

The background is a gradient of deep blue and purple, speckled with small white dots. On the left side, there are several concentric circles and a large arc with a scale. The scale has numbers ranging from 140 to 260 in increments of 10. There are also smaller circles with arrows indicating a clockwise direction.

SOPRANO RESONANCE STRATEGIES

AN EXPLORATORY CASE STUDY

BACKGROUND, AIMS, OBJECTIVES AND JUSTIFICATION

- importance of soprano resonance strategy
- speech acoustics theory and Western classical vocal training
- abstract and complex concept
- familiarity with acoustic concepts and language
- use of spectrographic software
- mis-match between the information represented in current acoustic pedagogical texts and my own experience
- relevance of speech formant acoustic theory to soprano resonance strategy
- feminist epistemology/soprano centric lens

LITERATURE REVIEW

- Pedagogical texts; Vennard (1967), Doscher (1997) McCoy (2004), D. Miller (2008) Bozeman (2013, 2017)
- Early research; Lindblom and Sundberg (1971), Sundberg (1975, 1985, 1997)
- MRI studies showing resonance strategies Bresch (2010) and Echternach (2010)
- Recent research; Deme (2014), Joliveau (2004), Henrich (2011), Garnier (2010)

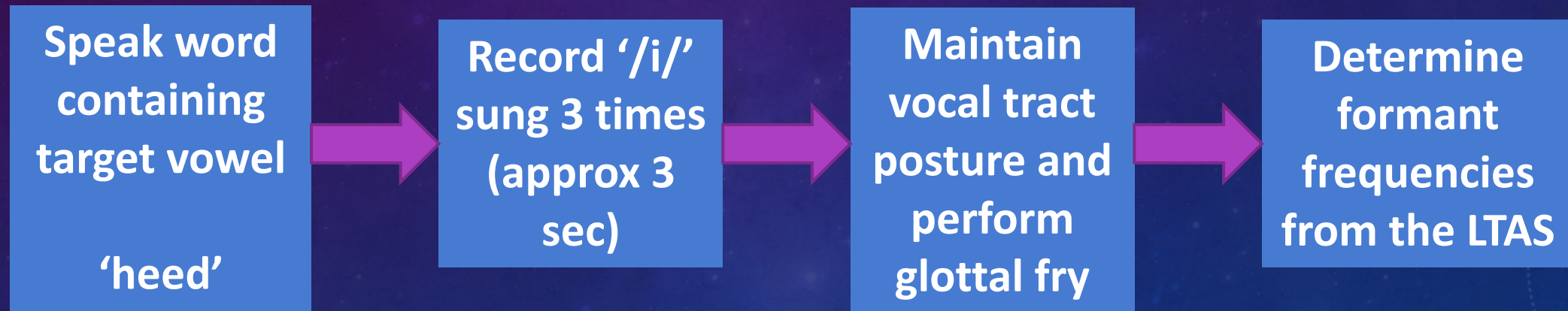
METHODOLOGY

- exploratory mini case study collecting my own quantitative data and comparing it to current research
- comparison of data to pedagogical text representation
- soprano centric lens based in a feminist epistemology

