Analysis of Five Musical Theater Belting Substyles

Voice Foundation Symposium

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Goals

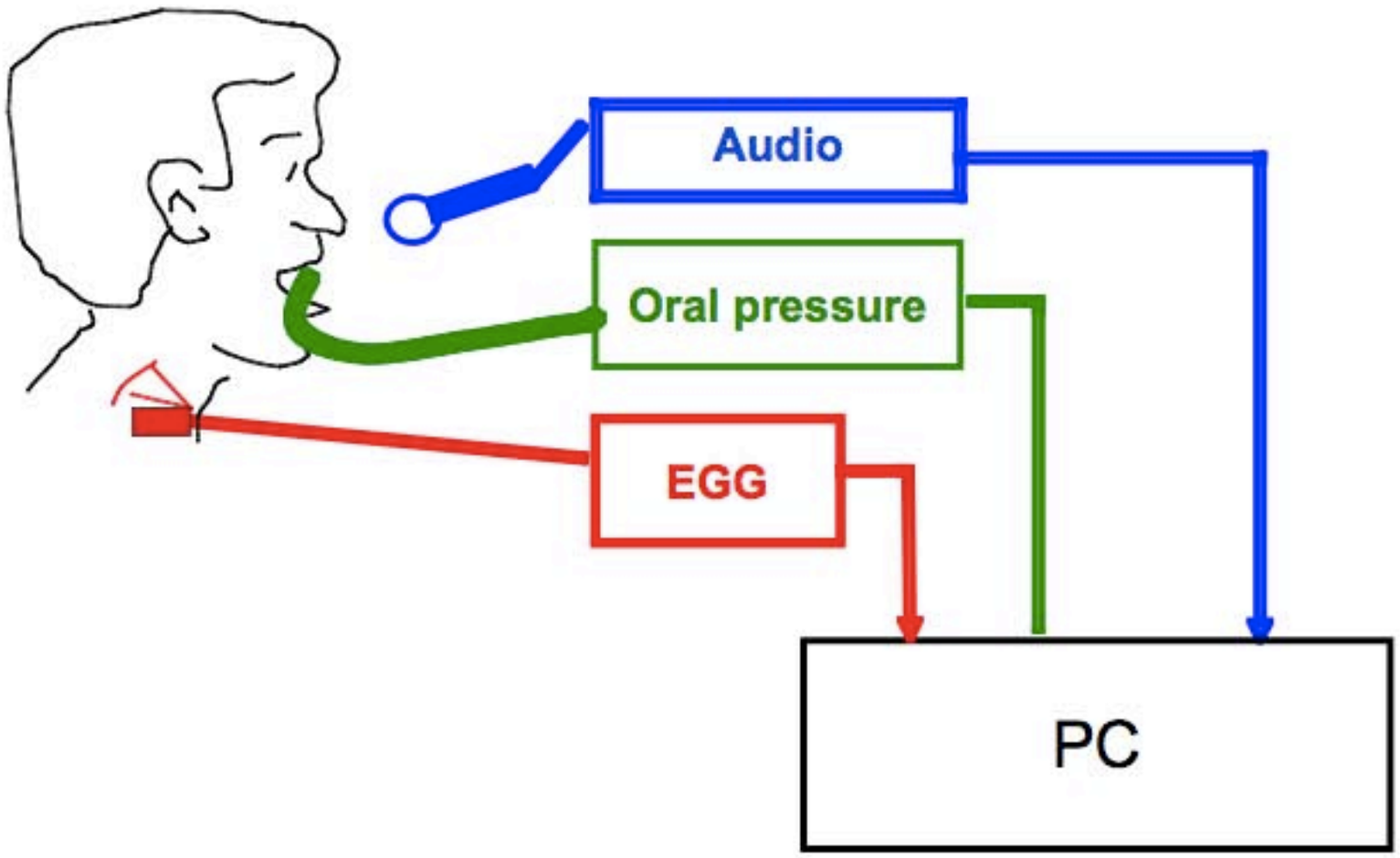
Describe five commonly heard musical theater belting substyles:
heavy belt
brassy belt
ringy belt
nasal belt
speech-like belt comparing these to the characteristics found in traditional **classical** voice production.

