information sheets, consent forms, questionnaires, interview schedules etc.) must be confirmed by the DoS/Supervisor, module tutor or Head of School.

RESEARCH STUDENTS AND STAFF ONLY

All communications relating to this application during its processing must be in writing and emailed to pgresearch@uwtsd.ac.uk, with the title 'Ethical Approval' followed by your name.

You will be informed of the outcome of your claim by email; therefore **it is important that you check your University and personal email accounts regularly.**

STUDENTS ON UNDERGRADUATE OR TAUGHT MASTERS PROGRAMMES should submit this form (and receive the outcome) via systems explained to you by the supervisor/module leader.

This form is available electronically from the Academic Office web pages:

<http://www.uwtsd.ac.uk/academic-office/>

Application Process

All staff research projects and all research students must submit the Ethical Approval Form to the **University Ethics Committee** via the Academic Office (pgresearch@uwtsd.ac.uk). Staff research directly in relation to personal study for taught undergraduate or Masters programmes should be submitted via the Faculty procedures explained below.

Taught masters and taught undergraduate research Ethical Approval Forms are considered **within Faculties**. Faculties will provide details of the specific processes for this. Where the Ethical issues within any single ethical application are of particular concern the Faculty will refer these to the University Ethics Committee. Any student activity that involves the collection of primary data needs to undergo Ethical approval, this includes assignment work as well as dissertations.

Notes for guidance in completion of this form

Section A: About You

Please complete all relevant sections

Section B: Approval for research activity

Research proposals must be approved in principle before applying for Ethical Approval. The proposal approval only becomes final when the ethical approval is received.

The process for proposal approval varies according the individual and programme of study:

- Research students, by application on form PG1 to the Research Degrees Committee
- Taught students by review of research proposal within Faculties (Faculties provide specific details of these processes)
- Staff, by agreement by the Head of School/Assistant Dean

Section C: External Ethical Guidance materials

Many discipline areas are required to operate with the discipline specific codes of research ethics (for example health, psychology, education etc.), any such codes must be listed and you must tick to confirm that you have consulted with these.

Section D: External Collaborative Research Activity

Provide details of the external collaborative partners, where appropriate you might want to submit a copy of the external collaboration agreement with the Ethical Approval Form. If the partner requires the research to be subject to its own internal Ethical approval process then please provide details of that process and a copy of any final (or interim) approvals received from the organisation.

Section E: Details of Research Activity

Remember that the individuals reviewing this Ethical Approval Form may not have seen your research proposal, and also may not be experts in the specific area of your research. The information provided should therefore be jargon free and clearly stated.

Indicative Title: please use the same title as used on the research proposal.

Purpose: the Ethical approval process will want to ensure that the methods you propose are adequate and appropriate to address the research aims and objectives. Excessive additional data collection can be seen as unethical.

Proposed Methods: the Ethical approval process seeks to ensure that you understand the methods that are intended, and that the implementation of those methods will be appropriate and without unnecessary impact on respondents. Please be specific.

Location: this needs to mention geographical location and also local situation (for example, within Local Authority Offices in Cardiff, using a private room but close to other individuals). If you are collecting data within an organisational setting then you need to explain the permissions that you have obtained to do this.

Research Activity outside of the UK: please complete this section in detail, and note any guidance you have received. Also describe your own familiarity (or not) with the location that you will be utilising.

Section F: Scope of Research Activity

Please tick ALL of the research activities that might be undertaken. If any additional types of activity are intended then please add an extra box and describe these.

If you have answered no to all questions in F then sections G and J do not need to be completed. Section H should be considered, and may be completed. Signatures are still required in section K.

Section G: Intended Participants

Please tick all categories that might apply.

Numbers & Source: if you are using a series of different methods or research activities please list numbers for each stage/phase. Be clear about how you will find

respondents. Will you use intermediaries, and if so how? How will you ensure compliance with your sampling strategy?

Information for participants: all participants should be appropriately informed about the research, what is expected of them and what will happen to the information that they provide. The Ethical review process does not ask to see this documentation, but requires this to be reviewed and approved by the Director of Studies in the case of research students, the supervisor/module tutor in relation to students on taught programmes and the Head of School/Assistant Dean in relation to staff research.

Section H: Anticipate Risks

All research carries some level of risk. The answers you provide to questions in this section will be reviewed to ensure that you have an appropriate understanding of the type of risks involved and how you can mitigate against these risks. If you have completed a full risk assessment, as required for example for laboratory work, field work, clinical tests, diving operations, or by a collaborative partner, you may append that to this form. In that case, please tick the box indicating this has been provided. You will not then be required to complete Section H.

Risk to participants Think very carefully about how your actions/questions/discussions might affect the people you are involving as participants. You might identify the risk as small but it would still be a risk. Many types of question have the potential to make respondents less content with their life / job; you need to recognise and try to ameliorate any such effects

If these are business owners, time with you may reduce profit.

In some locations physical risk is very real to both participants and yourself, please consider this.

Risk to you, the researcher Think about where you will meet people, if there are any dangers involved in the location. If you are meeting people as individuals think about using a public place. In general do not visit people in their own homes or remote locations. If you are talking to individuals about certain issues think about how their responses might affect you emotionally. What about the risk of collecting insufficient data?

Risk to the University When undertaking your research, you are acting as a member of the University (student or staff). Professionalism is important, so it is important to be well organised and well prepared. Punctuality, clarity etc. are all part of this. What will you do to ensure this? You must ensure you do not harm the good name of the University in any way and do nothing to undermine the reputation of the research it conducts and sponsors. Upholding high standards of conduct and integrity are vital in this regard. You must also conduct the research in such a way to minimise the potential for claims of negligence made against the University, its researchers and any collaborating individual or organisation. In this respect you should always comply with ethical, legal and professional frameworks, obligations and standards as required by statutory and regulatory authorities, as well as the

university's Research Integrity and Ethics Code of Practice. Research misconduct in this respect can take many forms, including:

- fabrication: making up results or other outputs (eg, artefacts) and presenting them as if they were real
- falsification: manipulating research processes or changing or omitting data without good cause
- plagiarism: using other people's material without giving proper credit
- failure to meet ethical, legal and professional obligations: for example failure to declare competing interests; misrepresentation of involvement or authorship; misrepresentation of interests; breach of confidentiality; lack of informed consent; misuse of personal data; and abuse of research subjects or material
- improper dealing with allegations of misconduct: failing to address possible infringements such as attempts to cover up misconduct and reprisals against whistle-blowers

Adverse Outcomes. Think carefully about the possibilities, and cover here

Section I: Feedback, Consent and Confidentiality

Feedback to participants: outline your approach. Will interview transcripts be shared with respondents to check accuracy? Will summaries of questionnaire analysis be made available to respondents in some way? Will an overview report be provided? How and when?

Informed consent: Draft letter / e-mail / or heading (or footer) section of questionnaire must be approved by DoS/supervisor (if research student), supervisor/module tutor if taught student, or Head of School / Assistant Dean if a member of staff.

Confidentiality/Anonymity. Explain clearly how you will ensure confidentiality and anonymity.

Section J: Data Protection and Storage

Before completing this section it is necessary to read the University's Research Data Management information. The questions that follow are designed to ensure compliance with the Data Protection Act as well as established research protocols.

Many research activities will involve electronic transfer of data and use of data management systems in the summarisation and analysis of data. You will need to explain these in relation to compliance with the Data Protection Act.

Think carefully about who will have access to your data, this will include supervisors and examiners. Also that a thesis will be made available via the University library and the British Library system. If you are seeking an access bar for a period of time after completion then mention it here. If you will provide a copy of your findings, or intend to give a presentation, to a facilitating/ supporting/accessing organisation then explain that in this section. But also think about the general principle of data sharing, as explained in the Research Data Management information.

In terms of storage of data please ensure security, and also mitigate against loss of data.

Section K: Declaration

Ensure the appropriate countersignatures have been provided

Look carefully at the checklist and ensure that you comply with and tick all that are relevant to your research.

APPENDIX 2 – PERMISSION LETTER

9A Grove Park
Liverpool
Merseyside
L8 0TL

03/08/2020

Debbie Winter
Voice Workshop Ltd
The Gattinetts
4CD Office 1
Hadleigh Road
East Bergholt
Suffolk
CO7 6QT

Dear Debbie,

I am aware that it is a pre-requisite of submitting my ethics form that I supply written permission from my employer, allowing me to conduct my planned research project as part of module BMPF7008.

Please accept this letter as confirmation that, as a self-employed vocal coach, I give myself permission to conduct the research which I plan to undertake as part of this project. This research will be conducted online.

Yours sincerely,

Emily Jackson

Emily Jackson
Student number: 1807587

APPENDIX 3 – HARMONICS AND FORMANTS OF THE VOCAL TRACT – OVERVIEW

Harmonics

When a pitch (the fundamental or F0, also known as the first harmonic or H1) is sung, the resulting tone is also comprised of a stack of harmonics (H2, H3, H4, H5, etc.), which sit above the fundamental frequency and are created simultaneously. The musical interval between each subsequent harmonic becomes successively smaller (H1 to H2 = an octave, H2 to H3 = perfect 5th, H3 to H4 = perfect 4th, H4 to H5 = major 3rd, etc.). These harmonics are created at the vocal fold level, and each successive harmonic is weaker than the previous one. The relative strength of each harmonic stacked above the fundamental affects the overall tone quality of the resulting sound (Bozeman, 2013b).

Formants

A formant may be defined as a “natural [resonance] of the vocal tract” (Bozeman, 2013b, p. 11), or “a specific concentration of energy within the vocal sound wave” (Doscher, 1993, p. 133).

Although there are technically an infinite number of formants, only the first three (for bass singers) to five (for sopranos) are significant (known as F1, F2, F3, etc.); this is due to the limitations of human hearing. The first two formants (F1 and F2) are principally determined by the positioning and shaping of the tongue and lips. The relationship between F1 and F2 determines the vowel produced, which is why they are often called the ‘vowel formants’. F3, F4 and F5 are generally referred to as ‘quality formants’ (Doscher, 1993; Bozeman, 2013b). These formants cluster together to create ‘The Singer’s Formant’, which is also commonly referred to as vocal ‘ring’. This clustering occurs when a particular set of conditions are present: “a low larynx, an open throat and a narrowed epilaryngeal exit” (Bozeman, 2013b, p. 17). The narrowing of the epilaryngeal exit, also known as aryepiglottic sphincter (AES) narrowing, forms a cavity between the vocal folds and the aryepiglottic folds, called the epilaryngeal tube (Titze and Jin, 2003, p. 2; Bozeman, 2013b, p. 18). Unlike the vowel formants, the Singer’s Formant Cluster (SFC) is not adjustable to different frequencies, and is fixed at approximately 3000Hz (Doscher, 1993, p. 140; Titze and Jin, 2003, p. 2; Bozeman, 2013b, p. 17).

Harmonic/formant interaction

As it passes through the filter of the vocal tract, if a harmonic (one of the partials produced the vocal fold level) aligns with a formant, the harmonic will be boosted in strength, impacting on the overall tone colour of the sound created (Sundberg, 1987; Doscher, 1993; Bozeman, 2013b). For example, when H2 (an octave above the fundamental) aligns with F1 (i.e. the frequency of the harmonic is just below the frequency of the formant), a powerful open timbre is produced. This may be referred to as F1/H2 coupling (Bozeman, 2013b, p. 21).

If the existing F1 frequency is maintained whilst raising the pitch, H2 will rise above F1, resulting in the boost in resonance acquired by the F1/H2 coupling to be lost. Bozeman calls this 'turning over', describing the resulting tone as 'close timbre' (Bozeman, 2013b, pp. 20–21).

One strategy to avoid this loss of resonance when raising the pitch, is to raise F1 (by widening the vowel, raising the larynx and lifting the tongue into a high and forward position), so that the F1/H2 coupling is maintained. The resulting voice quality is known as 'yell' or 'belt' (Bozeman, 2013b, pp. 21–22; Johnson and De Haas, 2018, pp. 250–252).

Another such strategy is to lower F1 (by narrowing the vowel and lowering the larynx), so that H1 (the fundamental) aligns with F1 to create an F1/H1 coupling. The resulting voice quality may be described as 'whoop' (Bozeman, 2013b, pp. 23–24). According to Bozeman, "tonal sensations may seem... centralized, as whooping is generally felt in the head and vertical pharyngeal column" (Bozeman, 2013b, p. 28).