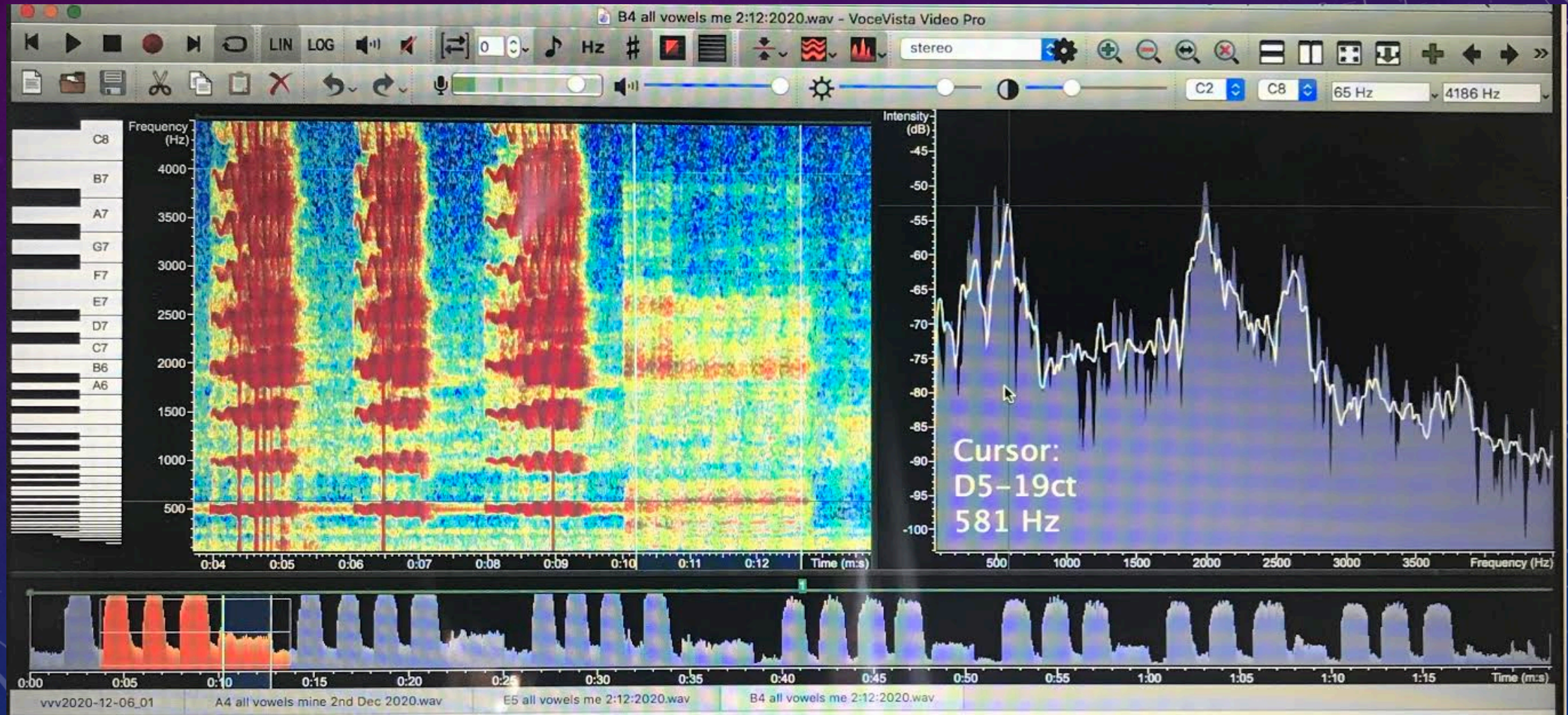
OUTLINE OF METHODS

- acoustic based research by fellow pedagogues; Dann Mitton 2020 DMA
- Donald Miller (1997, 2008) method - developer of Voce Vista
- Titze (2017) similar technology as an 'at home' method for students to map their own formants reliably representative
- deviation from Mitton's (2020) method; formants mapped over a two octave range and 7 Italian vowels used