Analyzing:

- Evaluation by panel of expert listeners
- Spectrum
- Sub-glottal pressure
- Voice Source
- Formant Frequencies

Experimental Set-Up

Recording in Anechoic Chamber



Protocol

Co-author (LP) performed in

- **heavy belt**
- **brassy belt**
- **ringy belt**
- **nasal belt**
- **speech-like belt**
- **classical**

A. song excerpt from 'Everything's Coming Up Roses' from Gypsy (music by Jule Styne, lyrics by Stephen Sondheim)

B. same excerpt with syllable /pae/ replacing syllables of the lyric ('melody paes')

C. a diminuendo repeating the syllable /pae/ ('pae diminuendos')

Listening Test

Expert listening panel comprised of ten singing teachers with experience in both belting and classical voice production were provided with training samples for the 6 styles:

Heavy Belt:
Lisa Kirk ***Big Time*** from ***Mack & Mabel***, music & lyrics by Jerry Herman

Brassy Belt:
Ethel Merman ***There's No Business Like Show Business***, from ***Annie Get Your Gun,*** music & lyrics by Irving Berlin

Ringy Belt:
Debbie Gravitte ***Secret Love*** from ***Calamity Jane***, by Sammy Fain and Paul Francis Webster

Nasal Belt:
Patti Lupone ***As Long As He Needs Me*** from ***Oliver!,*** music & lyrics by Lionel Bart

Speech-Like Belt:
Idina Menzel ***No Good Deed*** from ***Wicked***, music & lyrics by Stephen Schwartz

Classical:
Beverly Sills ***Una Voce Poco Fa***, from ***Il Barbiere di Siviglia*** by Giocomo Rossini

Listening Test

We would like you to classify a group of sung samples into belting substyles and classical. First listen to typical examples of these styles:

Track 1 Heavy Belt
Track 2 Brassy Belt (nasal & ringy, more nasal)
Track 3 Ringy Belt (nasal & ringy, more ringy)
Track 4 Nasal Belt
Track 5 Speech-Like Belt
Track 6 Classical

A: Song with original lyrics

	Heavy	Brassy	Ringy	Nasal	Speech-Like	Classical
1	___	___	___	___	___	___
2	___	___	___	___	___	___
4	___	___	___	___	___	___
5	___	___	___	___	___	___
6	___	___	___	___	___	___
8	___	___	___	___	___	___
9	___	___	___	___	___	___
10	___	___	___	___	___	___
11	___	___	___	___	___	___
12	___	___	___	___	___	___

B: Song with /pae/ syllable replacing the lyrics

C: Diminuendo tones sung on /pae/ syllable

Listening Test

Rater Consistency

Raters' number of identical responses for identical stimuli

Rater	1	2	3	4	5	6	7	8	9
Song Lyrics	6	5	6	6	3	6	3	2	3
Song /pae/	6	2	6	6	4	6	2	5	6
Dimin /pae/	6	4	6	6	5	6	3	6	5
Sum % of all	100	61	100	100	67	100	47	72	83

Number of Correct Classifications

Song Lyrics

STIMULUS	Heavy	Brassy	Ringy	Nasal	Speechlike	Classical
Heavy	**14**	1	1			
Brassy		**15**	1			
Ringy			**12**	3	1	
Nasal			1	**14**	1	
Speechlike			1	1	**14**	
Classical						**16**
% correct	**88**	**94**	**75**	**86**	**88**	**100**

