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CAN CHANGES IN FACIAL EXPRESSION SERVE AS TOOL TO IMPROVING TUNING COMPETENCY IN NOVICE SINGERS?

**A Mixed Methods Study
By Tanya Holt**

JUSTIFICATION

Tuneful singing is a foundational singing skill

Edmonds et.al, 2023; Pfordresher et al., 2007

Lack of perceived innate ability can lead to self-reporting as tone deaf

Numminen et al., 2015; Wise and Sloboda 2008

Development of remedial tools

LITERATURE REVIEW

Historical Pedagogical Texts



Facial expression and singing

Impact of facial expression on timbre

Lamperti, 1877; Mancini, 1774; Tosi 1723



Advent of spectrographic Technology

Bozeman, 2019; Miller, 1996, 2004;
Nair, 1999; Obert, 2023

Causes of poor pitch singing



Too many variables to isolate or measure conclusively

Herbst, 2016; Numminen et al., 2015; Zhang, 2016



Pitch accuracy requires coordination of auditory perception, motor and memory abilities

Dalla Bella, 2012

Vocal Sensorimotor Loop

Facial expression causes



Outward manifestations of physiological changes in vocal mechanism

Janagisawa et al., 1991; Sundberg, 1979;
Thomson and Russo, 2007

Ascending pitch associated with emotional arousal

Fisher et al., 2020; Scherer, 2003

Control of amplitude and timbre

McQuade, 2018; Miller, 2006, Sundberg, 1979

Communication with audience

Pinto et al. 2014

THE EXPERIMENT

- 11-participants self-identifying as novice or beginner singers
- Eight exercises sung with three prescribed facial expressions recorded using spectrographic software
- Short unstructured interviews
- A comparative analysis of mean fundamental frequency between facial expressions

Can facial expression improve tuning in singing?

RESEARCHER NEEDS YOUR HELP!

Would you be prepared to anonymously record a few simple melodies using differing facial expressions to contribute to this research study? Please contact me for further information: tanya@tanyaholt.co.uk
THANK YOU!



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

ETHICAL CONSIDERATIONS

Ethical Principles University of
Wales and Trinity Saint David

Participant welfare and anonymity

Belmont Report (1979)

Insider Researcher positionally

Charmaz (2006)

METHODS

OUTLINE

1. ETHICAL APPROVAL



2. RESEARCH PROPOSAL



3. LITERATURE REVIEW



4. PARTICIPANT
CONSENT PROTOCOLS



5. PROCEDURE
UNDERTAKEN



6. QUANTITATIVE DATA
ANALYSIS



7. QUALITATIVE DATA
ANALYSIS



8. THE RESULTS



9. FINDINGS



PROCEDURE

OUTLINE

1. STUDIO SET-UP



2. VOCAL WARM UPS



3. LEARNING THE
EXERCISES



4. LEARNING THE FACIAL
EXPRESSIONS



5. RECORDING THE
EXERCISES



6. UNSTRUCTURED
SHORT INTERVIEWS



PROCEDURE

THE EXERCISES

Vowels

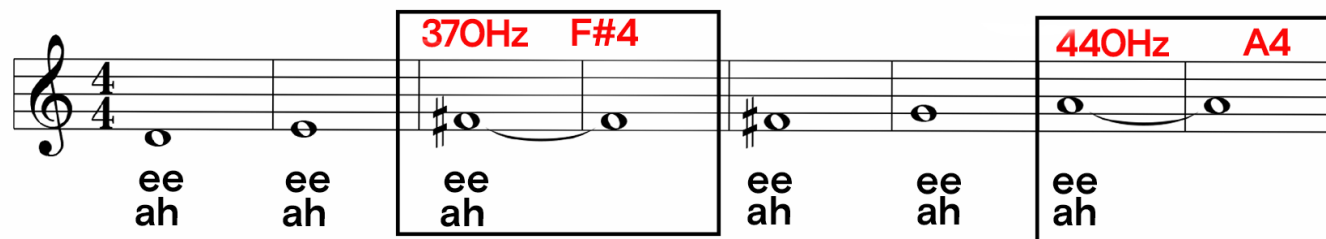


Figure 1. First vowel exercise (notes to be measured are highlighted).