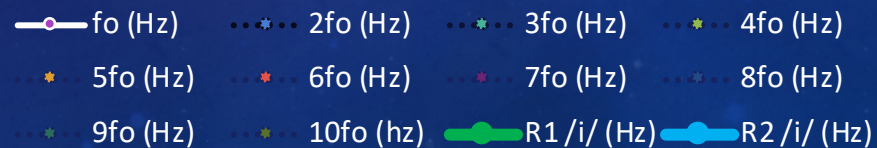
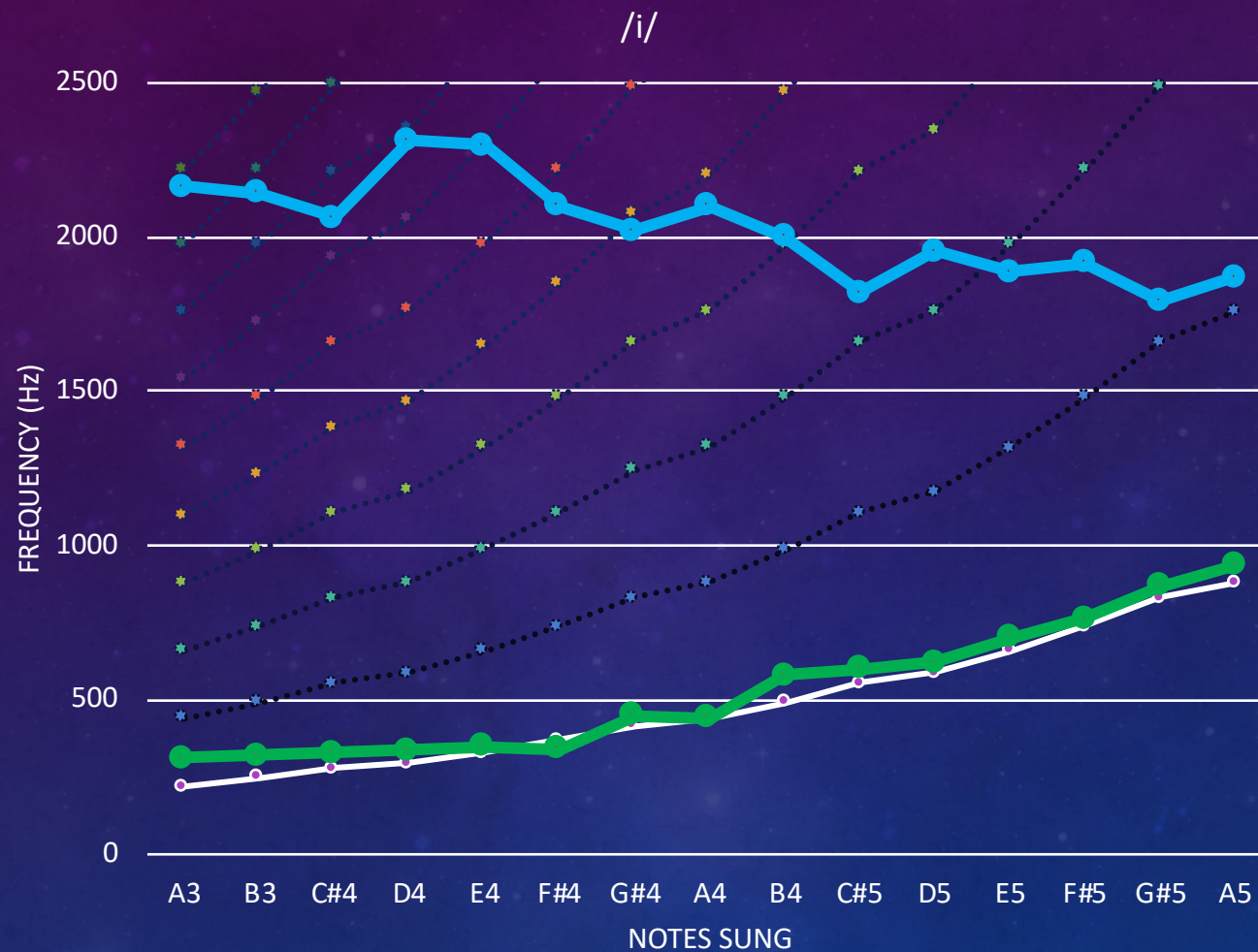
FLOW CHART SHOWING EXPERIMENTAL METHOD USING THE /i/ VOWEL AS AN EXAMPLE



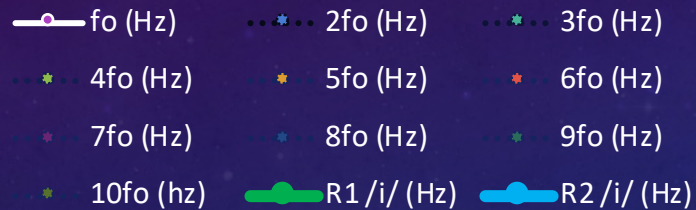
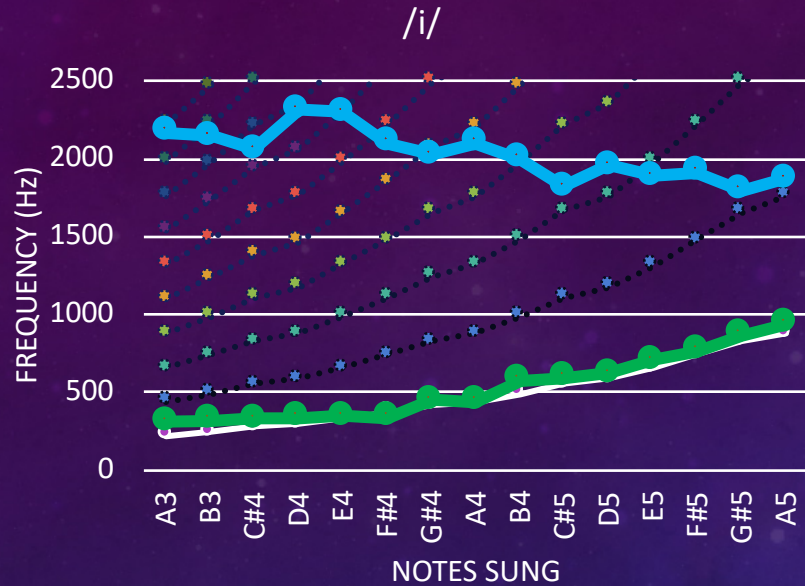
MEASURING THE FIRST FORMANT OF THE VOWEL /i/ SUNG ON THE NOTE B4 USING THE LTAS IN VOCE VISTA PRO