APPENDIX 4 – ACOUSTIC EVENTS SURROUNDING THE MALE PASSAGGIO

Acoustic Events Surrounding the Male *Passaggio*

First Formants: IPA in Boxes
F1/H2 Crossing Pitches in Black
F1/H3 Mini-Crossings in Red



Tenor



Baritone



Bass

(Bozeman, 2013b, p. 125)

APPENDIX 5 - TEACHING STRATEGIES

Part 1: Straw phonation /SOVTs

- Whilst vocalising through a 3mm diameter cocktail straw, check that airflow is directed through the straw only and that no air is escaping through your nose. Do this by pinching and un-pinching your nose a couple of times; if the sound does not change, then airflow is directed through the straw.
- Whilst you should feel some resistance, if vocalising through one straw is very difficult, try adding one or more additional straws.
- Glides
 - Descending
 - Descending then ascending
 - Ascending then descending
 - Ascending with accents ('revving car engine'), then descending smoothly
- Scales
 - Major octave arpeggios
 - Starting in upper register: Descending / ascending / descending
 - Starting in lower register: 1358____531 sustain on top note
 - 1.5 octave arpeggio (ascending, and descending on the dominant arpeggio) 135 ^1^3^5 ^4 ^2 75421 (NOTATE THIS)
 - Pentatonic scales (maj and min) moving over the transition
 - Descending minor pentatonic figure – 875 754 543 431
 - Ascending minor pentatonic figure – 134 345 457 578
 - Ascending & descending minor pentatonic figure (e.g. A3 - A4), moving over the transition
- Sing the melody of your song excerpt through the straw

Part 2 – Exploring vowels (use the scales and song above)

- Close vowels/diphthongs (such as foo, goo, go, bo, wee, gee, bee) – to discourage larynx-raising, allow harmonics to cross through F1 and **access head voice more easily**
- Semi-close vowels (such as bug, gug, mum, baw, gaw, quaw) – to explore 2nd formant strategies and **experience ‘mix’** - pay attention to kinaesthetic sensations and describe in your own words

Part 3 – Vowel tuning strategies for wide and close vowels

Try these on ascending scales:

- Open vowels – close slightly (or at least maintain a fairly close mouth shape as in speech) through the *zona di passaggio*, in order to avoid over-opening or larynx-raising
- Close vowels – open slightly through the *zona di passaggio* in order to preserve a vibrant ‘mix’
- In your song excerpt, identify a challenging note which is situated within your transition area and experiment with the following:
 - If it is an open vowel which feels like a strain to reach, narrow it slightly.
 - If it is a close vowel which sounds a little too ‘hooty’, try opening it slightly.

Encouraging VF adduction / closure

Tutor demonstration, keep phonating through the phrase rather than breaking up melismatic phrases with an aspirate sound like an ‘h’

APPENDIX 6 – SINGER PARTICIPANT CONSENT FORM

Consent to take part in research:

'A Study into the Efficacy of 'Mix' Strategies for Male Contemporary Commercial Music Singers'

- I voluntarily agree to participate in this research study.
- I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question without consequences of any kind.
- I understand that I can withdraw permission to use data from my session/interview within seven days after the session/interview, in which case the material will be deleted.
- I understand that I will not benefit directly from participating in this research.
- I have had the purpose and nature of the study explained to me both verbally and in writing, and I have had the opportunity to ask questions about the study.

I understand that my participation involves:

- Completing an initial questionnaire in advance of session 1, focusing on my own perspective and experiences of voice registration issues
- Attending weekly online vocal coaching sessions:
 - 4-6 sessions in total
 - each session 45-60mins in duration
 - voice strategies which may facilitate 'mix' will be trialled during these sessions
 - all sessions will be audio recorded
- Regular singing practice in between sessions, using specified vocal exercises
- Completing the following vocal tasks within my first and last session (forming the basis of 'before and after' recordings):
 - specified vocal exercises
 - singing an excerpt of a contemporary song, requiring use of my vocal transition area
- Taking part in a short interview following my last session, during which I will reflect upon and evaluate my own progress. This will be audio recorded.

I understand that my anonymous 'before' and 'after' audio recordings will be:

- shared with a small number of CCM teacher-participants, who will complete a questionnaire in order to gain insights into the extent to which progress may have been achieved (before/after recordings will be randomised)
- analysed using spectrographic software, to gain insights into acoustic properties of your voice / what progress has been made

My data

- I agree to my sessions and my interview being audio-recorded.
- I understand that all information I provide for this study will be treated confidentially.
- I understand that in any report on the results of this research, my identity will remain anonymous. This will be achieved by changing my name and disguising any details of my interview which may reveal my identity or the identity of people I speak about.

- I understand that disguised extracts from my interview may be quoted within academic studies, conference presentations or published papers.
- I understand that signed consent forms and original audio recordings will be retained on the researcher's own laptop computer (password-protected, accessible only by the researcher), until the University confirms results of the researcher's Work Based Learning Project.
- I understand that under freedom of information legislation, I am entitled to access the information I have provided at any time while it is in storage as specified above.
- I understand that an anonymised transcript of my interview in which all identifying information has been removed will be retained for two years from the date at which the University confirms results.

Safeguarding

- I understand that if I inform the researcher that I myself, or someone else, is at risk of harm, they may have to report this to the relevant authorities - they will discuss this with me first but may be required to report with or without my permission.

Further information

- I understand that I am free to contact the researcher to seek further clarification and information.

Researcher details:

Name: Emily Jackson
Qualifications: BA(Hons) Music, PGCert Professional Practice (Voice Pedagogy)

Affiliations:

This study is being conducted as part of the researcher's ongoing MA Professional Practice (Voice Pedagogy), in affiliation with The Voice Workshop and the University of Wales Trinity Saint David (UWTSD)

Researcher's email address: emily@emilyjacksonmusic.com
Researcher's contact number: 07891374679

Researcher declaration:

I believe the participant is giving informed consent to participate in this study.

Signature of researcher:

Date:

Participant declaration:

I understand all of the information above, and voluntarily agree to take part in this study.

****Signature of participant:** ----- (*Please type your name here*) -----

****Date:** (*Please insert date here*)

APPENDIX 7 – TEACHER PARTICIPANT CONSENT FORM

Teacher-participant consent form

A Study into the Effectiveness of 'Mix' Strategies for Male Contemporary Commercial Music Singers

- I voluntarily agree to participate in this research study.
- I understand that even if I agree to participate now, I can withdraw at any time or refuse to answer any question, without consequences of any kind.
- I understand that I will not benefit directly from participating in this research.
- I have had the purpose and nature of the study explained to me in writing, and I have had the opportunity to ask questions about the study.

I understand that my participation involves:

- Listening to **audio recordings**. These anonymous 'before & after' recordings of three singer-participants will each comprise a short song excerpt and scale excerpts. It will not be specified which are the 'before' recordings and which are the 'after' recordings.
- Completing a **questionnaire**, in order to evaluate how effectively 'mix' is demonstrated in each recording.

My data

- I understand that in any report on the results of this research, my identity will remain anonymous.
- I understand that anonymous extracts from my questionnaire may be quoted within academic studies, conference presentations or published papers.
- I understand that signed consent forms will be retained on the researcher's own laptop computer (password-protected, accessible only by the researcher), until the University confirms results of the researcher's Work Based Learning Project.
- I understand that under freedom of information legislation, I am entitled to access the information I have provided at any time while it is in storage as specified above.

Safeguarding

- I understand that if I inform the researcher that I myself, or someone else, is at risk of harm, they may have to report this to the relevant authorities - they will discuss this with me first but may be required to report with or without my permission.

Further information

- I understand that I am free to contact the researcher to seek further clarification and information.

Researcher details:

Name: Emily Jackson

Qualifications: BA(Hons) Music, PGCert Professional Practice (Voice Pedagogy)

Affiliations:

This study is being conducted as part of the researcher's ongoing MA Professional Practice (Voice Pedagogy), in affiliation with The Voice Workshop and the University of Wales Trinity Saint David (UWTSD)

Researcher's email address: emily@emilyjacksonmusic.com

Researcher's contact number: 07891374679

Researcher declaration:

I believe the participant is giving informed consent to participate in this study.

Signature of researcher:

Date:

Participant declaration:

I understand all of the information above, and voluntarily agree to take part in this study.

****Signature of participant:** ----- (*Please type your name here*) -----

****Date:** DD/MM/YYYY

APPENDIX 8 – PURPOSE & NATURE OF STUDY (TEACHER PARTICIPANTS)

Purpose and nature of the study

Researcher name: Emily Jackson BA(Hons) PGCert

Working title: A Study into the Effectiveness of ‘Mix’ Strategies for Male Contemporary Commercial Music Singers

Context

As a freelance vocal coach specialising in contemporary commercial music (CCM) genres of singing such as rock, pop and soul, the researcher has noticed that one of the most common challenges faced by adult male singers is negotiating the register transition (passaggio) between the lower register (‘chest’ voice) and upper register (‘head’ voice). Issues experienced by these singers include:

- high effort levels to ‘reach’ a high note;
- strained or ‘shouty’ tone;
- irregularities in pitch when gliding through the transition, presenting as an audible ‘flip’ or as a gap in the range, through which phonation is impossible;
- significant disparity of tone between lower and upper registers;
- significant loss of projection over the transition area.

These singers wish to sing smoothly through their entire vocal range, with no abrupt changes in tone or projection, maintaining stylistic accuracy within CCM repertoire; this approach to register transition is often referred to as ‘mix’ or ‘mixed registration’. In order to successfully and reliably facilitate this, effective and appropriate voice training strategies must be identified.

Research aims

The aims of the research are to:

- Draw together and summarise the existing body of recent research, establishing how laryngeal function and vocal tract acoustics may contribute to the ability to sing seamlessly through the register transition
- Gain fresh insight into how adult male CCM singers experience their passaggio, in terms of:
 - kinaesthetic sensations
 - thoughts and feelings
 - perception of how their voice sounds through this part of their range

- Identify research-based teaching strategies which may facilitate 'mix' in adult male contemporary singers
- Trial these strategies, gaining insights into their effectiveness via:
 - the singers' perspectives
 - CCM voice teachers' perspectives
 - spectrographic analysis
- Draw conclusions and identify areas for further research.

Methods - overview

- After conducting a **literature review** on the topic, the researcher designed a set of voice training strategies to facilitate 'mix'.
- Each **singer-participant** completed an initial **questionnaire**, in which their perspectives on their voice registration issues were explored.
- **Six online vocal lessons** were conducted via Zoom with each singer-participant, in order to trial the voice training strategies.
- In session 1, a **'before' recording** was made. In order to showcase their current ability to produce 'mix', each singer-participant sang:
 - (iii) specified vocal exercises;
 - (iv) an excerpt of a contemporary song of their choice, requiring use of their vocal transition area
- These tasks were repeated in session 6, to create an **'after' recording**.
- A **semi-structured interview** was conducted with each singer-participant following session 6, in which they reflected upon and evaluated their own progress.
- The anonymous 'before' and 'after' audio recordings of each participant singer will be shared with **three CCM teacher-participants**, who will each complete a **questionnaire** in order to provide insights into to what progress may have been achieved.
- To ensure relevance, these teacher-participants were selected on the basis that they specialise in CCM styles and that they teach 'mix'.
- In order to maximise objectivity, the teacher-participants will:
 - not know the singer-participants' identities;
 - not be involved in the training process;
 - not know which recordings are from 'before' and which are from 'after' the training programme.

- The 'before' and 'after' audio recordings will also be **analysed by the researcher using spectrographic software**, in order to gain quantitative insights into what progress has been achieved.

APPENDIX 9 - BEFORE / AFTER RECORDING LABELS – KEY

SINGER	VOCAL TASK	RECORDING LABEL	BEFORE / AFTER
P1	SCALES/GLIDES	A	AFTER
		B	BEFORE
	SONG EXCERPT	C	AFTER
		D	BEFORE
P2	SCALES/GLIDES	E	BEFORE
		F	AFTER
	SONG EXCERPT	G	BEFORE
		H	AFTER
P3	SCALES/GLIDES	I	AFTER
		J	BEFORE
	SONG EXCERPT	K	AFTER
		L	BEFORE

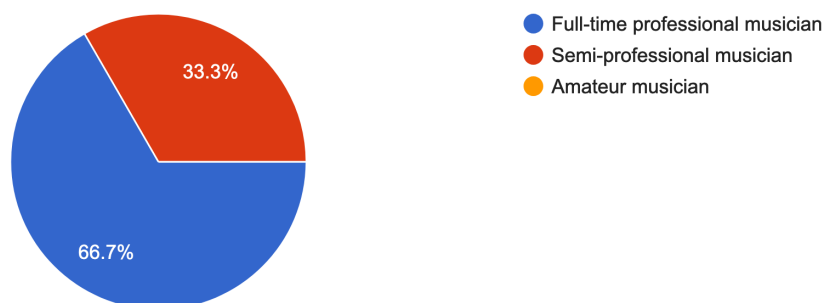
APPENDIX 10 - INITIAL SINGER QUESTIONNAIRE RESPONSES - SUMMARY

Section 1 - About you

Q1:

Which of the following best describes your (pre-Covid restrictions) musical occupation?

3 responses



Q2: For how many years have you been performing on lead vocals? Feel free to give more details.

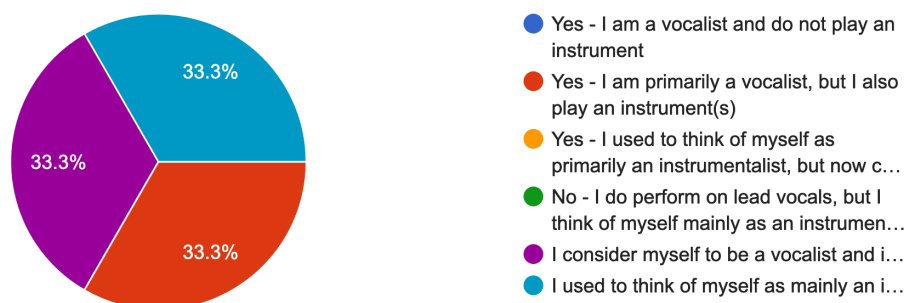
3 responses:

1. 8
2. Approximately 20 years.
3. 4

Q3:

Do you consider vocals to be your main instrument?

3 responses



OPTIONS:

Yes - I am a vocalist and do not play an instrument

Yes - I am primarily a vocalist, but I also play an instrument(s)

Yes - I used to think of myself as primarily an instrumentalist, but now consider myself to be mainly a vocalist

No - I do perform on lead vocals, but I think of myself mainly as an instrumentalist

I consider myself to be a vocalist and instrumentalist in equal measures

I used to think of myself as mainly an instrumentalist, but now consider myself to be a vocalist and instrumentalist in equal measures

Section 2 - Singing over your transition area

Q4: When singing over you transition area - i.e. the area where you transition from your lower register (chest voice) to upper register (head voice / falsetto) - how would describe the sound of your voice? Please describe in your own words, in as much detail as you wish.