Palm Trees

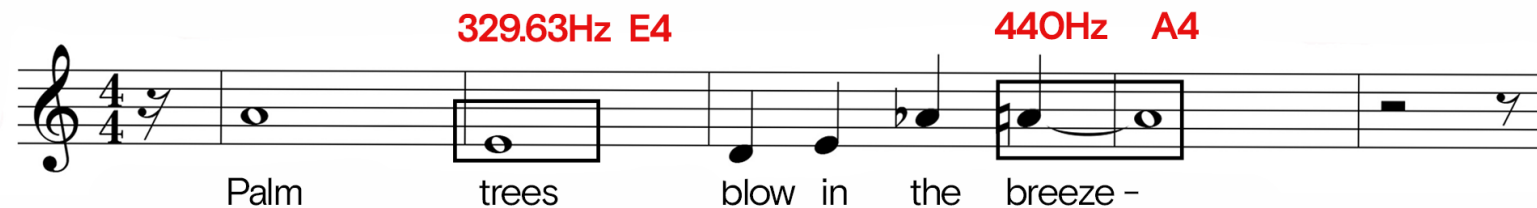


Figure 2. First word exercise

PROCEDURE

FACIAL POSTURES

1. Vocal pedagogy focuses on relaxation and a lack of tension (Fisher et al, 2020).
2. Squinty face frequently observed across genres, notably in the higher ranges (Obert, 2023).
3. The Rose draws on historical classical pedagogical instructions to smile, lift the eyebrows and cheekbones, flair the nostrils and show the teeth (Mancini, 1774).

