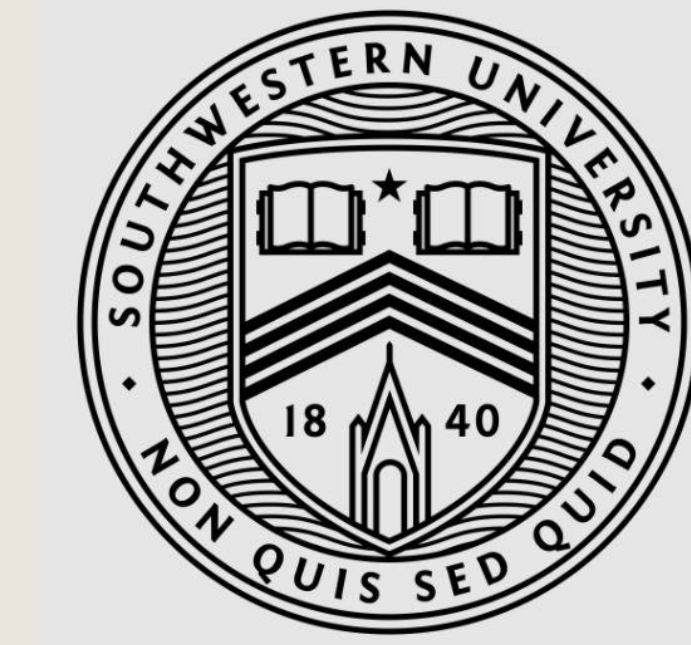




THE EFFECT OF AURAL MODELING ON VOWEL & CONSONANT DURATION IN UNDERGRADUATE WESTERN CLASSICAL SINGING



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PURPOSE: To isolate and analyze the effect of focused listening activities on sung vocal production.

RESEARCH QUESTIONS

1. Can targeted listening prior to sung practice affect singers' tonal concept enough to bring initial production closer to a stylistic goal?
2. Is auditory bombardment (focused auditory stimulation) (Hodson & Paden 1991, Fey 1986) an effective model for designing listening activities in the Western Classical voice studio?
3. Is measuring vowel vs. consonant duration an effective quantitative tool for assessing one important aspect of legato singing?

STUDY DESIGN

Participants $N=38$, Ages 17-26 (avg. 20.5)
Undergraduates enrolled in voice lessons and/or choir at a private liberal arts institution