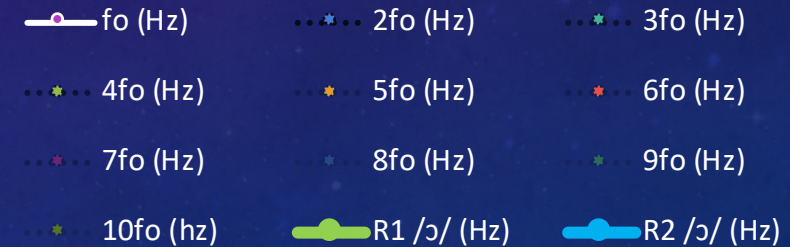
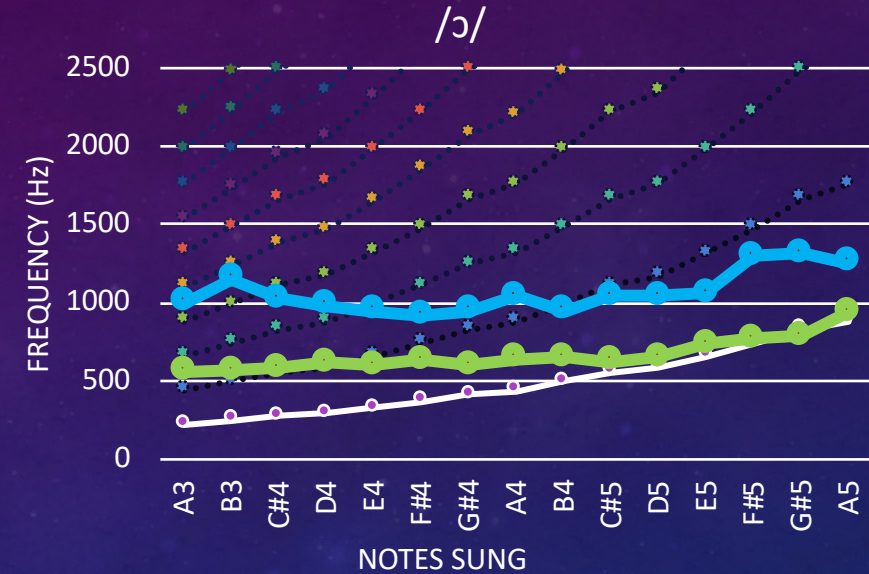
VOWEL FORMANTS OF /i/ VOWEL OVER TWO OCTAVES