1. Neutral Face



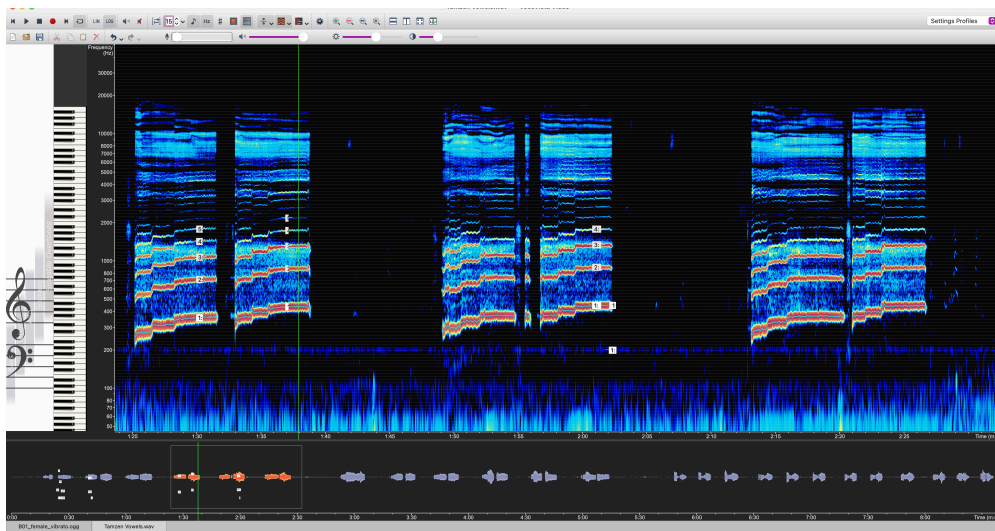
2. Squinty Face



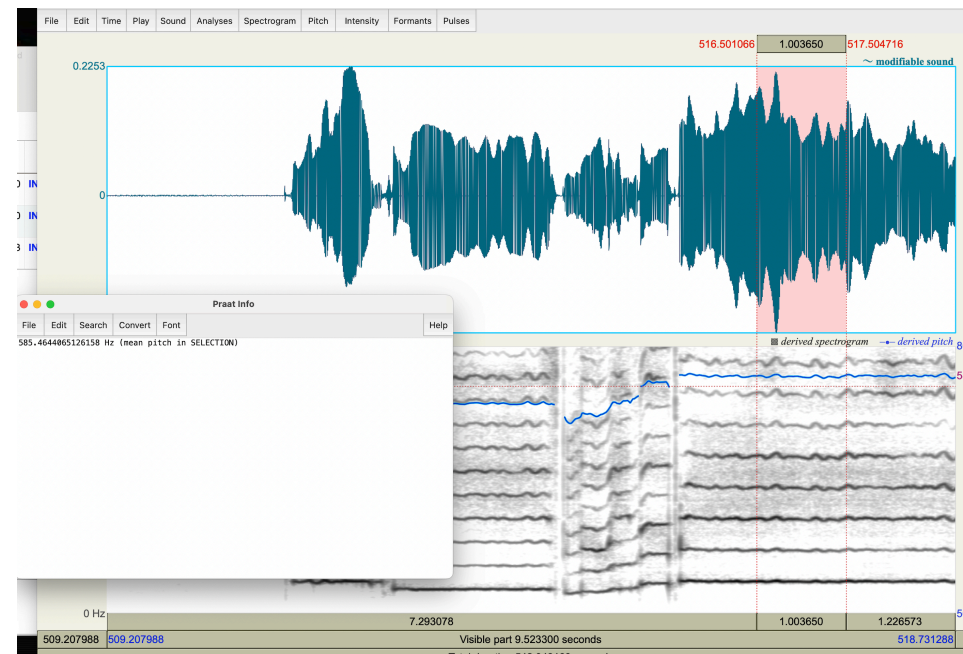
3. Sniff the Rose



COLLECTING THE DATA



Step 1. Voce Vista



Step 2. Praat

COLLECTING THE DATA

Exercise 1: 'ee' Vowel

Two notes scrutinised



Participant Identity	Neutral Face	Neutral Face	Squinty Face	Squinty Face	Sniff the Rose	Sniff the Rose
A	-229	-196	-11	59	-3	9
B	48	-29	28	-13	43	-67
C	18	-1	25	17	2	-8
D	8	-21	26	1	60	0
E	-3	4	7	-16	39	-13
F	0	9	-23	6	-16	1
G	-8	-1	-2	17	15	-6
H	-29	N/a	-70	251	30	345
I	-17	21	18	19	-7	13
J	-8	4	21	-2	39	2
K	15	16	22	44	26	26
Mean Pitch	-19	-19	4	35	21	27

Metric used: Cents

100 cents = semitone

50 cent allowance either side considered 'in-tune'
(Dalla Bella, 2013; Hutchins & Peretz, 2012)

Fundamental Frequency = 0

Outliers identified: A and H

RESULTS

Note: The mean pitch ratings for specified notes in three conditions, Neutral face, Squinty face and Sniff the Rose are reported above for analysed measurements ($n = 9$). Pitch is measured in cents, with zero representing the fundamental frequency. Standard Deviation is reported in the error bars.

Paired sample t-tests determine relative effect of facial postures on fundamental frequency:

Neutral & Squinty, recorded statistical significance (Field and Hole, 2003)