Number of Correct Classifications

Melody /pae/

STIMULUS	Heavy	Brassy	Ringy	Nasal	Speechlike	Classical
Heavy	**15**	1				
Brassy	1	**13**	1		1	
Ringy		2	**12**		2	
Nasal			1	**13**	2	
Speechlike				1	**15**	
Classical						**16**
% correct	**94**	**81**	**75**	**81**	**94**	**100**

Number of Correct Classifications

Diminuendo /pae/

STIMULUS	Heavy	Brassy	Ringy	Nasal	Speechlike	Classical
Heavy	**15**	1				
Brassy	1	**12**	1	2		
Ringy			**6**	10		
Nasal		3	5	**8**		
Speechlike			2	1	**13**	
Classical						**16**
% correct	**94**	**75**	**38**	**50**	**81**	**100**

Analysis

1- Listening Test

2- Spectrogram & LTAS

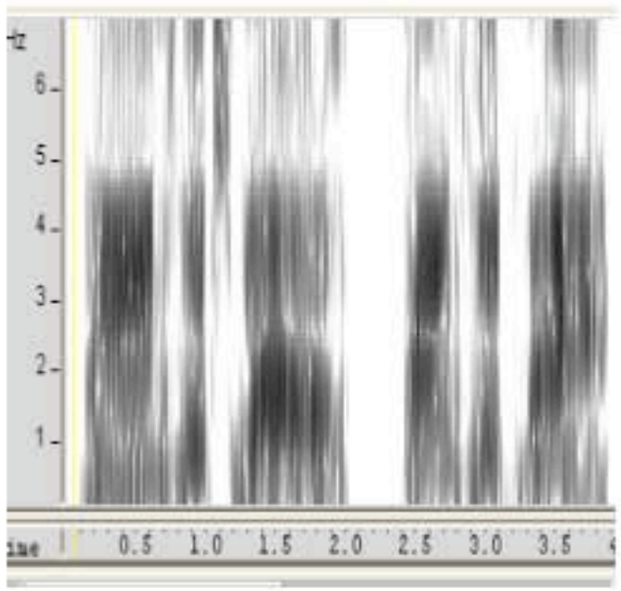
3- Subglottal Pressure estimated from oral pressure during occlusion for consonant /p/

4- Voice Source by inverse filtering audio signal (not feasible for Speech-like and Nasal samples because of nasality