FINDINGS

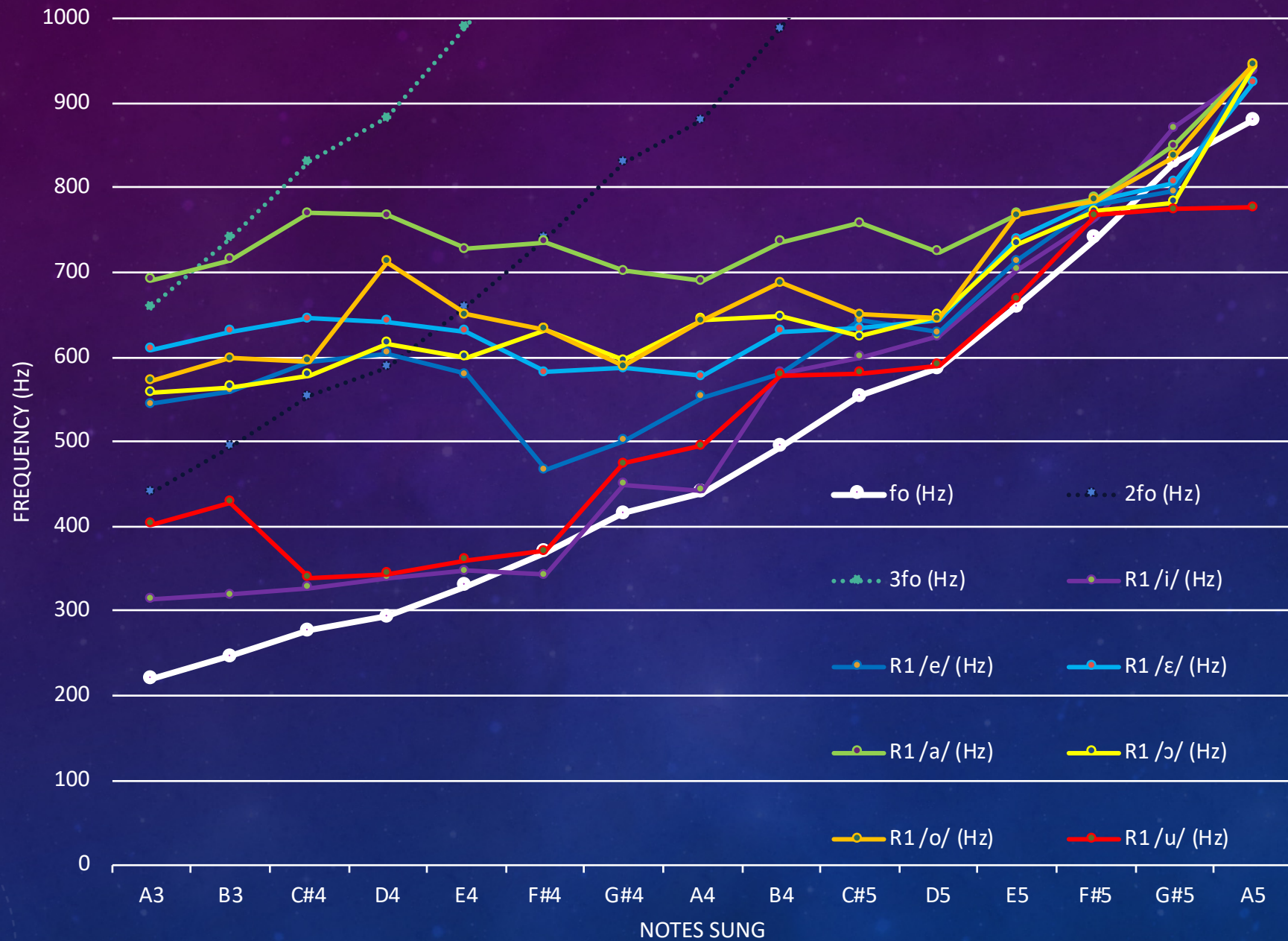


- *R1:fo* tracking when the *R1* of speech of the vowel is reached
- *R1* of all vowels converge as *fo* approaches the top of the stave