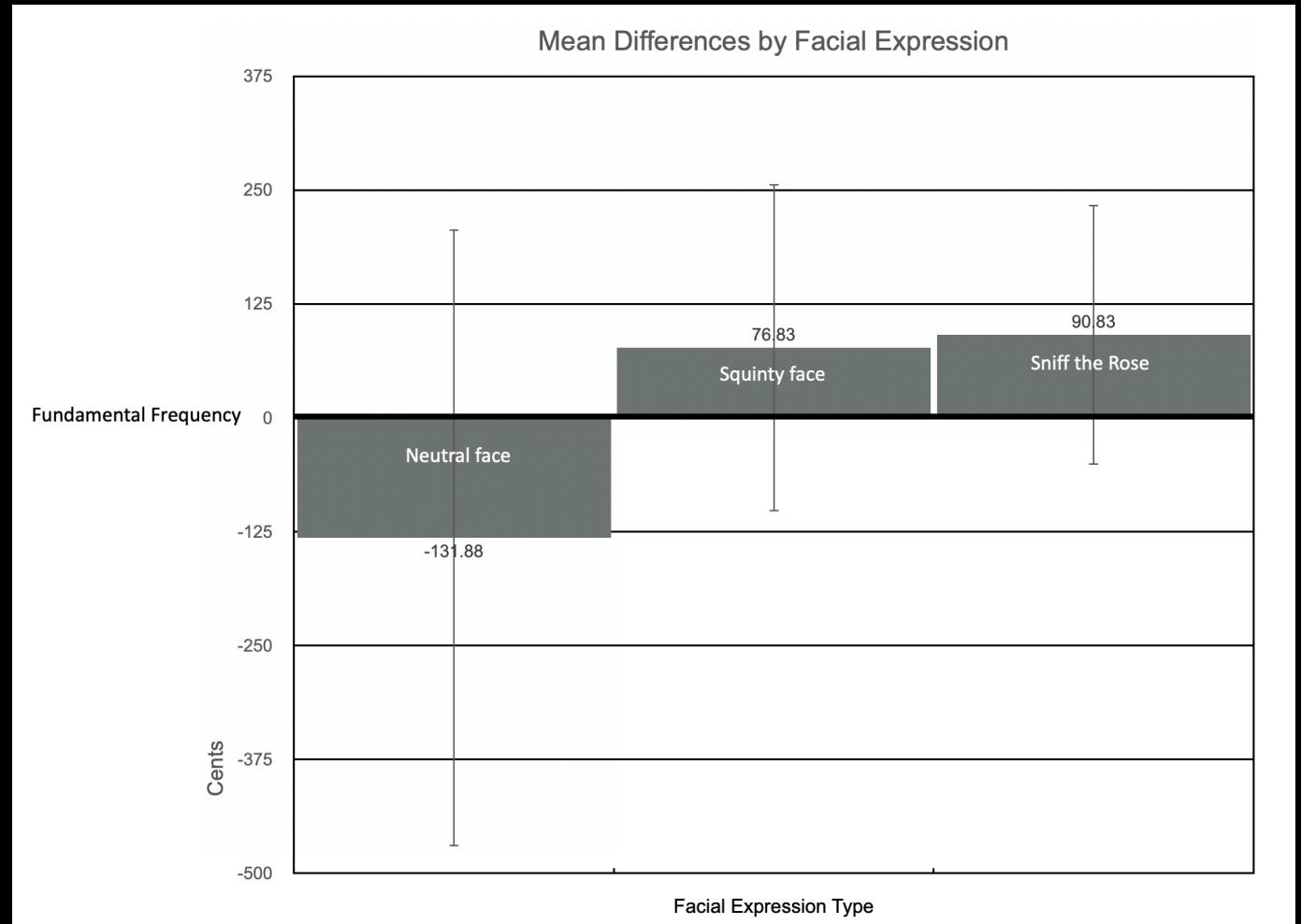
($t = 0.041$, $p > .05$)

Neutral & Rose

($t = .078$, $p < .05$)

Rose & Squinty

($t = .855$, $p < .05$)



FINDINGS

- In a small sample of beginner singers ($n = 9$), changing facial expression impacted the fundamental frequency.
- Squinty posture is mathematically closest to the fundamental frequency across most of the exercises and Sniffing the Rose shows a consistency for above-the-target pitching.
- Neutral face demonstrated a pitch-deficit across the experiment, increasing with ascending pitch.
- The extreme standard deviations recorded suggest instances of over-reaching the target.
- Outliers suggest that 'facial pitching' might be a more suitable strategy for those singers who are able to preconceive the note but do not yet have the developed motor skills or muscular flexibility, essential elements of the auditory-phonatory circuit (Dalla Bella, 2009).

FINDINGS

NEUTRAL FACE



- Extreme pitch deficit recorded by the execution of the Neutral Face; $M = (-)131.88$ relative to the rose $M = 90.8333$ and squinty face $M = 76.83$, across the whole experiment. An emerging consideration might be that a perceptual lack of facial expression, such as Neutral face, might increase the chances of pitch inaccuracy.
- Participants reported Neutral face to be problematic in achieving high notes with $n = 6$ reporting, variously, that Neutral felt under-powered, was a hinderance in high note singing and that the overall sound was “dull” (A). Others reported that equating Neutral with relaxation, allowed for easier singing.
- Participant I observed that the descriptor ‘Neutral’ was misleading, suggesting it was in itself an extreme facial expression akin to a theatrical ‘dead-pan’ expression.
- “Neutral face highlights how singing is easier if you use your face” (A)
- High notes “feel” higher in the head, therefore, attempting to maintain a neutral facial posture on ascending pitches proved challenging (G)