3 responses:

- I would call it a 'lucky dip', sometimes a nice smooth transition, sometimes too chesty and other times losing the power in the sound and becoming too much of a falsetto sound. Or even breaking...
- It mainly feels weaker and harder to keep in tune. It's hard to achieve a harder sound with more attack.
- Loud. Find myself inventing consonants to make the notes come out.

Q5: When you sing over your transition area, how does it feel? Please describe in your own words, in as much detail as you wish

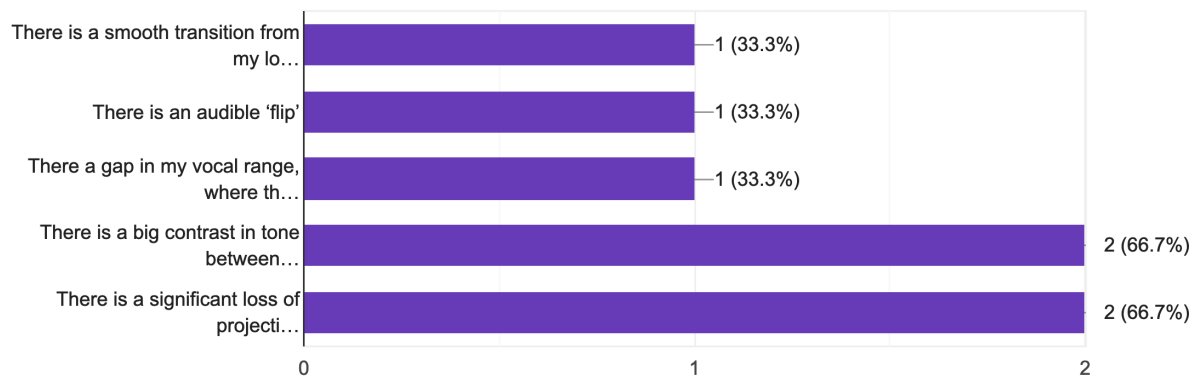
3 responses:

- Sometimes a build up constriction, combined with a tightening of jaw, tongue and rising larynx to 'reach the notes'
- Similar to above it feels weak and wobbly, like it could fall off a note easily.
- Slightly strained. It's like guesswork if I'm going to hit the note or not. I can feel where the note is supposed to be formed in my throat. Usually get it, can feel when I'm not going to reach.

Q6:

When singing a pitch glide from low to high through my transition... (select all that apply)

3 responses



OPTIONS:

When singing a pitch glide from low to high through my transition... (select all that apply)

There is a smooth transition from my lower to upper register

There is an audible 'flip'

There a gap in my vocal range, where there are notes I can't sing at all

There is a big contrast in tone between my lower and upper registers

There is a significant loss of projection over my transition area

Q7:

When negotiating challenging repertoire which uses your transition area, which approaches have you used? (select all that apply)

3 responses



OPTIONS:

Strained to reach 'high' notes in chest voice (lower register)

Used a light head voice (upper register) for 'high' notes (even though you would prefer these to sound 'fuller')

Transposed song to a lower key to avoid difficult 'high' notes

Changed melody to avoid difficult 'high' notes

Avoided performing certain songs altogether due to difficult 'high notes'

Other:

Section 3 - Your chosen song excerpt

Q8: In your song excerpt, which phrase do you find the least challenging to sing?

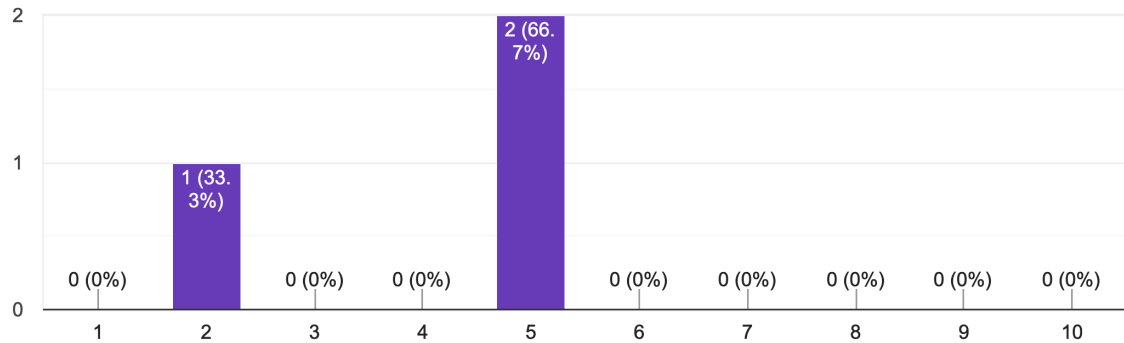
3 responses:

- The verse as it is all comfortably in chest range
- The first 2 lines
- All of V1

Q9:

On a scale of 1 to 10, how much effort are you using when singing this 'least challenging' phrase?

3 responses



Q10: Please describe in your own words how it feels to sing this 'least challenging' phrase:

3 responses:

- Very easy, nice and comfortable with good resonance
- Comfortable and solid with plenty of warmth
- Comfortable. Find it easy to project my voice in this instance.

Q11: In your song excerpt, which phrase do you find the most challenging to sing?

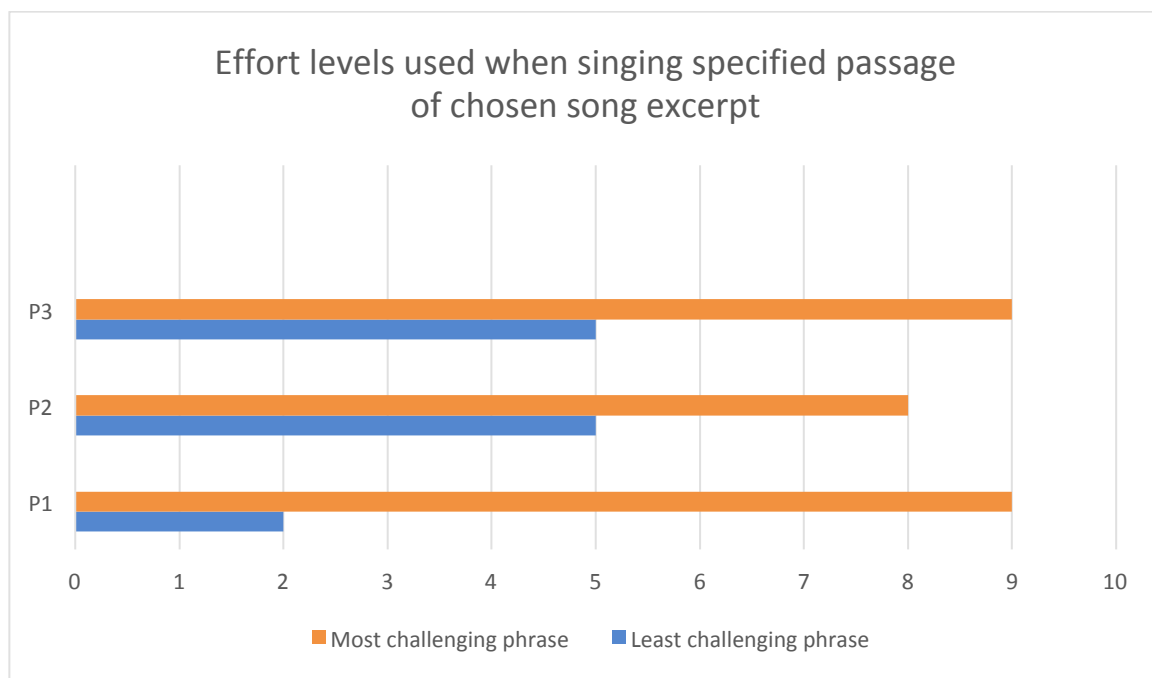
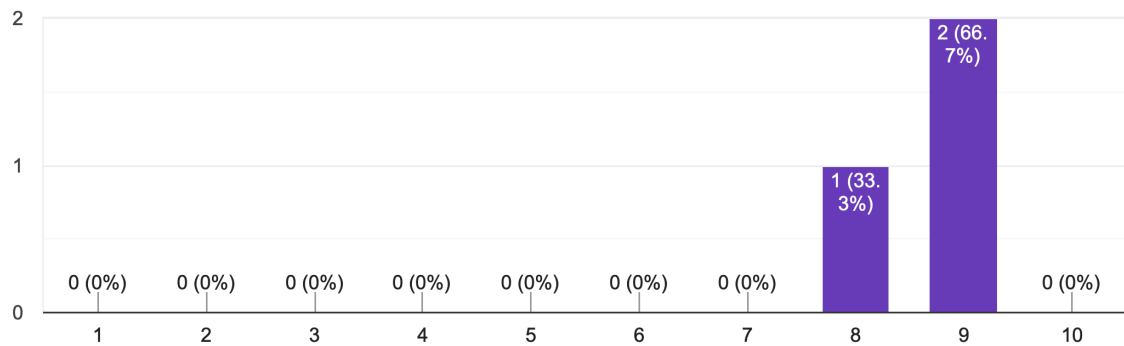
3 responses:

- The bridge which all sits in the transition register, the passagio.
- There ain't no room for the hopeless sinner
- The vocal run in the third line of the chorus

Q12:

On a scale of 1 to 10, how much effort are you using when singing this 'most challenging' phrase?

3 responses



(Information extracted from Q9 & Q12)

Q13: Please describe in your own words how it feels to sing this 'most challenging' phrase:

3 responses:

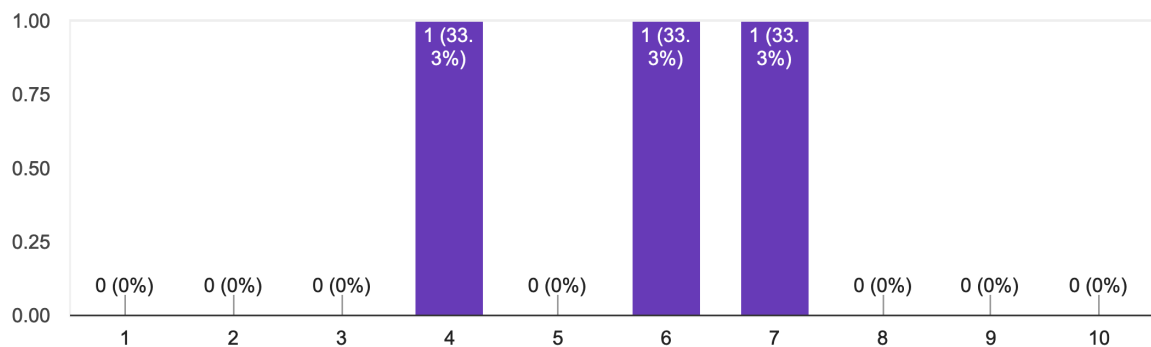
- Lots of breath support needed, much concentration to get the right coordination to navigate. A focus on 'inhaling the voice' so as not to push and create too much pressure.
- Using head-voice for the higher part and flipping to chest voice feels awkward and I'm unsure where best to do so.
- It feels like there are notes I just can't get in the scale, even though I can hit higher notes. I have to start off with a higher note, whereas in the recording he sings lower then goes into the run.

Section 4 - Your voice

Q14:

On a scale of 1 to 10, how much effort do you generally use when singing in your lower register (chest voice)?

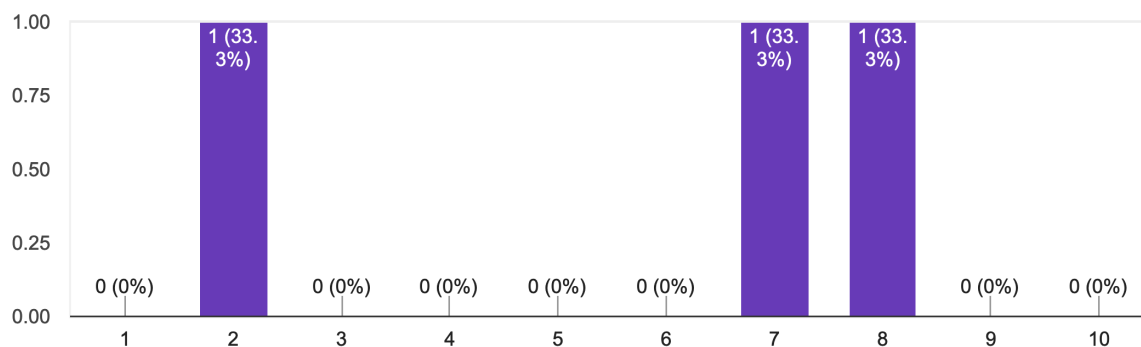
3 responses



Q15:

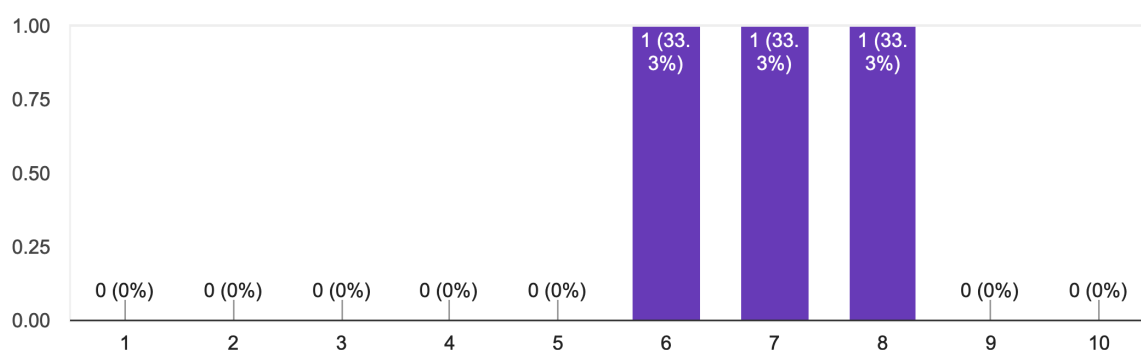
On a scale of 1 to 10, how much effort do you generally use when singing in your upper register (falsetto / head voice)?