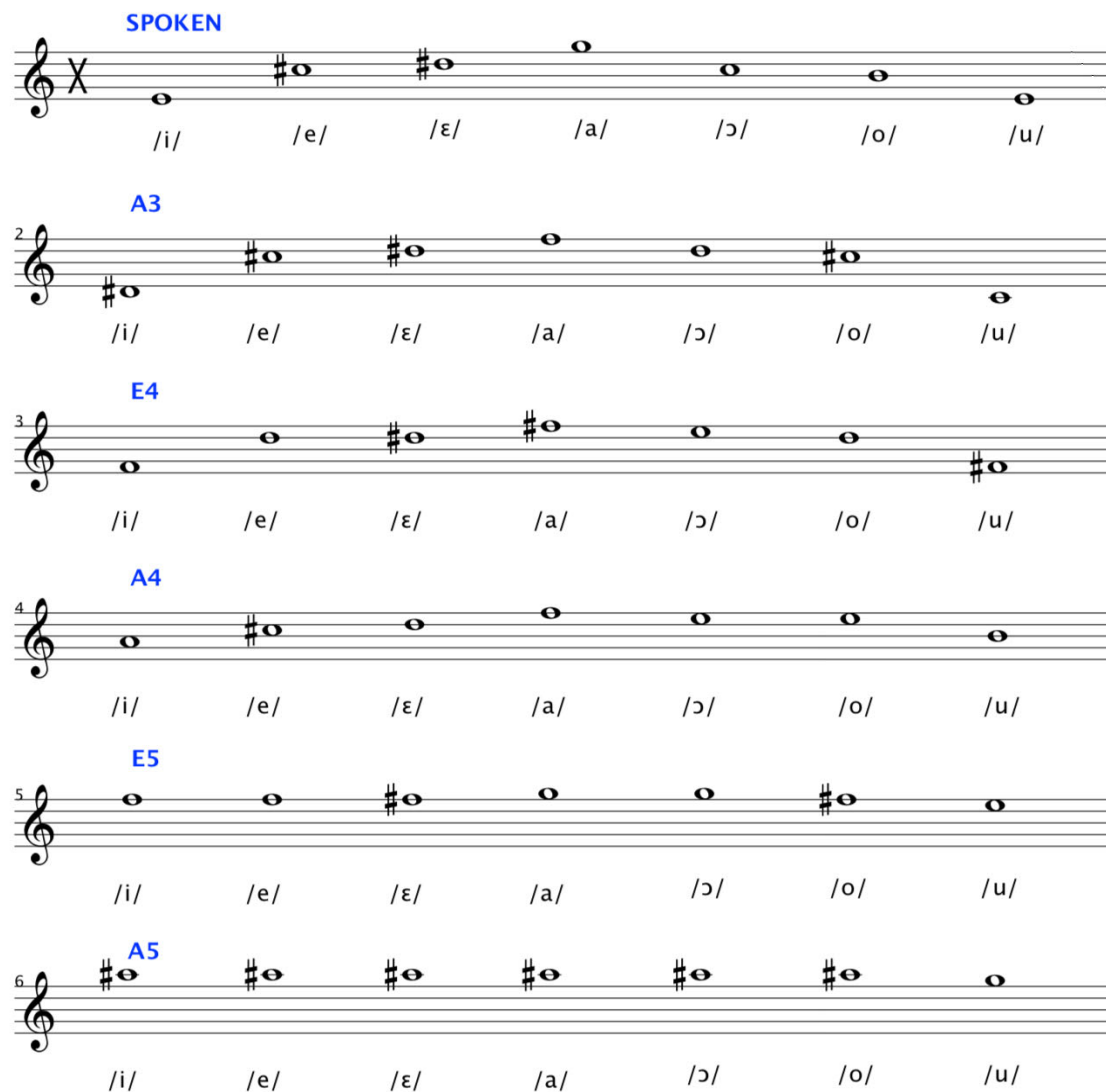


- ‘Double coupling’ of *R1:fo* and *R2:2fo* for tongue fronted vowels
- Uncoupling of *R2* from *2fo* for back vowels

FIRST FORMANT FREQUENCIES OF ALL VOWELS OVER TWO OCTAVES



FIRST FORMANT LOCATIONS



COMPARISON OF CASE STUDY FIRST FORMANT LOCATIONS THROUGHOUT RANGE TO SOPRANO FIRST FORMANT LOCATIONS IN BOZEMAN (2017)



COMPARISON OF THIS CASE STUDY'S RESULTS TO OTHER RESEARCH

- Current research agrees with my *R1* results (Joliveau, 2004; Garnier, 2010; Deme, 2014; Henrich, 2011)
- Importance of this resonance strategy (Titze, 1988; Sundberg, 1997)
- *R2* strategies are inconclusive
- This study shows clear uncoupling of *R2* from $2f_0$ above stave for 'best vowel'
 - Bozeman (2017) agrees
- Research studies show 'double coupling' strategies (Garnier, 2010; Deme, 2014)

CONCLUSIONS AND RECOMMENDATIONS

- $R1:fo$ strategy shown conclusively (Joliveau, 2004; Deme, 2014; Henrich, 2011; Garnier, 2010)
- $R1$ jaw and tongue relationship; jaw opening = increase $R1$; less tongue constriction = increase $R1$ (Lindblom and Sundberg, 1971)
- $R2:2fo$ strategy above the stave – needs further study but from this study it could be postulated that an uncoupling of $R2$ from $2fo$ above the stave would be an important soprano resonance strategy
- $R2$ tongue constriction location; back = lowered $R2$, front = raised $R2$ (Lindblom and Sundberg, 1971)
- Further investigation of the use of the tongue for vowel formants from a soprano resonance strategy perspective