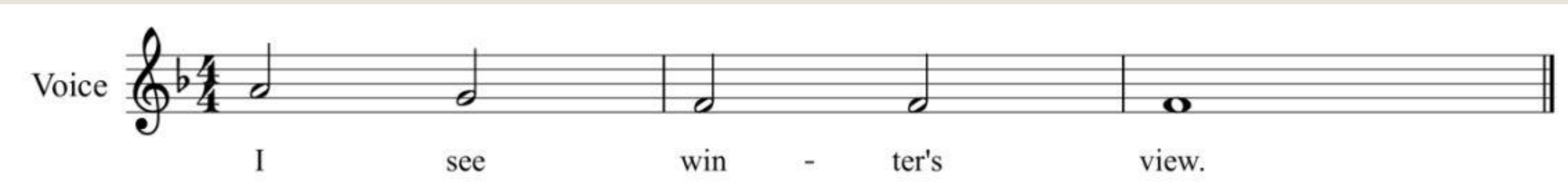
Control Group

$N=20$
6 Novice, 14 Advanced

Listening Group

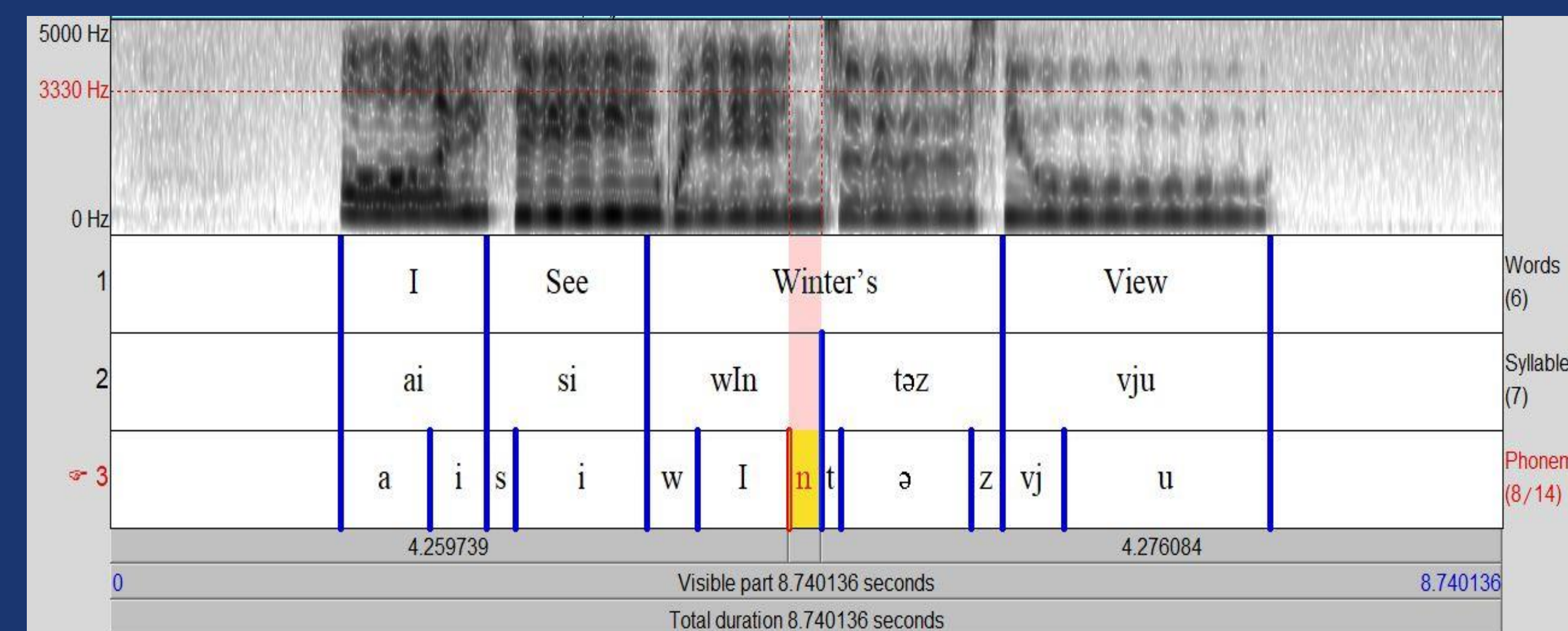
$N=18$
4 Novice, 14 Advanced

Focused Listening Activity: Ten minutes per day of repeated listening to melody sung by professional opera singer of similar voice type (mezzo or baritone). No sung practice. Baritone performed one octave below pitches shown.



Participants performed melody after a single hearing of the model singer's recorded performance. Printed text, but no musical score, was provided during recording session.

METHOD & ANALYSIS



Data collected in soundproof space with Earthworks SR77 cardioid pattern, virtually flat frequency response condenser microphone. Physical distance from microphone was controlled. Manual duration measurements in Praat software; sample order randomized. Repeated five times, margin of error 8.5 ms.