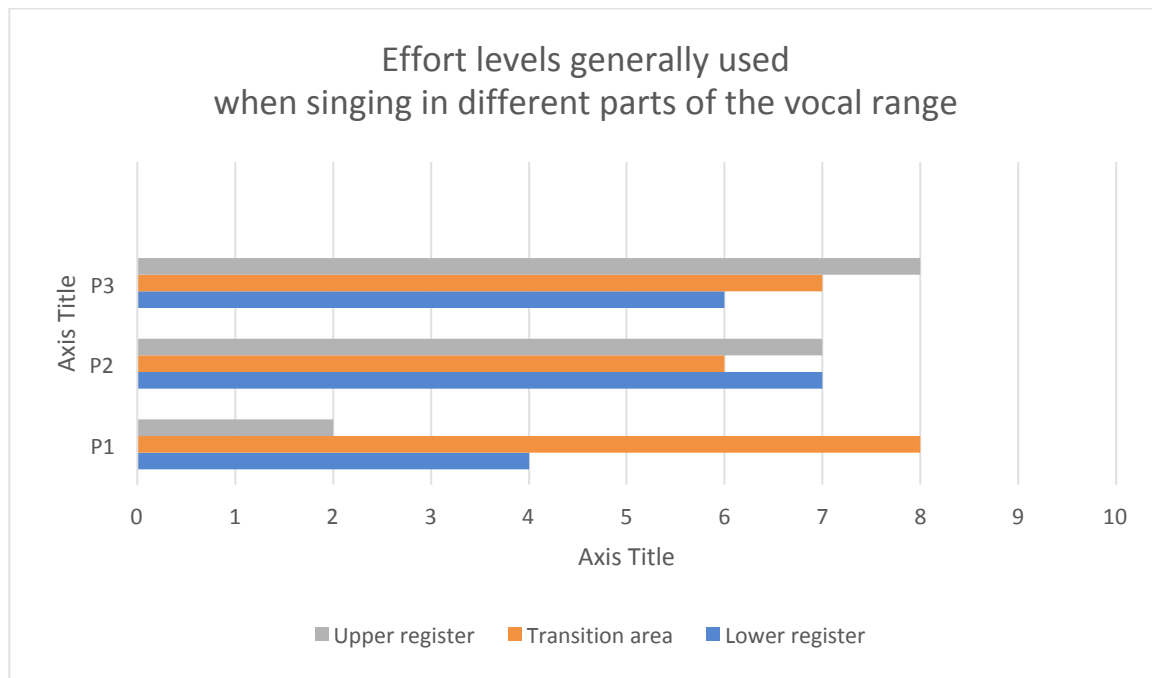
3 responses

**Q16:**

On a scale of 1 to 10, how much effort do you generally use when singing over your transition area (the area of transition between your lower and upper registers)?

3 responses



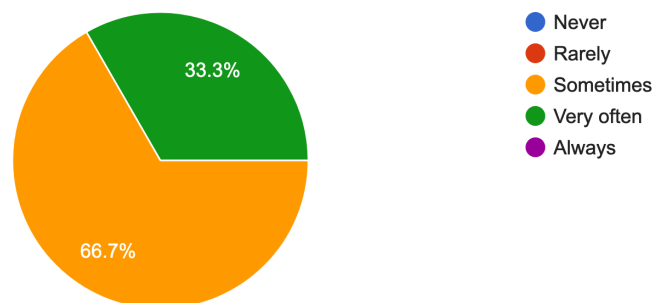


(Information extracted from Q14/Q15/Q16)

Q17:

When singing 'high' notes over my transition, I flip into a light falsetto (upper register)

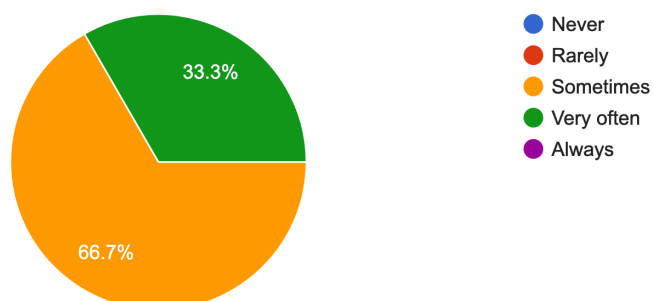
3 responses



Q18:

When approaching a 'high' note over my transition area in a performance, I feel confident that I will accurately sing the pitch I am aiming for

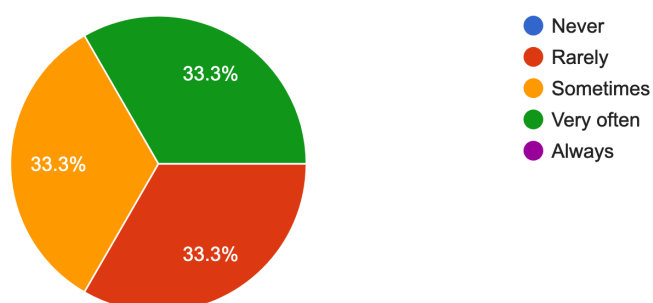
3 responses



Q19:

When performing, I experience anxiety before approaching a 'high' note over my transition area

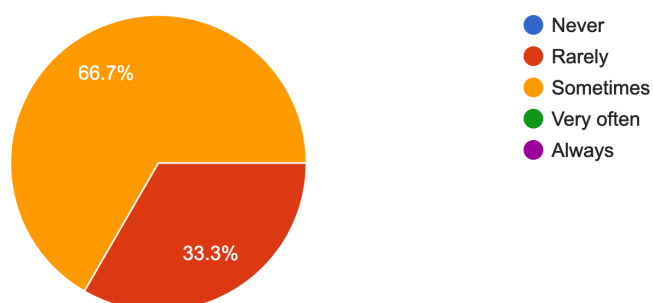
3 responses



Q20:

When approaching a 'high' note over my transition area in a performance, I feel confident that I will successfully achieve the tonal quality I want

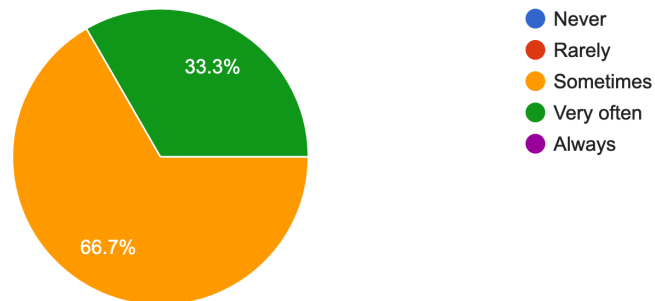
3 responses



Q21:

When singing 'high' notes over my transition area, I experience a strained or 'shouty' tone note

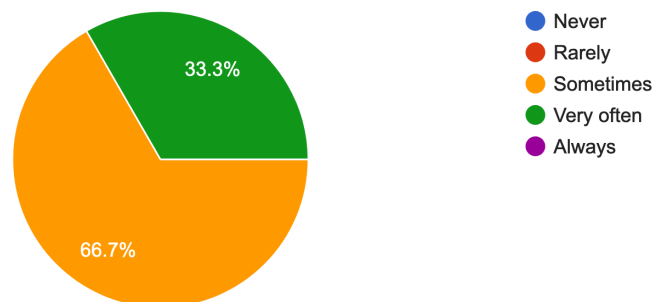
3 responses



Q22:

When singing over my transition area, I use a lot of effort to 'reach' a 'high' note

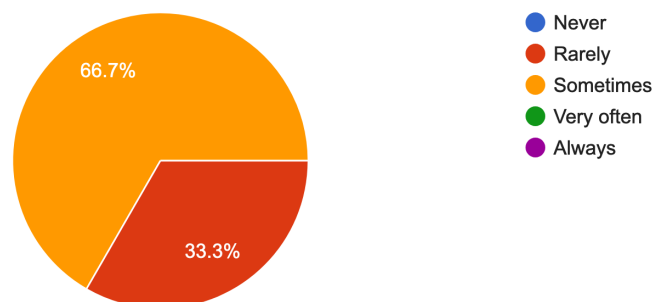
3 responses



Q23:

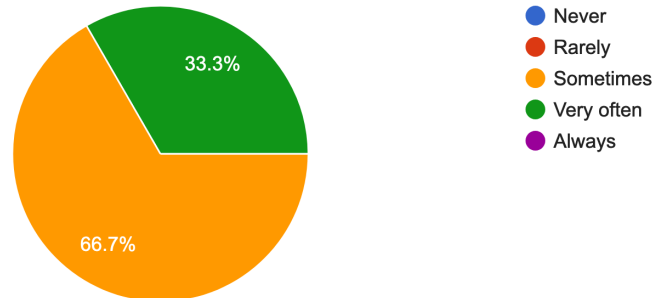
When singing 'high' notes over my transition area, I experience pitching issues (e.g. the pitch I sing is slightly flat compared to the note I am aiming for)

3 responses



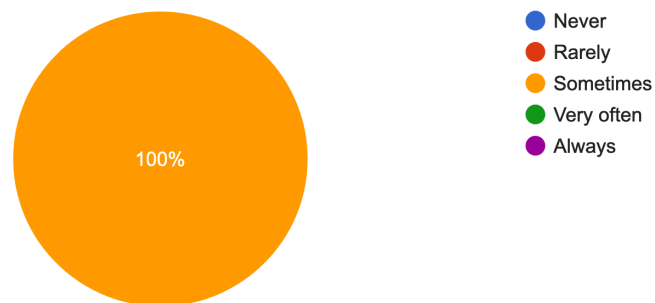
Q24:

I experience vocal fatigue after performing
3 responses



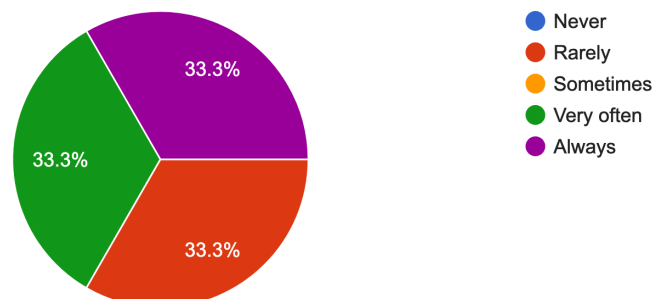
Q25:

If I am struggling to reach a note over my transition area, I apply more effort to hit the note
3 responses



Q26:

I warm up my voice before a gig
3 responses



Q27: If you were to warm up your voice, what would your warm-up usually consist of?
Please describe in your own words:

3 responses:

- Siren, lip roll, typical 5 note / octave exercises
- A variety of arpeggio/scale exercises, sometimes with a straw or v, f sounds and lip rolls.
- I usually just sing an easy song or two

Section 5 - Potential impact of 'mixed registration' training

If you were to develop the ability to sing smoothly through your entire vocal range, with no abrupt changes in tone or projection and maintaining stylistic accuracy within contemporary repertoire, what impact might this have on:

Q28:...the vocal choices you make during a performance?

3 responses:

- This would provide FREEDOM and CONFIDENCE in higher range. (P1)
- I would feel a lot more comfortable with less strict melody, i.e. more room for creativity. (P2)
- I'd go for more ambitious notes (P3)

Q29:...the repertoire you choose to perform?

3 responses:

- Very much so - I would definitely be picking songs which are in that register, Stevie Wonder, Donnie Hathaway etc. (P1)
- It would give me more freedom and confidence to sing a broader variety of material. (P2)
- Maybe sing more soul rather than just rock n roll. (P3)

Q30:...your career choices, e.g. the type of creative projects you might get involved in?

3 responses:

- Definitely - I want to perform professionally much more and my register and confidence limits my choices at the moment. (P1)
- I could attempt jobs that might currently be outside my comfort zone. (P2)
- I'd like to try musical theatre one day. (P3)

Q31:...the way you view yourself as a vocalist?

3 responses:

- Yes - 100%. (P1)
- I would feel like a more well-rounded performer and this would give me more confidence. (P2)
- I'd think I had more of a clue about what I'm doing (P3)

Q32:...your confidence?

3 responses:

- Definitely. (P1)
- Much greater. (P2)
- Could probably do with less confidence if I'm being honest haha (P3)

Q33:...your enjoyment of singing?

3 responses:

- 100%. I hate the feeling of too much effort and fatigue after a gig, when I know I have used bad techniques, muscle memory. (P1)
- I think I would feel freer to 'mess around' and try things and this would be a great deal of fun. (P2)
- I'd feel like singing was an achievement rather than just natural predisposition (P3)

Thank you very much for completing this questionnaire. Your data will remain anonymous.