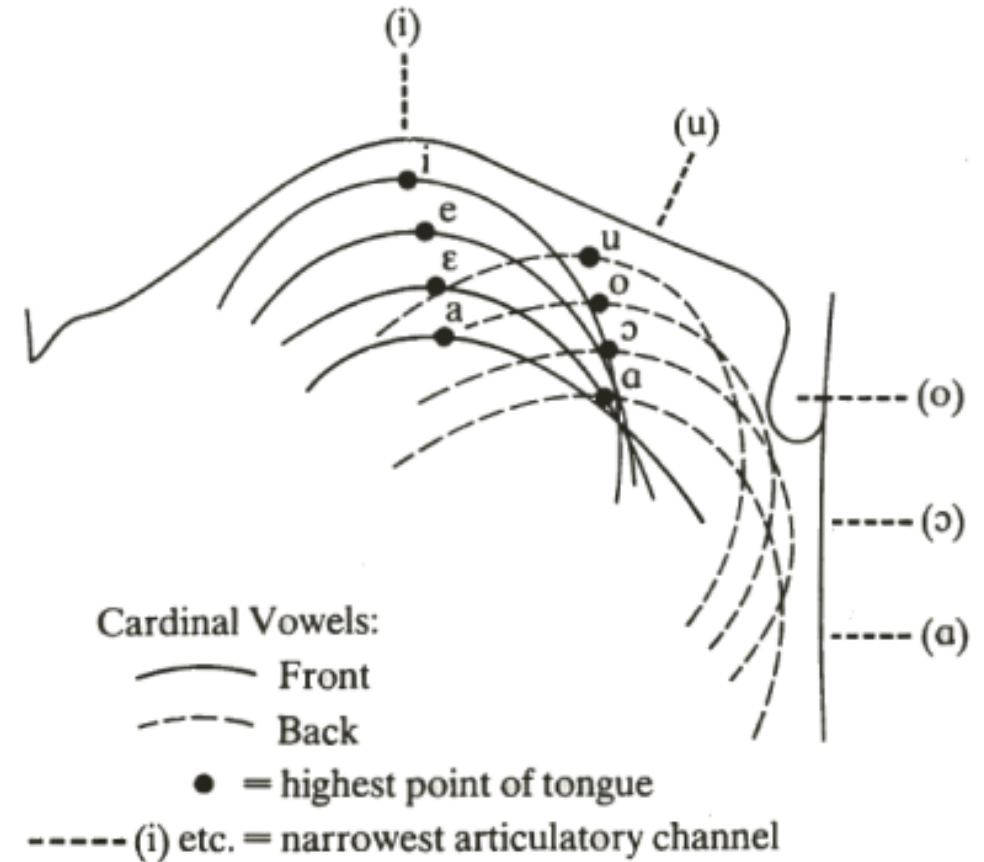


FIG. 38. Tongue-configurations for Cardinal Vowels

FURTHER CONSIDERATIONS

- Presentation of soprano resonance strategy
- Would more representative presentation enhance access and lead to better understanding
- Would greater understanding and embracing of acoustic led pedagogy by sopranos lead to an uptake of the use of available technology with possible biofeedback advantages (Moss, 2019)
- Would a more feminist epistemology led pedagogical research broaden and deepen our understanding of soprano resonance strategies and in turn inform traditional teaching practice



REFLECTIVE EXAMINATION OF THE PROFESSIONAL AND PERSONAL LEARNING EXPERIENCE

- hands on learning experience using Voce Vista
- mapped soprano formants throughout the range
- explored a different way of visualising soprano resonance strategies
- deepened my acoustic knowledge
- aided my understanding of soprano resonance strategies which has informed my teaching; tracking *R1* through the range, and choice of vowel above the stave (possible uncoupling of *R2* from *2fo*)
- influence of tongue on resonances
- importance of soprano centric epistemology reflecting the soprano acoustic experience
- possibilities of use of Voce Vista in the teaching studio either directly as a biofeedback tool (Moss, 2019) or indirectly to enhance understanding of technique choices