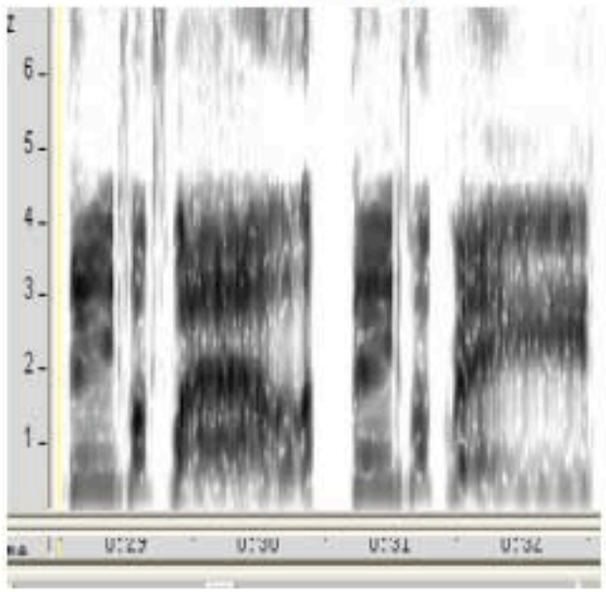
5- Formant Frequencies

Spectrograms

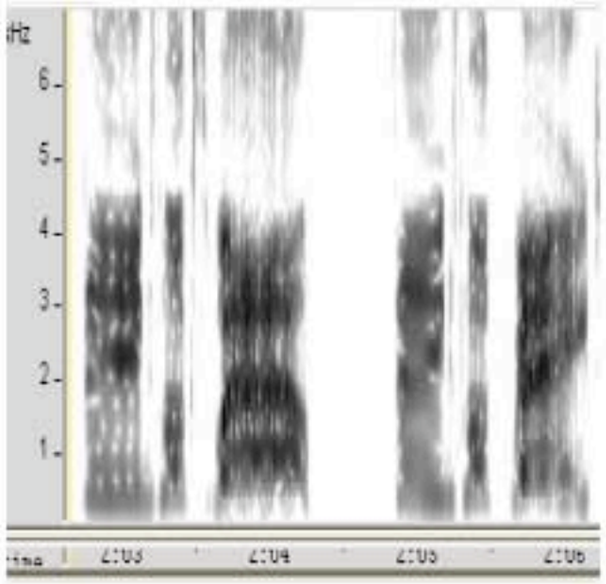