Coding key:

Emotions

Thoughts

Behaviours

APPENDIX 11 - INITIAL SINGER QUESTIONNAIRE QUESTIONS, BY THEME

<u>THEME</u>	<u>QUESTION NUMBERS</u>
Kinaesthetic	Open questions: 5, 10, 13 Closed questions: 9, 12, 14, 15, 16, 22, 24
Emotions / thought-processes	Open questions: 31, 32, 33 Closed questions: 18, 19, 20
Behaviours	Open questions: 27, 28, 29, 30 Closed questions: 7, 25, 26
Aural perception	Open questions: 4 Closed questions: 6, 17, 21, 23
Other	About you: 1, 2, 3* (also relates to self-image), Specifying song sections: 8, 11

APPENDIX 12 - POTENTIAL IMPACT OF 'MIX' TRAINING - EMOTIONS, THOUGHTS AND BEHAVIORS

Quotes have been extracted from the singers' responses to questions 28-33 of the initial questionnaire.

Potential impact upon:		Emotions	Thoughts	Behaviours
Vocal choices during a performance (Q28)	P1	"FREEDOM and CONFIDENCE in higher range"		
	P2	"I would feel a lot more comfortable with less strict melody"		"less strict melody, i.e. more room for creativity"
	P3			"I'd go for more ambitious notes"
Repertoire choices (Q29)	P1			"Very much so - I would definitely be picking songs which are in that register, Stevie Wonder, Donnie Hathaway etc."
	P2	"It would give me more freedom and confidence"		"sing a broader variety of material."
	P3			"sing more soul rather than just rock n roll"
Career choices, e.g. the type of creative projects you might get	P1		"my register and confidence limits my choices at the moment"	"Definitely - I want to perform professionally much more"
	P2			"I could attempt jobs that might currently

involved with (Q30)				be outside my comfort zone"
	P3			"I'd like to try musical theatre one day"
Self-image as a vocalist (Q31)	P1		"Yes - 100%." [It would impact the way I view myself as a vocalist]	
	P2	"[feeling like a more well-rounded performer] would give me more confidence"	"I would feel like a more well-rounded performer"	
	P3		"I'd think I had more of a clue about what I'm doing"	
Confidence (Q32)	P1	"Definitely" [It would impact my confidence]		
	P2	"Much greater [confidence]"		
	P3	"Could probably do with less confidence if I'm being honest haha"		
Enjoyment of singing (Q33)	P1	"100%. I hate the feeling of too much effort and fatigue after a gig, when I know I have used bad techniques, muscle memory.		
	P2	I think I would feel freer to 'mess around' and try		

		things and this would be a great deal of fun.”		
	P3		“I'd feel like singing was an achievement rather than just natural predisposition”	

APPENDIX 13 – SINGER-PARTICIPANT SEMI-STRUCTURED INTERVIEW QUESTIONS

Part 1 – EFFORT PERCEPTION / KINAESTHETIC SENSATIONS

- **SCALES**

In the questionnaire, you were asked: On a scale of 1 to 10, how much effort do you generally use when singing over your transition area (the area of transition between your lower and upper registers)? You responded: _____

Question 1

On a scale of 1-10 (1=min, 10=max effort), when singing through your transition on the scales we recorded today, how much effort did you use?

In the questionnaire, you were asked “when singing over you transition area, how does it feel”? You responded: _____

Question 2

When singing through your transition on the scales today, how did it feel? Please describe in your own words, in as much detail as you want.

- **SONG EXCERPT**

You previously stated that in your song excerpt, the phrase you found most challenging to sing was: _____, and that on a scale of 1-10 (min-max effort), your effort level when singing this phrase was: ____

Question 3

What effort level would you say you used today on that particular phrase? (1-10)

In the questionnaire, you were asked: “Please describe in your own words how it feels to sing this ‘most challenging’ phrase”. Your response was: _____

Question 4

When you sang this phrase today, did it feel any different? If so, how?

Question 5

Are there any other parts of your song excerpt which **felt** any different today, in terms of kinaesthetic sensations, than they did in your first session? If so, please elaborate.

PART 2 - AURAL PERCEPTION OF BEFORE & AFTER RECORDINGS

Question 6

Listen to your 'before' scale(s).

What did you hear as you moved up through your transition area, and how smooth were the transitions?

Question 7

Listen to your 'after' scale(s).

Are these similar to the session 1 recordings, or are there any noticeable differences? If so, please elaborate – what did you hear, and how smooth was the register transition?

Question 8

Listen to your 'before' song, and your 'after' song. Are your performances similar, or did you notice any differences? Please elaborate.

PART 3 – REFLECTING ON THE TRAINING PROCESS

Question 9

Since session 1, do you feel you have made any progress towards using 'mix' voice? Please elaborate.

Question 10

If you feel you have made progress, how long did it take before you noticed any progress?

Question 11

Did you have any memorable 'breakthrough' moments?

Question 12

Were there any elements of the training which you found particularly helpful?

Question 13

How many straws did you use on straw phonation, and has this changed at all?

Question 14

Did you experience any challenges, and how did you overcome these?

Question 15

How do you feel about the progress you've made?

Question 16

What further progress would you like to make on your ability to utilise 'mix'?

END OF PREPARED QUESTIONS – IS THERE ANYTHING ELSE YOU'D LIKE TO ADD?

APPENDIX 14 - P1 SEMI-STRUCTURED INTERVIEW

Emily Jackson

Right, okay - so this is your interview.

Emily Jackson

So, in the questionnaire, you were asked on a scale of one to 10 (one is minimum effort and 10 is maximum effort), how much effort do you generally use when singing over your transition area? So, the area of transition between your lower and upper registers. And you responded, eight out of 10.

Emily Jackson

So, question one is: on a scale of one to 10, (one is minimum effort, 10 is maximum effort), when singing through your transition on the scales we recorded today, how much effort did you use?

P1

Does it just have to be a number?

Emily Jackson

No! Say a number, and feel free to elaborate.

P1

So, effort in terms of getting through it is like two to three.

P1

But - in just today, just going on today - due to - I would call it sort of... tension, that created an issue - but not... a singing issue. So, just my own tension. So, effort level two really.

Emily Jackson

Effort level two in terms of sensations in terms of effort here.

P1

Yeah no... no strain. Yeah.

Emily Jackson

Okay. Great.

P1

In fact, I'd go so far as to say zero strain - yeah.

Emily Jackson

Okay. Great. So, in the questionnaire, you were asked when singing over your transition area, how does it feel? And you responded: "sometimes a buildup of constriction combined with a tightening of jaw, tongue, and rising larynx to reach the notes".

Emily Jackson

So question two is: when singing through your transition on the scales today, how did it feel? Please describe in your own words in as much detail as you want.

P1

Okay. It doesn't feel like that anymore. It feels like the larynx stays low. And moves out of the way and my throat is more open. I feel like the sound stays more in my larynx area.

Emily Jackson

Where did it... where did you feel like it was staying before?

P1

It was moving upwards.

Emily Jackson

Okay.

P1

Yeah. And I don't have to reach. There's no reaching.

Emily Jackson

Okay, great. Okay, so... your song excerpt. You previously stated that in your song excerpt, the phrase you found most challenging to sing was "the bridge, which all sits in the transition register, the passaggio", and, that on a scale of one to 10, your effort level when singing this phrase was nine. So question three is: what effort level would you say you used today on that particular phrase? On a scale of one to 10?

P1

I mean, there's some effort isn't there in singing?

Emily Jackson

Of course - absolutely.

P1

So we can't say one, so let's say... three.

Emily Jackson

Okay. Thank you.

Emily Jackson

So... in the questionnaire you were asked, please describe, in your own words, how it feels to sing this most challenging phrase. And your response was: "lots of breath support needed, much concentration to get the right coordination to navigate a focus on inhaling the voice, so as not to push and create too much pressure".

Emily Jackson

So question four is: when you sang this phrase today, did it feel any different? And if so, how?

P1

Yes, it did feel different. I don't need to create the support down lower in my... sort of abdomen, I guess. There's no buildup, so that's not an issue. It's more a feeling of trying to keep the vocal cords sort of in that engaged feeling and not pushing, so. So that's quite different.

Emily Jackson

Yes.

P1

And it's only the last phrase that causes some some small level of anxiety as it approaches.

Emily Jackson

Okay. Thank you.

Emily Jackson

Okay, so I was gonna say... question five. Are there any other parts of your song excerpt which felt any different today, in terms of kinaesthetic sensations, than they did in your first session? And if so, please, elaborate. There might be, there might not be, so...

P1

Can we just define kinaesthetic again?

Emily Jackson

So physical sensations, basically.

P1

Okay.

Emily Jackson

Feelings - rather than emotions, feelings? Yeah.

P1

Okay.

Emily Jackson

Any other bits of felt different particularly, in your song?

P1

It feels just more. It's... how do I describe this? Like, it's on the voice more, and there's more acoustic resonance in my voice. Yeah.

Emily Jackson

Okay. Thank you. Right, so...

P1

Would you say would you agree with that, 'off the record'?

Emily Jackson

Haha - it's all 'on the record'!

Emily Jackson

Okay, so... part two is going to be like an aural perception kind of thing, of the before and after recordings. So, if you could please have a listen to your 'before' scales - there's an edited version there - they're all together on one. Yeah. So have a listen to that. It'll probably take just a few minutes. Have a listen, and then I'll ask you what you heard. Okay.

P1

Okay..... here we go.

P1

Hmm.... I'm back!

Emily Jackson

Alright, so... what did you hear as you moved up through transition area, and how smooth were the transitions?

P1

What did I hear going through the transitions? So, I heard that my voice got weaker. It got more breathy. It became less resonant. There was a reaching and forced sound. It kind of fell off... the sound fell off the voice. It was lacking in coordination. There was a break between chest and falsetto - a break between chest and then going straight to falsetto with no 'mix'. There was an uncertainty in myself, how to approach that area. And the vocal closure diminished as the scales ascended.

Emily Jackson

Thank you. Okay, so now what I'd like you to do is listen to your 'after' scales, okay? So there's gonna be two recordings there. So have a listen to each of those, please.

P1

Okay. [Listens to recording]

P1

I'm back.

Emily Jackson

Great. Okay, so... you've listened to your 'after' scales...

P1

Yep.

Emily Jackson

...are these similar to the session one recording 'before' scales, or, are there any noticeable differences? And if so, please elaborate - what did you hear, and how smooth was the register transition?

P1

They weren't the same...

Emily Jackson

Okay.

P1

There was a marked difference. There was a smoothness in transition, although... in today's example, I would say due to anxiety or tension, that affected the overall sound... not especially the transition, but the overall sound itself coming out.

Emily Jackson

Okay, so a follow up question to that... how did today's... the way you performed today's scales... how's that, compared to how you've been performing those scales recently, over the last week or so?

P1

Um, today compared to the rest of the week? Yeah. Well, I could do them for you again now, it's like the tension is gone now, so [confidently demonstrates scale] ...you know, it's just like, the buildup of some anxiety. Yeah, my body is not there now, so that wouldn't be a problem any more.

Emily Jackson

Okay.

P1

So, so yeah... so the transition is smooth, and there is a mixed kind of mixed head and chest tone present.

Emily Jackson

Okay. Thank you.

P1

Happy days!

Emily Jackson

Right. Okay. So question eight. Okay, this is going to be around your song recordings. Okay. So I'd like you to listen to your 'before' song recording and then listen to your 'after' song recording.

P1

[Listens to recordings]

Emily Jackson

Right. Okay, so, um, so you've listened to your 'before' song and your 'after' song.

P1

Yep.

Emily Jackson

Are your performances similar, or did you notice any differences? Please elaborate.

P1

The performances were quite similar, although I can remember the sensation of the first performance being very challenging. And the performance of the second today was not challenging. It sounded freer. It had sort of more energy. More resonance in the voice. I thought the 'before' one was good. But then when I heard the 'after' one, I was... I then noticed there was more power and nicer tone in the upper register, without as much... without tension.

Emily Jackson

Okay, thank you. Right, okay, so that's all the listening! Okay, so we're gonna do a little bit of reflecting on the training process now. So, yeah, just a few questions left now.

Emily Jackson

So... question nine is: since session one, do you feel you have made any progress towards using 'mix' voice? Please elaborate.

P1

Very much progress. Yes. I have found the lessons and the exercises – they've created a kind of – how can I put this? Like a breakthrough, in achieving this, after lots of other trials and errors. And just the combination of things we've done has led me to... a way of... doing 'mix' voice.

Emily Jackson

Okay.

P1

...so yeah.

Emily Jackson

Thank you. Um, okay, question 10. So if you feel you have made progress, and how long did it take, before you noticed any progress - from our first session onwards.

P1

About midway through, I would say; a sudden change in coordination. And... and not just that, but the less of a potluck, more of a proven kind of feeling, and a coordination that I can rely upon, to recreate that same... singing sound.

Emily Jackson

Thank you. Question 11, so... did you have any memorable breakthrough moments?

P1

Singing the open 'ah' sound, and suddenly being able to go through my passaggio without a break.

Emily Jackson

Great.

P1

It is great!

Emily Jackson

Haha!

Emily Jackson

Question 12. Were there any elements of the training, which you found particularly helpful?

P1

.... It's like you do the straw phonation... and... it's somehow... it's somehow led me down this path, so... although I can't say that, it itself feels useful, it is what has led me to that feeling, so that's sort of... the two must go hand in hand.

Emily Jackson

So when you had that breakthrough - about halfway through that you started to notice that, you just said, I think - did you find that it was after doing straw phonation?

P1

Yeah, it was like mastering the feeling of going through the straw without a break. And that... that sensation of how that... how that is... that feeling, and knowing when it's right, and when it's not right; knowing when the coordination suddenly feels right, and is natural and love voice wants to do it like that without you getting in the way.

Emily Jackson

Okay, so... talking about that... how many straws did you use on straw phonation? And has this changed at all?