FINDINGS

SNIFF THE ROSE



- Participant feedback very positive, particular references to a feeling of “fluidity” in the breath. (C)
- “It made me want to sing out and perform.” (C)
- “It felt like Rogers and Hammerstein, a performance element.” (E)
- “It felt more dynamic. It felt like more power coming through. Opening everything up, opened me up.” (F)
- “The sound is nicer on sniff the rose. The sound is rounder.” (G)
- “Breathing-wise, sniff the rose gave me the most energy for the breath. Everything felt more open and that felt good.” (J)
- The word ‘surprised’ was included in the descriptors and several participants agreed that this was the keyword for enabling the posture with ease.
- Participants adjustment shoulder posture while ‘sniffing’, consequently changing the head-neck alignment (Miller, 1996).
- Downward pitch direction resulting in below frequency measurements, suggesting Rose to be efficient on ascending frequencies

FINDINGS

SQUINTY FACE



- Several participants reported improved access to higher notes with some finding the posture difficult to achieve. In vivo observations record strenuous physical effort by some.
- The easiest for accessing high notes “especially showing the teeth and lifting the cheekbones.” (J)
- G agrees that it is easier to produce higher notes, but that “Squinty has a more piercing quality to the sound” preferring the rounder sound of the Rose.
- “Potentially easier to reach high notes than sniffing” (F)

DISCUSSION

- Striking negative impact of Neutral face on pitching.
- Implications in a pedagogical setting?
- Primary focus in singing pedagogy is on relaxation to avoid excessive tension in the vocal system (Fisher et al., 2020; Larrouy-Maestri and Morsomme, 2014) and avoiding stress in the facial musculature (Linklater, 1976, 2006).
- ‘Relaxation’ was a key word used in the description of Neutral for this experiment, and yet the posture was found to be inhibiting.
- A student instructed to relax their face may variously resort to a static or “dead-pan” posture (participant I) and perhaps the effort to relax in itself, might create tension in the vocal system, when misconstrued. Perhaps a review of semantics?
- The importance of facial animation in early years teaching to avoid children learning to sing with neutral expressions?
- The Still Face Experiment (Tronick, 1976) seminal research supporting the value of facial expression in early years development

LIMITATIONS

- The complex nature of singing makes it impossible to identify whether it is facial expression alone that has caused the acoustic changes in the output in this experiment (Dalla Bella, 2012; Herbst, 2016; Hutchins & Peretz, 2012; Pfordresher & Brown, 2007; Watts et al., 2003; Welch, 1983; Zhang, 2016).
- Without the benefit of high definition and motion capture video it remains impossible to get an exact metric of facial expression, which will vary from person to person (McQuade, 2016).
- Participants tended to use exaggerated facial postures to a degree that may have affected the pitch outcomes.
- The sample size is very small and limited to amateur singers. A repeat study of more advanced singers using more naturalistic interpretations of the postures might be of value.

CONCLUSION

- Singing in tune is a foundational skill, however it can present as a major challenge to some people (Dalla Bella, 2009; Edmonds et.al, 2023; Pfordresher and Brown, 2007)
- Developing remedial strategies is complicated as singing is a complex process, making the identification of a single cause difficult (Berkowska and Dalla Bella, 2009; Herbst, 2016; Numminen, A. et al. 2015; Zhang, 2016).
- The postures that elevated the facial features, Squinty and the Rose, delivered either above or very close to the target pitch, most notably on ascending intervals and presented as helpful in high singing.
- Neutral face consistently recorded negative target pitching with participants positing that the posture felt inhibiting on ascending pitches.
- Two outliers who were found to be unable to judge pitch direction or octave, suggesting that the use of facial expression in this context might not be effective for all singers and that should the study be repeated a pre-tested minimum pitching proficiency might add depth to the findings.
- The results indicate that facial expression has potential to serve as a remedial tool for poor pitching in the context of training novice singers.

1. Beneficial for my academic and professional development
2. Impacting my professional practice
3. Improved understanding of the use of spectrography, learning two spectrographic software packages.
4. Introduction to statistical data analysis (SPSS)
5. Improved understanding of the reasons and manifestations of poor pitch singing
6. An improved understanding of the role of facial expression in singing
7. Developed skills and knowledge in undertaking and presenting research
8. Inadvertently going beyond the remit of the project was time-consuming and impractical. A better understanding and commitment to project remit will serve me better in the future. Finding more contemporary research has been difficult and perhaps more focus on developing skills in finding relevant literature.
9. I feel I have answered my research question and that there is more to learn on this subject

PERSONAL REFLECTIONS AND LEARNING OUTCOMES

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