Heavy



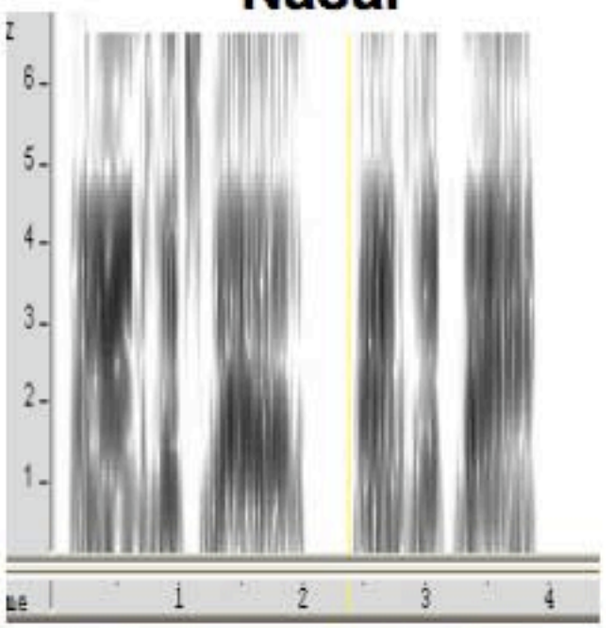
Brassy



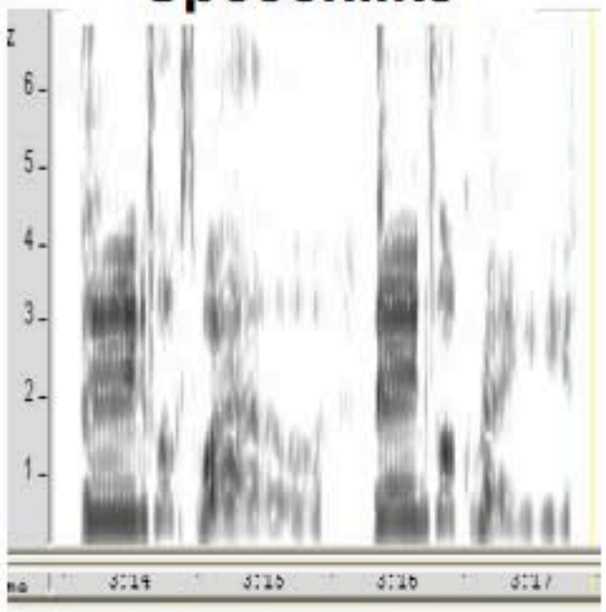
Ringy