$$R_{VC} = \frac{T_v}{T_c}$$

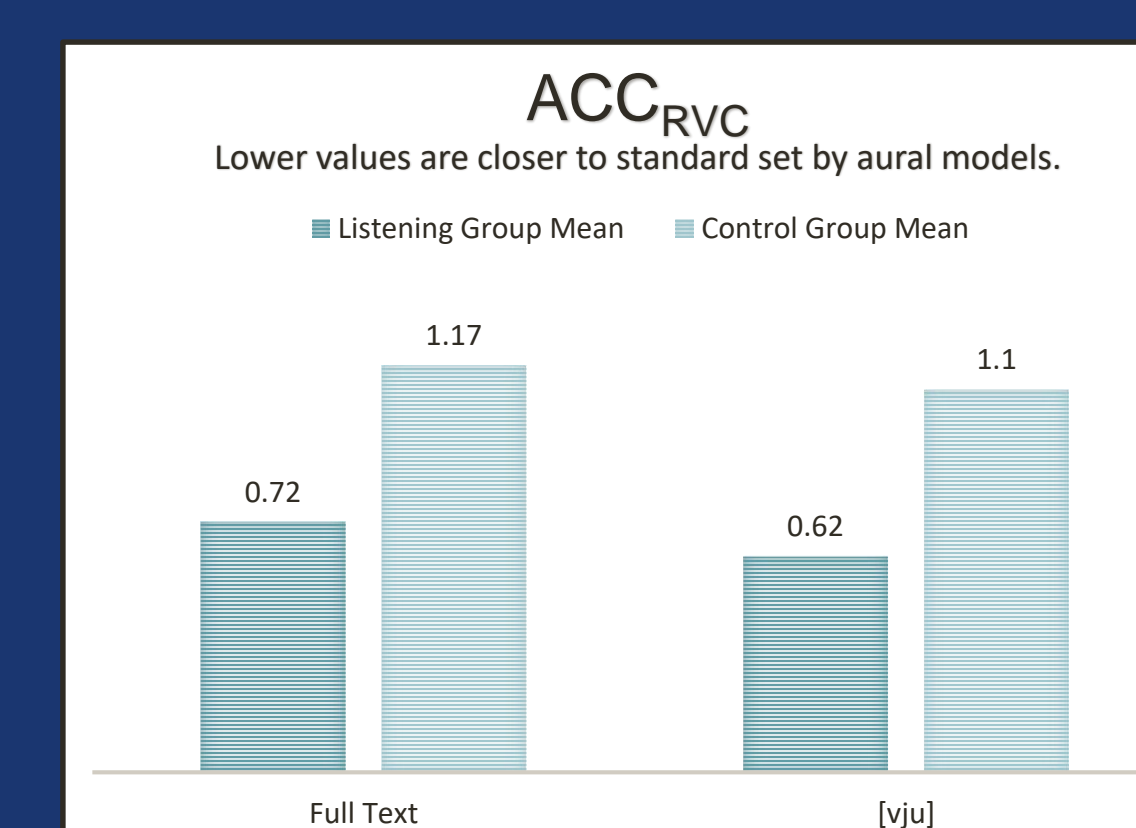
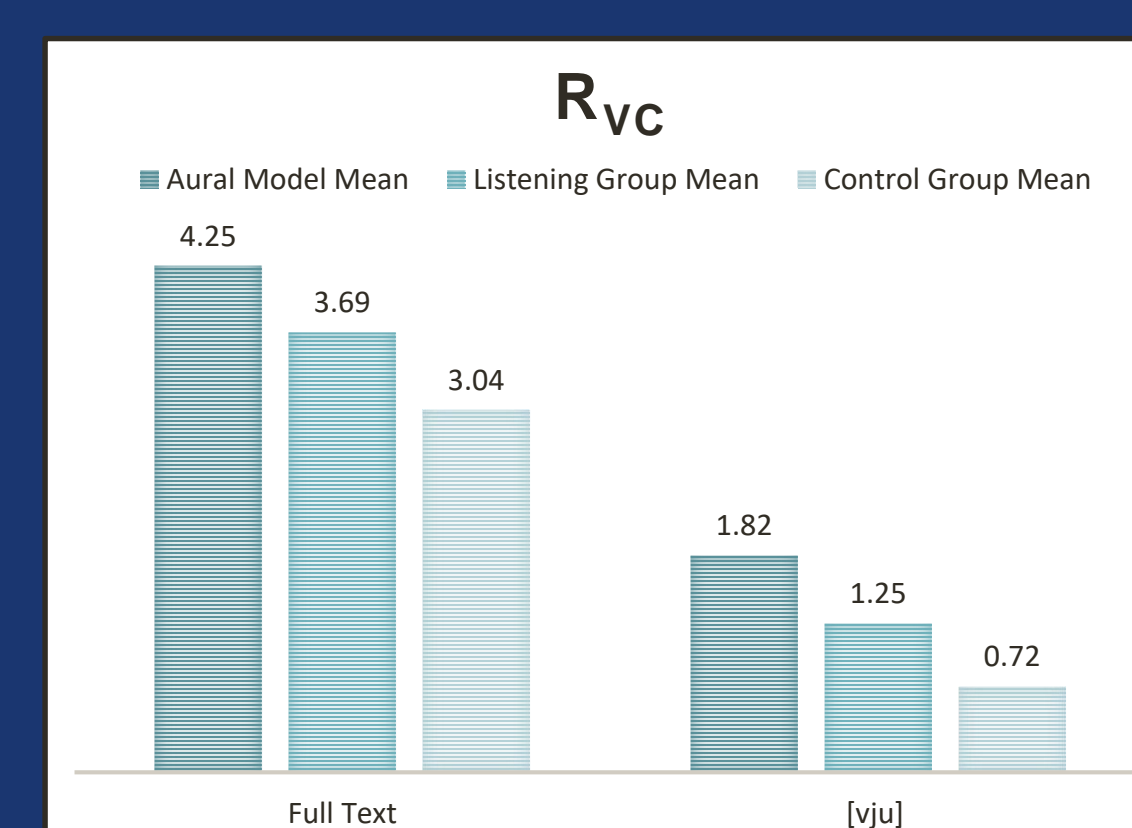
$$ACC_X = |X_M - X_P|$$

$$NACC_X = \frac{ACC_X}{\sigma_X}$$

- R_{VC} = Ratio of vowel duration to consonant duration
- T_v = Total time spent articulating vowels
- T_c = Total time spent articulating consonants
- ACC_X = Accuracy of measured acoustic parameter X
- $NACC_X$ = Normalized accuracy metric for acoustic parameter X
- X = Any acoustic parameter measured (e.g. duration)
- |...| = Absolute value
- X_M = Acoustic parameter measurement for model
- X_P = Acoustic parameter measurement for participant
- σ = Standard deviation

N.B.: This analysis treated [j] as a consonant.

RESULTS



Paired samples T-test of normalized accuracy (NACC) R_{VC} values in SPSS revealed that the difference between listening and control groups was statistically significant (sig. value .026).

DISCUSSION & CONCLUSIONS

These results demonstrate that listening via auditory bombardment (focused auditory stimulation) was effective in influencing the time singers spent articulating vowels vs. consonants, including [j].

It also appears that comparing time spent articulating vowels vs. consonants may be a useful quantitative measure of legato singing in the Western Classical style.

Voice teachers may wish to experiment with students using focused auditory stimulation activities prior to sung practice.

FUTURE DIRECTIONS

- Perceptual corroboration of improvement in legato line in the listening group by a panel of experts.
- Repeat study with population including only voice majors.
- Durational measurement of diphthong articulation (primary vowel vs. secondary vowel).
- Quantitative and perceptual analysis of the impact of focused listening activities on other acoustic parameters.
- Experimenting with structure of targeted listening activities.

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