P1

I can't really do straw phonation with one straw, and... it works best for me with two.

Emily Jackson

Okay, great.

P1

Which it works absolutely perfectly.

Emily Jackson

Great. So have you used two straws throughout the process?

P1

Yes.

Emily Jackson

Okay, great. Question 14, did you experience any challenges? And how did you overcome these?

P1

Um... without going into massive detail, the challenges that I have experienced are just purely personal to do with anxiety...

Emily Jackson

Mmm.

P1

... and how that how that can sometimes exacerbate issues. So...

Emily Jackson

Okay, thank you.

P1

That's an ongoing journey.

Emily Jackson

Okay. Thank you.

Emily Jackson

Question 15. How do you feel about the progress you've made?

P1

I'm really pleased. And it's... singing can be very frustrating...

P1

...you sort of, have peaks and troughs, you... make progress with one thing, then it sort of drops away, then you try something else, then that drops away. This is the first time it's been like... I can go back to it, and it's improving each time. So...

Emily Jackson

Thank you.

P1

So yeah - brilliant.

Emily Jackson

Thank you... and finally, question 16. What further progress would you like to make on your ability to utilise 'mix'?

P1

I'd like to feel that I can rely on my voice to sing songs in sort of higher keys. Upper... upper register tunes, male voice tunes, Stevie Wonder, Donny Hathaway and the like, and to... be able to get into that in a relaxed way, and feel that I'm not in some kind of lottery where I'm depending on this thing to work or not.

Emily Jackson

Okay. So... that is the end of the questions, really. So is there anything else that you'd like to add at all?

P1

[Shakes head]

Emily Jackson

We've probably covered most things, haven't we?

P1

Yeah.

Emily Jackson

Thank you very much.

Emily Jackson

End of interview.

APPENDIX 15 - P2 SEMI-STRUCTURED INTERVIEW

Emily Jackson

Right. Okay, so

Emily Jackson

right, so here's the interview. Um,

Emily Jackson

So first of all, let's think about your scales.

Emily Jackson

So in your questionnaire you said on a scale of one to 10. And when you asked her on a scale of one to 10, how much effort Do you generally use when singing over your transition area? You said, a six out of 10, usually the error of transition between the lower and upper registers.

Emily Jackson

So question one is, on a scale of one to 10, where one is minimum effort, and 10 is maximum effort, when singing through your transition on the scales we recorded today, how much effort did you use, would you say?

P2

I guess it felt a bit more, maybe a seven, or... it just felt like a different kind of effort. Really, I think before I'd be pulling back a little bit, not pushing too hard, because I felt like it was going to be really weak. So I think I feel like I can probably push a bit more. But still, I'm still being careful. But it does feel like a different type of effort, really.

Emily Jackson

Mmm. Okay - thank you.

Emily Jackson

So... in the questionnaire, you said that... when singing over your transition area, you said: "It mainly feels weaker, and harder to keep in tune. It's hard to achieve a harder sound with more attack... It feels weak and wobbly, like it could fall off a note easily."

Emily Jackson

So question two is: when singing through your transition on the scales today, how did it feel? Please describe in your own words in as much detail as you want.

P2

Yeah, I feel like it definitely feels more solid or more kind of... uh.... comfortable. And I can't remember the word... would be like... 'safe'...? I don't know, haha.

Emily Jackson

Yeah?

P2

I'm not... I'm not... I feel like there is some kind of... uh... yeah. I feel like I've got sort of reinforcement, if that makes sense. And then over, like around the note somehow, a bit more. I definitely don't feel like it's such a clear, like, sort of leap, or there's this horrible hinterland where I feel like I can't sing, I don't know where to sing basically, in my in my, in my chest or head.

Emily Jackson

So there isn't - that isn't there anymore? In the same way?

P2

It doesn't seem as clear, like, I'm not really sure what's there anymore. (Only sometimes, you know, if I'm not warmed up or anything, but..)

Emily Jackson

Okay. Alright. So, so let's think about your song excerpt. Yeah, so you previously stated that in your song, song excerpt, the phrase you found most challenging to sing was: "There ain't no room for the hopeless sinner". And that on a scale of one to 10 - minimum to maximum effort - your effort level when singing that phrase was eight.

Emily Jackson

So question three is: what effort level would you say you used today on that particular phrase?

P2

I think I wasn't pushing as hard on that word, and I think we sort of felt fairly solid, starting in a certain, you know, in sort of head voice range. So probably, I think generally, I've not been

pushing as hard. So probably like a seven or... I dunno... not, you know, drastically different but... I don't feel as tense.

Emily Jackson

Okay,

P2

Maybe six, seven... I dunno... yeah.

Emily Jackson

Okay.

Emily Jackson

So, in the questionnaire, you were asked, please describe, in your own words, how it feels to sing this most challenging phrase. And your response was: "using head voice for the higher part and flipping to chest voice feels awkward, and I'm unsure where best to do so".

Emily Jackson

So question four is: when you sang this phrase today, did it feel any different (and if so, how)?

P2

Yeah, I don't think I was thinking as hard about where to change; I felt a bit more confident in... I think, jumping between the two, kind of... I guess, the two bits voice chest or head didn't feel as clear and like, like, I'm having to land on a whole whole new part of my... singing, if that makes sense. It just felt...

Emily Jackson

Didn't feel as different, would you say?

P2

Yeah, and it just felt a bit more comfortable doing it, because it does feel a bit closer to the... I dunno. I feel like I'm singing in a similar part of my chest somehow, even when I'm in my head voice. I don't know if that makes sense...? Haha.

Emily Jackson

Yeah, great.

Emily Jackson

Um, so... question five. Are there any other parts of your song excerpt which felt any different today, in terms of kinesthetic sensations, then they did in your first session (and if so, please elaborate)?

P2

Yeah, I think the whole thing did, to be honest... I feel like I'm singing... my whole voice seems like I'm singing a bit more low down in my chest, or at least, that sort of low down in my throat somehow, like it feels further back... in my in my chest, and generally even, even the lowest stuff, I feel like I'm trying to sing in the same part. Because I know that when I go higher, I'll be wanting to use that part, if that makes sense.

Emily Jackson

Okay, great. So... so part two, I just want you to have a little listen through a couple of things. So, um, could you listen to your 'before' scales, please?

P2

Before scales... yeah, OK. And you saying like, listen to the whole thing?

Emily Jackson

Yes, please.

P2

Cool. [P2 listens to the recording and signals that he has finished]

Emily Jackson

Thank you. So... what did you hear as you moved up through the transition area, and how smooth were the transitions?

P2

Very clear flip... it's not at all smooth. Yeah, it sounds like kind of yodel... yeah... and pretty wobbly, and uncertain.

Emily Jackson

Okay, great. Could you listen to your 'after' scales, please.

P2

Yeah... here we go. [P2 listens to recording]

P2

[Signals that he has finished]

Emily Jackson

Alright, so... are those similar to session one recordings, or are there any notable differences?

P2

Yeah, definitely noticable.

Emily Jackson

...and if so, please elaborate: what did you hear, and how smooth was the transition?

P2

Even... so on the way up, I tend to be still flipping a little bit, but it seems like... less of a noticeable kind of yodel kind of flip thing. It's definitely there, but... and then coming back down, most of them were pretty smooth. It's hard to tell where the change was. And I think yeah, overall, it sort of sounded - sounded slightly different. I'm not quite sure how - the timbre, or whatever. Yeah, definitely.

Emily Jackson

Wonderful.

Emily Jackson

Right, so... if you could please listen to your 'before' song, and then your 'after' song.

P2

Alrighty.

P2

Okay. Eek - here we go! [P2 listens to recordings]

P2

All right - done.

Emily Jackson

Thank you. So... were your performances similar, or did you notice any differences? Please elaborate.

P2

Yeah, I did notice... I didn't, like... there are definitely similarities, but.. yeah. The second one sounded like less effort, like I was pushing less. And it was more in tune, I think just generally, 'cause I'd probably been practising singing, than before. I think that the really high bit somehow even sounded slightly different. It wasn't what I would say was 'nice', but it sounded a bit more... kind of somehow... yeah, less effort and kind of hooty probably.

Emily Jackson

Mmm. Okay - thanks.

Emily Jackson

So, part three. So... these questions are gonna be reflecting on the training process a little bit, so...

Emily Jackson

Question nine. Since session one, do you feel you have made any progress towards using 'mix' voice - please elaborate?

P2

Yeah, definitely. I think we have... obviously, we had a few... we had that one session, and... and then the last session, where I think it kind of there were elements of my voice that I was using completely differently from how I felt before, like they felt a lot more chesty, and... I wasn't entirely sure which part I was using: head or chest. And I think generally, I feel like I'm starting to sing in a slightly different... part. It feels like I'm using a different part of my voice somehow, yeah, generally. And pushing less. I think, if that makes sense?

Emily Jackson

Great - thank you.

Emily Jackson

So, question 10: if you feel you've made progress, how long did it take before you noticed any progress (from the first session onwards)?

P2

I would have said, real kind of noticeable progress was probably towards the end, like sort of - fourth or fifth session. When it started to feel like - I think there are little things, but I think that was really when it started to click, and I was like, "oh, okay; this is exciting".

Emily Jackson

Cool. Question 11: did you have any memorable breakthrough moments?

P2

Yes, yeah - there was that one - I think it was in the fifth session. Yeah, it was kind of a shock to me. Like I was singing, and it was almost like some someone else was singing, it felt kind of a completely different sensation. Which was, yeah, which was great.

Emily Jackson

Can you tell us any more about that?

P2

Yeah, I think it was just, um..... yeah, we were doing a... scale exercise, and it felt like I was using a different part of my voice than I'd ever had before. And I think it was a real kind of 'mix', sort of that sort of head voice, but with a real chesty vibe. Chesty kind of timbre - yeah.

Emily Jackson

Mmm. Okay, thank you. Um...

Emily Jackson

Question 12. Were there any elements of the training which you found particularly helpful?

P2

I think - well, generally, overall, but I imagine it felt like the kind of using different vowels and things to place a voice somehow differently. Like 'aahs' and 'oohs' and things - that was really interesting how... it showed how I would flip into different parts of my voice differently. And then the straw phonation generally just seemed like a really good exercise. And something I can do just watching TV or y'know, haha.

Emily Jackson

Great. So speaking of straw phonation, how many straws did you use on the show foundation? Has this changed at all?

P2

Yeah, I think we started on three, and then I worked down to two. And then two felt really comfortable by the end.

Emily Jackson

Great. Question 14. Did you experience any challenges? And how did you overcome these?

P2

Hmm, yeah, numerous challenges, I think. I'm trying not to push my voice over the kind of cracking bits, which I think it definitely helped because we're trying to use less effort anyway or less, you know, straining. I think, yeah, just having to slightly unlearn How To Sing.

Emily Jackson

Thank you. So, question 15. How do you feel about the progress you've made?

P2

It's exciting! I felt really good. I'd like to pursue it more. I would love to carry on looking into it. And practising.

Emily Jackson

Okay, thank you. Um, question 16. What further progress would you like to make on your ability to utilise 'mix'?

P2

I think, well, I felt like there's a long way for me to go. And it would be really interesting to kind of just solidify some of the things I've done and just yeah, go further down the path with that kind of just using higher parts of my voice in a more chesty tone; it seems like a really exciting, freeing kind of thing really, gives you a lot more freedom to sing different material.

Emily Jackson

Great, thank you.

P2

I don't know if that made sense to the question, sorry?!

Emily Jackson

Yeah, yeah. So um... that's the end of the questions I have prepared. So is there anything else you'd like to add at all?

P2

Um, no, not now, I think that's... yeah.

Emily Jackson

That's everything? Thank you very much.

Emily Jackson

End of interview.

APPENDIX 16 - P3 SEMI-STRUCTURED INTERVIEW

Emily Jackson

Okay, we're recording.

Emily Jackson

Okay, so -

Emily Jackson

In your questionnaire you are asked: on a scale of one to 10, how much effort do you generally use when singing over your transition area (so that the area of transition between your lower and upper registers)? You said: seven.

Emily Jackson

So question one is on a scale of one to 10, one is minimum effort and 10 is maximum effort, when singing through your transition on the scales we recorded today, how much effort did you use?

P3

Oh, I'd probably say about five, maybe.

Emily Jackson

Okay. Thank you.

Emily Jackson

In the questionnaire, you were asked, when singing over your transition area, how does it feel? And you responded: "slightly strained, it's like guesswork if I'm going to hit the note or not, I can feel where the note is supposed to be formed in my throat, usually get it, can feel when I'm not going to reach".

Emily Jackson

So question two is: when singing through your transition on the scales today, how did it feel? Please describe in your own words, in as much detail as you want.

P3

It felt like I knew what I was doing. And it felt like I wasn't using my body to try and simulate whether it was going to go there was less guesswork and less kind of like physical prompting, and it was more just like... I knew.... how to do it.

Emily Jackson

Great.

Emily Jackson

Okay, so let's move on to talking about your song excerpt, so you previously stated that in your song excerpt, the phrase you found most challenging to sing was: "the vocal run in the third line of the chorus". And that on a scale of one to 10, minimum to maximum effort, your effort level when singing this phrase was nine. So question three is, what effort level would you say you used today, when you were singing that particular phrase? On a scale of one to 10?

P3

Probably about six, six and a half?

Emily Jackson

Okay, thank you.

Emily Jackson

In the questionnaire, you were asked: please describe, in your own words, how it feels to sing this most challenging phrase. And your response was: "it feels like there are notes I just can't get in the scale. Even though I can hit higher notes, I have to start off with a high note. Whereas in the recording, he sings lower then goes into the run. So question four is, when you sang this phrase today, did it feel any different? And if so, how?