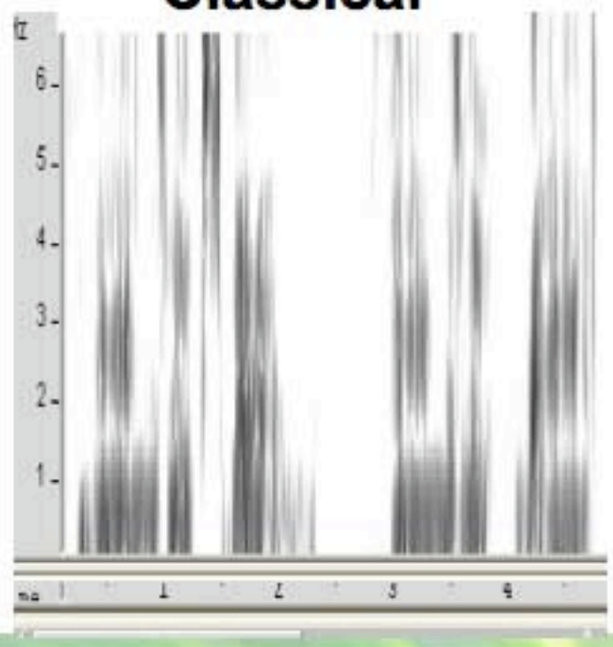
Nasal



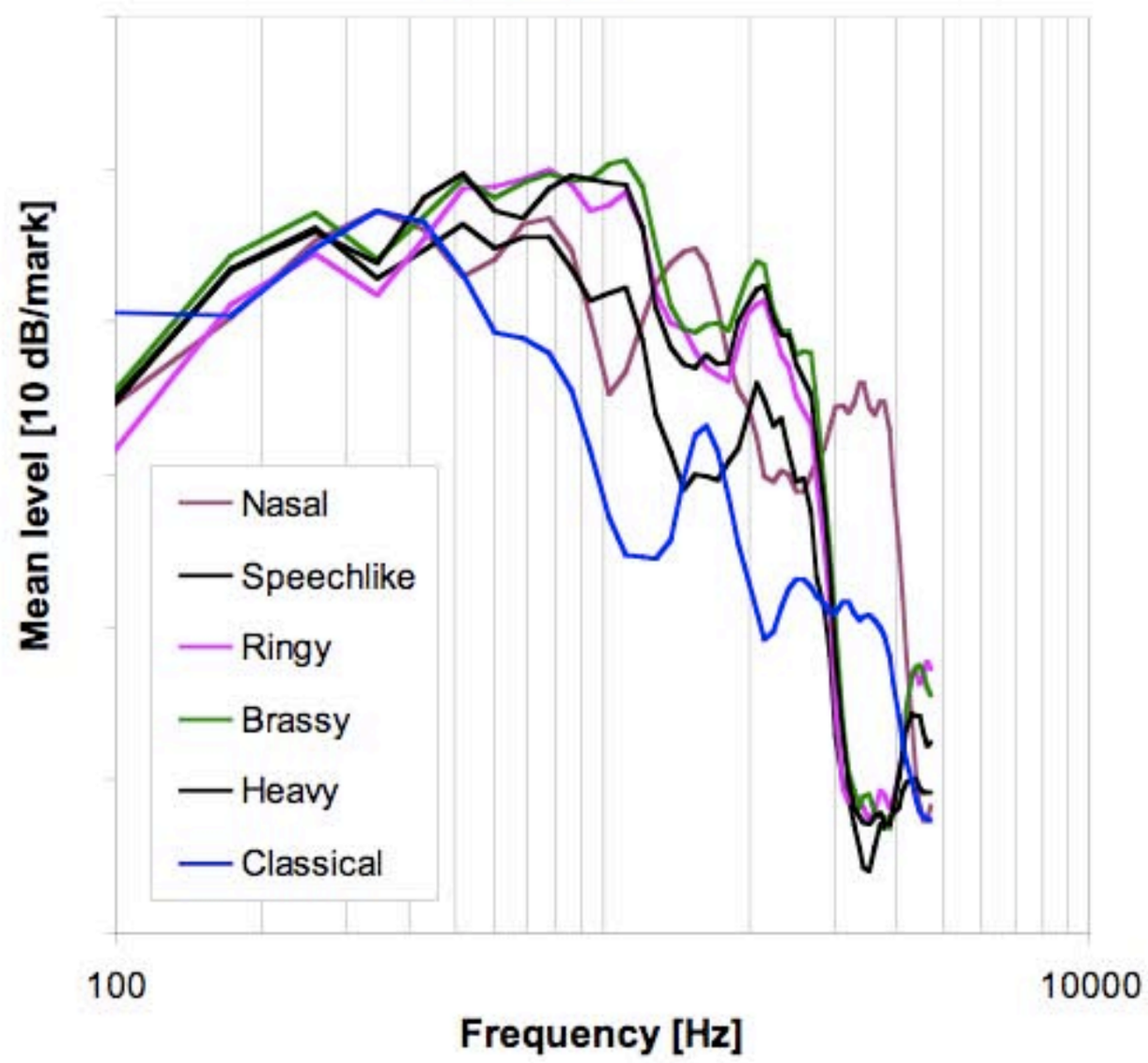
Speechlike



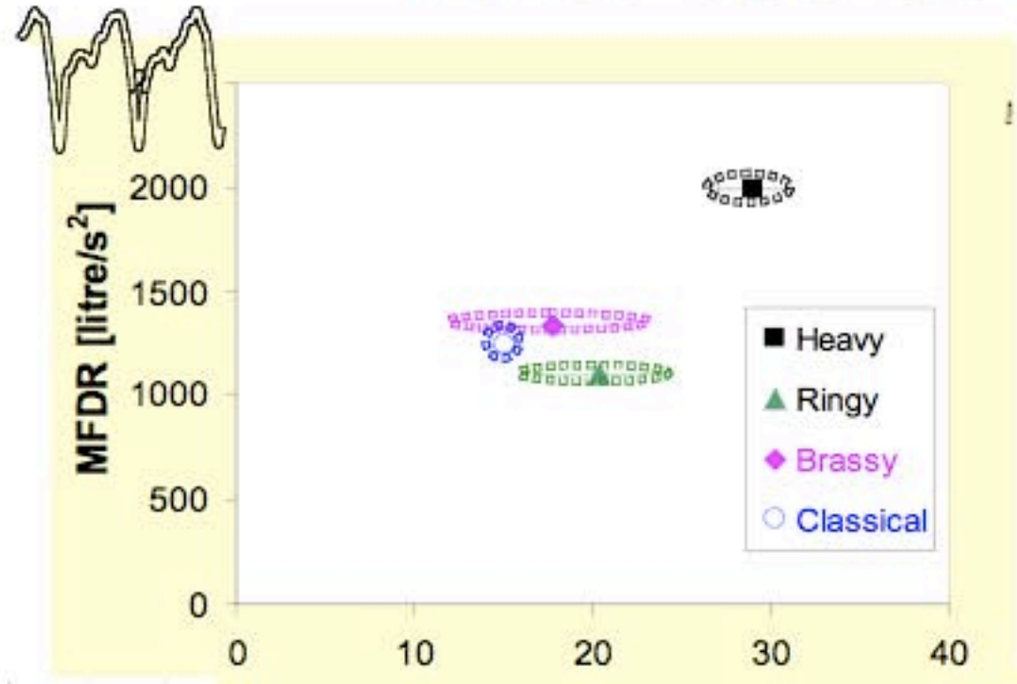