P3

Yeah, it felt more accurate... it felt like I knew what the notes were, and I didn't have to start higher, because I knew where the higher note eventually came in. And everything just kinda... made sense. It made sense what I was gonna do, and it wasn't like, there was notes, that were gonna catch me off guard, whereas beforehand, I was making the up as I kind of went along. It was an approximation rather than actually what he was doing.

Emily Jackson

Great - thank you.

Emily Jackson

Okay, so question five. Are there any other parts of your song excerpt which felt any different, say, in terms of kinesthetic sensations, so physical sensations, than they did in your first session? If so, please elaborate.

P3

Yeah - on the second line when he sings 'sweet'... it felt like... I could hit the note that that was on, easier. Like, and I felt like I could open my mouth and project it as well, like, in a stronger way than I usually could.

Emily Jackson

Great. Okay, thank you.

Emily Jackson

So, moving on to part two... this is going to be all perception of the before and after recordings. So, if you could open your folder that I shared with you, please, and if you could listen to your 'before' scales (so make sure it's the 'before' scales). I'd like you to have a listen through those - it'll take a couple of minutes - and then we'll talk about what you heard.

P3

Okay.

Emily Jackson

Thank you.

P3

[Listens to recording]

P3

Okay.

Emily Jackson

Thank you. So, you've listened to your 'before' scales. What did you hear as you moved up through your transition area, and how smooth were the transitions?

P3

Especially on the first scale, so the 'ahh' [demonstrates 13431 scale], I found on the descending notes, it was... I was rushing through them. They're like, 'ahh' [demonstrates the scale, rushing the rhythm of the descending notes], like... I wasn't really sure, or comfortable with them, and I found there was like quite an obvious flip as well.

Emily Jackson

Okay,

P3

..like, especially on those ones... and especially as I kind of went into head voice, it was like things got a little bit weak... and I was kind of struggling to hit the note properly as well.

Emily Jackson

Okay.

Emily Jackson

Thank you. Okay, so what I'd like you to do now is listen to your after scales, please. So those ones that we've recorded today.

P3

Here we go. [Listens to recording, then signals that he has finished]

Emily Jackson

Thank you. Okay, so... you've listened to your 'after' scales. Are these similar to the session one recordings, or are there any noticeable differences? And if so, please, elaborate: what did you hear, and how smooth was the register transition?

P3

On the scales... I thought they were very smooth, and they were a lot more controlled. The transition was pretty seamless, for the most part. The descending notes - they weren't rushed. They were quite like... the rhythm was pretty much there. If I'm being honest on the glides on the 'ah' glides, I thought they were quite weak going up and strong going down.

Emily Jackson

Okay, thank you very much. Right, so question eight. I'd like you to listen to your 'before' song and listen to your 'after' song. So if you could listen to both of those please starting off with the 'before' one.

P3

Mmm-hmm.

Emily Jackson

Right. Okay, so um, you've listened to your 'before' song and your 'after' song. Are your performances similar, or did you notice any differences? Please elaborate.

P3

I think they were entirely.... It was almost like they were two different songs! On the second line on the 'sweet' on the 'before', I was putting consonants in left, right and centre; I just wasn't sure of it really. On the same word in the next one, it was all on the same, like on the same breath. Like there was no 'helping it along'. The run on the first one I was always like on the 'before' on the vocal run / vocal riff, I always used to think, 'Oh, yeah, that's... it's close enough. It sounds alright' - but then listening to it in the 'after', it's like, 'oh, no, that's what it should sound like'... that sounds much better, once you actually have an idea about what you're doing. You're not just again, guesswork it guessing your way through it. And I think... that part could still probably be stronger, but that's just going to keep coming with practice, more than anything.

Emily Jackson

Okay, thank you. Great. So that's all of the listening.

Emily Jackson

So now we're going to move on to part three - so, reflecting on the training process. So question nine. Since session one, do you feel you have made any progress towards using 'mix' voice? Please, elaborate.

P3

Yeah, definitely... I kinda... I know what I'm doing a little bit more. Now. I know how to access parts of my voice, and how to transition through without it being... it being strained, or starting to shout, or competing to keep it in chest voice; I kinda... I've learned to kind of let go of 'everything has to be in chest voice'. Accessing the part of my head voice that's not just falsetto, if that makes sense. Like getting higher, but more powerful. So I don't sound like Frankie Valli all the time, if I'm gonna go really high.

Emily Jackson

Thank you. Question 10. If you feel you have made progress, how long did it take before you noticed any progress? So from how long from our first session onwards did it take?

P3

I'd say by the third session, things were getting easier. And then between third and the fourth session, like when I was practising midweek, I was like: Okay... this is what it should sound like, this is more kind of... it sounds like when you do it. And when I was doing it to start with, because I'm not like a singer who's trained or anything, I'm just like the guy... who relies on kind of natural ability, whatever I can do naturally. But actually knowing a little bit of the theory, and then actually practising it - it helps tenfold. And I kind of noticed that about the third week in, I think, yeah.

Emily Jackson

Thank you... question 11. Did you have any memorable breakthrough moments?

P3

I think it might have been on the minor pentatonic scale. When I was kind of figuring out like, breaking things down - but not just in terms of like the riff that we were working on, but like in terms of like, breaking things down and listening for the individual notes, and then knowing whereabouts in my range that I will be going to the head voice from there and just being comfortable with going to it. Maybe it's because it seemed like a kind of a scale that I use all the time. But I felt like that was like the moment where I was like, no, I can actually use this in like my band life, and like actual performance, rather than it just being i dunno, like theory or just warm up exercises or just practices, do you know what I mean?

Emily Jackson

So you... so did you find that using the minor pentatonic scale, you found that relevant?

P3

Yeah, that was probably the first time where I was like, okay, that's really, really relevant, because, like, still in the band won't be doing Tennessee whiskey anytime soon, like I wouldn't dream of trying to do that live just yet! But... that was one where I was like, oh, I can see where I've been going wrong. Like in my, like, when I'm actually performing. And now when I look back, I'm like, if I'd done it like that, or I'd used this part of my voice, rather than straining for a big note, then... it'd improve it tenfold. And now I just wish there were gigs, so I could practice!

Emily Jackson

Yeah!

P3

Like live again!

Emily Jackson

Absolutely! Thank you.

Emily Jackson

So my next question actually is question 12. Were there any elements of the training which you found particularly helpful?

P3

So yeah - minor pentatonic, the straw phonation, and... and whenever you shout at me for making the wrong vowel sound, as well!

Emily Jackson

Ha ha ha!

P3

(You don't shout!)

P3

Yeah, cos I'm definitely really guilty of doing that. But then I suppose I'm like that, like the musicians I listen to like Pearl Jam, Bruce Springsteen, they always like... you can't understand a word Eddie Vedder says anyway! But... Bruce Springsteen as well, he puts on different accents depending on the song and it's like nothing ever sounds like it should sound, but...

Emily Jackson

There's a lot of individuality isn't there, in contemporary singing?

P3

But it'd be nice to... to actually be able to make the word sound like the actual word, because I have quite like an interest in musical theatre as well. Like I always say I want to be Audrey II from Little Shop of Horrors, I thought that'd be a great job!

Emily Jackson

Yes!

P3

Like stuff like that, or things like you know where it's like... a lot of words crammed into a short space, like you know, kind of... not rap, but like...

P3

Yes.

P3

...when things are quick, especially like because it happens sometimes in blues and rock'n'roll, doesn't it? It's like I'd like to be able to be like, working my pronunciation and I think, by working on the right vowel sound, whatever, probably helps that as well.

Emily Jackson

Thank you. Um, question 13: how many straws did you use on straw foundation? And has this changed at all?

P3

Yeah, so I started I think I started the first week on four, actually. And then I went to three. Now I think I started on two didn't like it. So I went to three and then thought, I'm gonna cheat and put a fourth one in there, make it easy. And then I went down to three pretty soon after now I'm back on to two.

Emily Jackson

And how does that feel now? How does phonating through two feel like, compared to what it did at the beginning?

P3

It feels a lot easier. I think cos I didn't have the technique down either. But now that I've got the technique down, like last week, I kind of I think last week was when I went down to two. So was it week five? And it was a struggle at first, but now - that was easy. It was easy as it was with three.

Emily Jackson

Great, thank you... question 14: did you experience any challenges, and how did you overcome these?

P3

Challenges... I think maybe making the right vowel sounds, again, like and... kind of physically visualising the notes. And like the way it kind of changed my body shape and probably changed the way the notes were coming out anyway. It's still a challenge. I still really struggle to just picture the note, I still feel like I'm grabbing for it, like literally grabbing for it sometimes. And yeah, maybe the transition to from chest to head voice, especially on the on the glides, I find that quite difficult, and the flip was still... the flip is always, like it's still there. I'm really struggling to iron it out, but I think today, like there's a couple of times where it really started to iron out... but again, it's just a work in progress.

Emily Jackson

Thank you. Okay, so, question. 15 - so just a couple more questions now - so question 15. How do you feel about the progress you've made?

P3

I feel like I'm a better... maybe not necessarily a better singer than I was six weeks ago, but I feel like I've definitely... I know more now. And I feel like it kind of informs me when I'm singing, I'm actually thinking about it, rather than just feeling my way through - if that makes sense. I feel like I'm a little bit smarter for it, and it kind of reflects when I'm actually singing. And not just singing like the song that I've been working on with you, but like, with other things as well. And when I kind of put that into practice, and I kind of do... not even a before and after, but I'll be singing it and then I'd be like: oh no, why don't I try that. And then I'll do it again, and be like: oh, no that actually sounded a lot better. And that's really like, quite rewarding to see.

Emily Jackson

So do you think that you've, you're more reflective in your process when you're practising?

P3

Yeah. And maybe it comes from like a place like - I'm the most self-critical guy when it comes to my own performance. Like if I hear something I don't like, and like when I'm singing live, like, I hate myself for a week. But now it's kind of like, I'm like: oh, well why don't I try that? And actually, I have like some information that's kind of based on relevant theory rather than just nothing.

Emily Jackson

So maybe a little bit more... like curiosity instead of judgement, perhaps?

P3

Yeah, yeah. Yeah, definitely.

Emily Jackson

Thank you. Okay, question 16: what further progress would you like to make on your ability to utilise 'mix'?

P3

I'd still like to iron out that flip. When I hear it now, it feels like I'm going down, and then I just... it's like, for me, it's like going down a ladder or a slide and then the bottom just bopping in there, and me just hitting the ground.

Emily Jackson

So that's... that's when on descending ones, is it?

P3

Descending, yep. Descending, when I'm doing a straw-work, and then in the glides when ascending it on an 'ah' sound. It's like, I'd like to, for that just to be smooth. And I think maybe erm... yeah, just making the head voice stronger and stronger as I go along. Because that's where all the fun notes are!

Emily Jackson

Ha ha. Thank you.

Emily Jackson

Right, so... that's all of the questions that I have prepared, so - is there anything else that you'd like to add? We've covered a lot of things but...

P3

No, I think I'm pretty much covered... nothing that I haven't already said.

P3

Okay - thank you very much.

P3

End of interview.

APPENDIX 17 - P1 RECORDINGS – TEACHER QUESTIONNAIRE SUMMARY

CODING KEY:

'AFTER' RECORDING SHOWS IMPROVEMENT

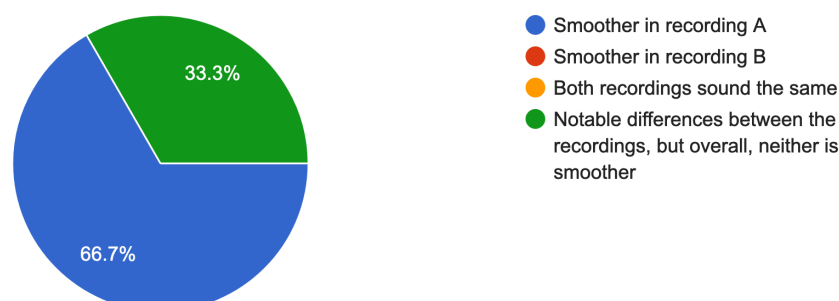
NO IMPROVEMENT

'BEFORE' RECORDING MORE 'SUCCESSFUL'

P1 SCALES / GLIDES - Please listen carefully to recordings A and B. Consider how smoothly the singer demonstrates the register transitions, in terms of intonation, tone and projection.

In which recording (A or B) do you feel the singer demonstrates smoother register transitions?

3 responses



KEY:

B = BEFORE

A = AFTER

T1 comments: – smoother in recording A (AFTER)

Much more consistency of tone and pitch in recording A. In recording B, there is a notable change in timbre (flip) at bridge, tone becomes thinner and breathier. In recording B, pitch is unstable throughout as voice breaks/yodels around bridge. Recording A eliminates most of this, much smoother transition throughout range.

T2 comments: : – smoother in recording A (AFTER)

Both are a little shaky in terms of fundamental frequency, but there is marked improvement in smoothness in recording A

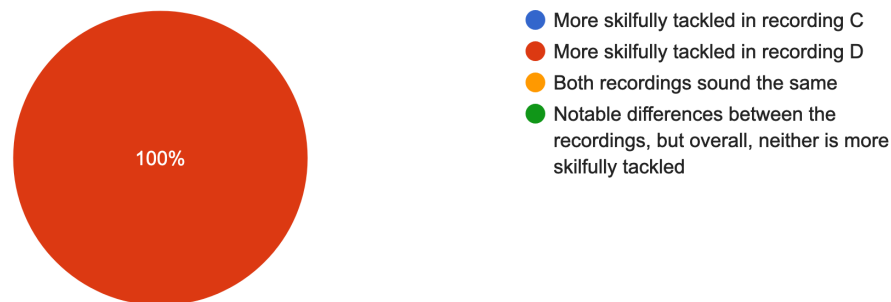
T3 comments: : – notable differences but overall, neither is smoother

Parts of the bridge was smoother in A

P1 SONG EXCERPT - Please listen carefully to recordings C and D. Observe how skilfully the singer negotiates the transition area; consider factors such as accuracy of intonation, any abrupt changes in tone or projection, and stylistic accuracy of tone.

In which recording (C or D) do you feel the singer tackles the challenges of the transition area more skilfully?

3 responses



KEY:

D = BEFORE

C = AFTER

T1 comments: More skilfully tackled in recording D (before)

I felt there was more consistency of pitch, tone and projection in recording D. In recording C, the second "oh" sounds slightly forced and unstable, and the following "never" cracks a little so that the tone becomes inconsistent and it loses some of the projection. While recording D has a little tone inconsistency over the "never gives out," it is much less pronounced than in recording C.

T2 comments: More skilfully tackled in recording D (before)

The transition was much less wobbly on recording D

T3 comments: More skilfully tackled in recording D (before)

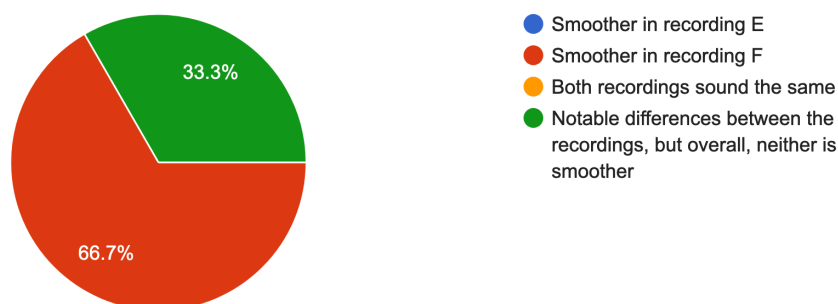
Recording D was a lighter vocal production, so presumably further on in training. The vibrato sounded easier and more comfortable.

APPENDIX 18 - P2 RECORDINGS – TEACHER QUESTIONNAIRE SUMMARY

P2 SCALES / GLIDES - Please listen carefully to recordings A and B. Consider how smoothly the singer demonstrates the register transitions, in terms of intonation, tone and projection.

In which recording (E or F) do you feel the singer demonstrates smoother register transitions?

3 responses



KEY:

E = BEFORE

F = AFTER

T1 comments: – smoother in recording F (AFTER)

While there was a noticeable "flip" in both E and F, it was much more pronounced and disruptive in recording E. The tone quality was much more consistent over the bridge in recording F. The pitch was a little less consistent in recording F, however.

T2 comments: – smoother in recording F

Although the scales were both a bit unstable in transition, the slides in recording F were noticeably smoother

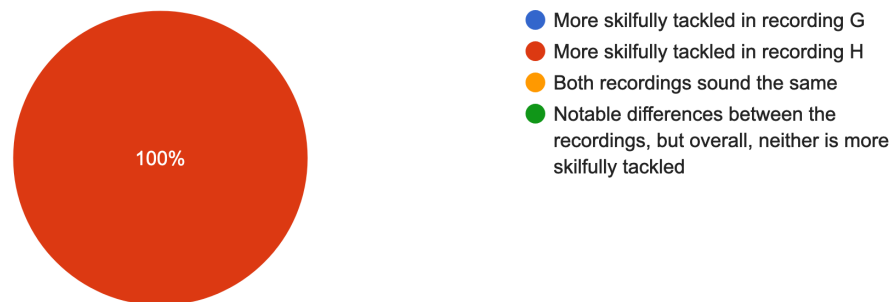
T3 comments – notable differences between the recordings, but overall, neither is smoother:

He self corrected more in example E, so was more aware of his voca[l] technique.

P2 SONG EXCERPT - Please listen carefully to recordings C and D. Observe how skilfully the singer negotiates the transition area; consider factors such as accuracy of intonation, any abrupt changes in tone or projection, and stylistic accuracy of tone.

In which recording (G or H) do you feel the singer tackles the challenges of the transition area more skilfully?

3 responses



KEY:

G = BEFORE

H = AFTER

T1 comments:– more skilfully tackled in recording H (AFTER)

Tone quality was much more consistent in Recording H, as was pitch. Some parts of recording G had a "yelly" quality which compromised pitch and transition, especially at the end of the recording, which wasn't present in recording H.

T2 comments:– more skilfully tackled in recording H (AFTER)

Both recordings showed an audible shift into falsetto, but recording H showed slightly more skilful use of mix in the latter part

T3 comments:– more skilfully tackled in recording H (AFTER)

The flips and high larynx was less prominent in the second example

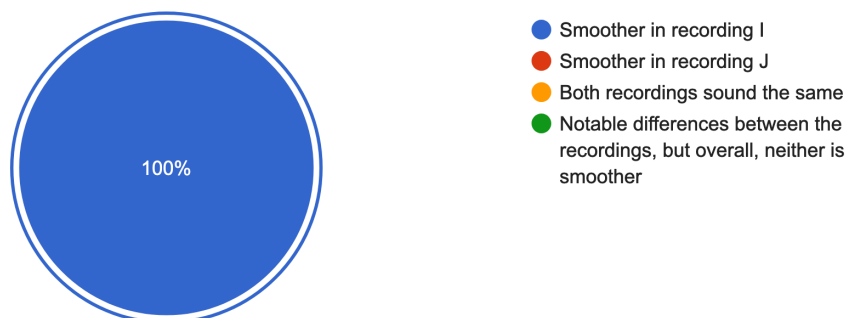
APPENDIX 19 - P3 RECORDINGS – TEACHER QUESTIONNAIRE SUMMARY

SINGER P3 - SCALES / GLIDES RECORDINGS

1. Teachers' perceptions:

In which recording (I or J) do you feel the singer demonstrates smoother register transitions?

3 responses



KEY:

J = BEFORE

I = AFTER

T1: smoother in recording I (AFTER)

Comments:

There is some slight pitchiness in both recordings, however in recording J, as the singer approaches the bridge, the pitch begins to plateau until he switches to "head voice". As he does this (in recording J) there is an obvious change in tone and projection. The transition in Recording I is **much smoother and the tone and pitch much more consistent** as he navigates over the bridge area.

T2: smoother in recording I (AFTER)

Comments:

There was greater pitch instability during transition in recording J

T3: smoother in recording I (AFTER)

Comments:

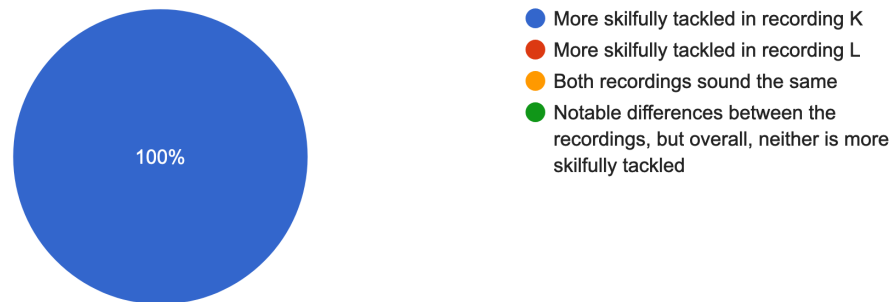
Less intonation issues [in recording I], although a challenging vowel modification

SINGER P3 – SONG EXCERPT RECORDINGS

1. Teachers' perceptions

In which recording (K or L) do you feel the singer tackles the challenges of the transition area more skilfully?

3 responses



KEY:

L = BEFORE

K = AFTER

T1: more skilfully tackled in recording K (after)

Comments:

The difference wasn't as obvious between these recordings, and comparison was made a little more difficult by a slightly different phrasing in each recording, however I think recording K was marginally more successful. Recording K was slightly lighter in attack in the bridge area which made the overall performance more consistent. The run on "warm" in recording K was well navigated over the bridge area, was consistent in pitch and tone and was cleaner than a similar run in recording L.

T2: more skilfully tackled in recording K (after)

Comments:

"I felt that both recordings were good, but K showed a more skilful use of mix and some sweeter tone and vibrato"

T3: more skilfully tackled in recording K (after)

Comments:

Although the roughness is nice, the flexibility seems improved in riff on the first recording [K, i.e. 'after' recording] which suggests healthier and more balanced production

APPENDIX 20 – P1 CODING MATRIX (KINAESTHETIC BEFORE / AFTER)

P1	In vivo codes	Theme
Before – Transition Area	“constriction” “tightening of jaw, tongue” “rising larynx” “reach the notes”	constriction constriction rising larynx reaching
Before – Song Phrase	“lots of breath support needed” “much concentration to get the right coordination to navigate” “focus on 'inhaling the voice', so as not to push and create too much pressure”	active breath support much concentration to navigate focus on 'inhaling the voice' trying to avoid too much subglottal pressure
After – Scales/Glides	“It doesn't feel like [my initial description] anymore” “larynx stays low and moves out of the way and my throat is more open” “the sound stays more in my larynx area [whereas previously] it was moving upwards” “I don't have to reach” “there's no reaching” “no strain” “I'd go so far as to say zero strain” “sort of... tension, that created an issue – but not... a <u>singing</u> issue. So, just my own tension”	different sensation low larynx no constriction low larynx no reaching no reaching no constriction no constriction tension caused by anxiety “created an issue”
After – Song Phrase	“Yes, it did feel different.” “I don't need to create the support down lower in my...abdomen” “there's no buildup, so that's not an issue” “trying to keep the vocal cords...in that engaged feeling” “not pushing” “so that's quite different” “it's only the last phrase that causes... some small level of anxiety as it approaches”	different sensation no active breath support needed no buildup of breath pressure a focus on maintaining the feeling of vocal fold engagement not pushing different anxiety stronger tone

	“it's <u>on</u> the voice more” “more acoustic resonance in my voice”	more resonant
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APPENDIX 21 – P2 CODING MATRIX (KINAESTHETIC BEFORE / AFTER)

P2	In vivo codes	Theme
Before – Transition Area	“weak” “wobbly” “could fall off a note easily” “pulling back a little bit, not pushing too hard, because I felt like it was going to be really weak”	weak unstable unstable ‘pulling back’ weak
Before – Song Phrase	“Using head-voice for the higher part and flipping to chest voice feels awkward” “I’m unsure where best to do so”	flipping awkward uncertainty
After – Scales/Glides	“it definitely feels more solid” “more...comfortable” “I can’t remember the word.... ‘safe’...?” “I feel like I’ve got...reinforcement” “I definitely don’t feel like it’s such a clear...leap” “there’s [no longer] this horrible hinterland where I feel like I can’t sing, I don’t know where to sing...in my chest or head.” “it just felt like a different kind of effort” “I feel like I can push a bit more [without it becoming weak]” “I’m still being careful” “it does feel like a different type of effort” “the whole thing [felt different], to be honest”	secure more comfortable secure secure less obvious flip less uncertainty ‘different kind of effort’ secure ‘still being careful’ ‘different kind of effort’ different
After – Song Phrase	“I wasn’t pushing as hard on that word” “felt fairly solid, starting in a certain, you know, in sort of head voice range” “I’ve not been pushing as hard” “I don’t feel as tense” “I don’t think I was thinking as hard about where to change” “I felt a bit more confident in... jumping between the two” “the two bits...chest or head didn’t feel as clear and like I’m having to land on a whole new part of my... singing”	pushing less hard secure pushing less hard less tension less uncertainty more confident tone more consistent between registers more comfortable

	“it just felt a bit more comfortable” “I feel like I'm singing in a similar part of my chest somehow, even when I'm in my head voice” “my whole voice seems like I'm singing a bit more low down in my chest, or at least, that sort of low down in my throat somehow, like it feels further back... in my in my chest, and generally even, even the lowest stuff, I feel like I'm trying to sing in the same part. Because I know that when I go higher, I'll be wanting to use that part, if that makes sense.	less disparity between registers
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APPENDIX 22 – P3 CODING MATRIX (KINAESTHETIC BEFORE / AFTER)

P3	In vivo codes	Theme
Before – Transition Area	“slightly strained” “guesswork if I'm going to hit the note or not” “can feel when I'm not going to reach”	strained uncertainty reaching
Before – Song Phrase	“It feels like there are notes I just can't get in the scale, even though I can hit higher notes.” “I have to start off with a higher note, whereas in the recording he sings lower then goes into the run.”	‘notes I just can't get’ has to change melody to negotiate
After – Scales/Glides	“I knew what I was doing” “I wasn't using my body to try and simulate whether it was going to go” “less guesswork” “less...physical prompting” “more just like... I knew.... how to do it”	more assured less extrinsic effort more assured less extrinsic effort more assured
After – Song Phrase	“it felt more accurate” “it felt like I knew what the notes were” “I didn't have to start higher” “everything just kinda... made sense” “it made sense what I was gonna do” “it wasn't like, there was notes, that were gonna catch me off guard” “I was [no longer] making [it] up as I...went along” “It was [no longer] an approximation” “on the second line when he sings 'sweet'... I could hit the note that that was on, easier... I felt like I could open my mouth and project it as well...in a stronger way than I usually could”	more accurate more assured not necessary to change melody more assured more assured more assured more assured more accurate easier to hit notes more resonant