Classical

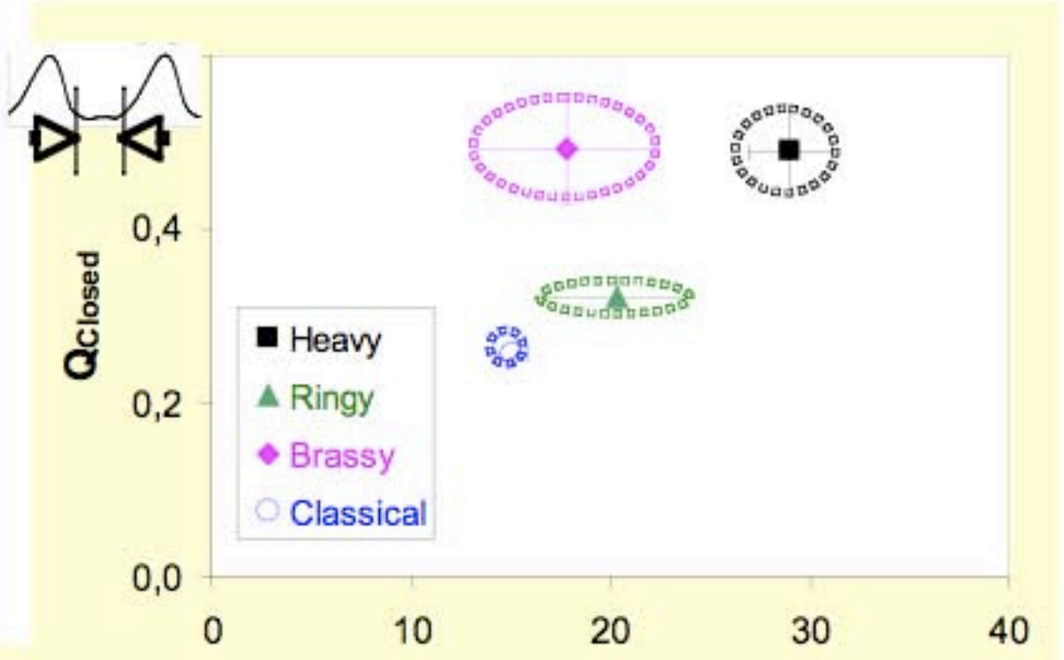


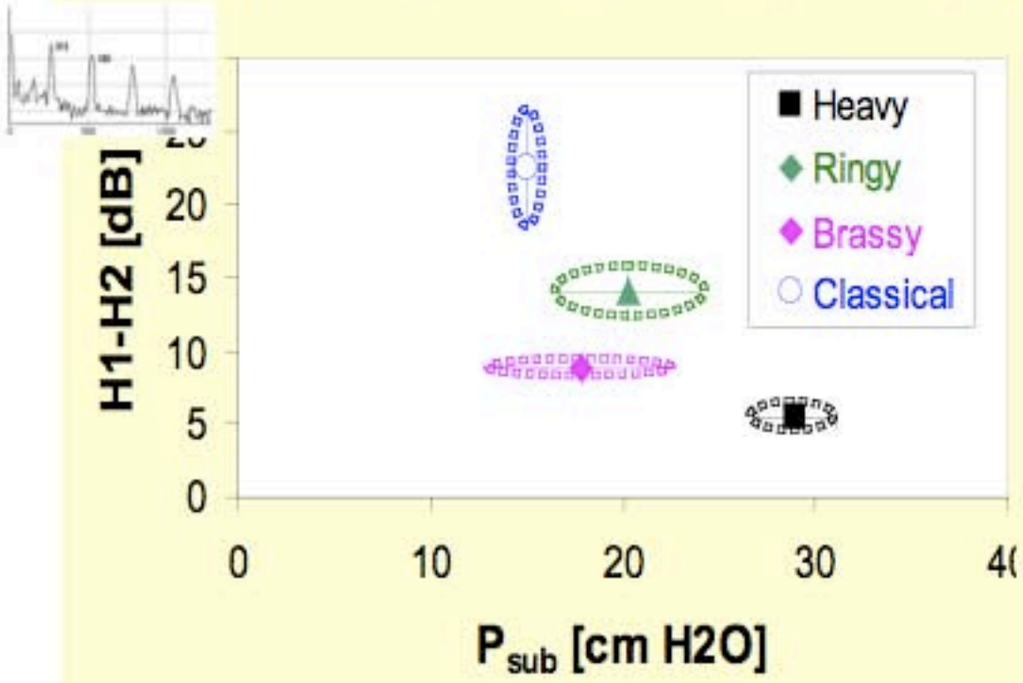
Long-Time Average Spectra

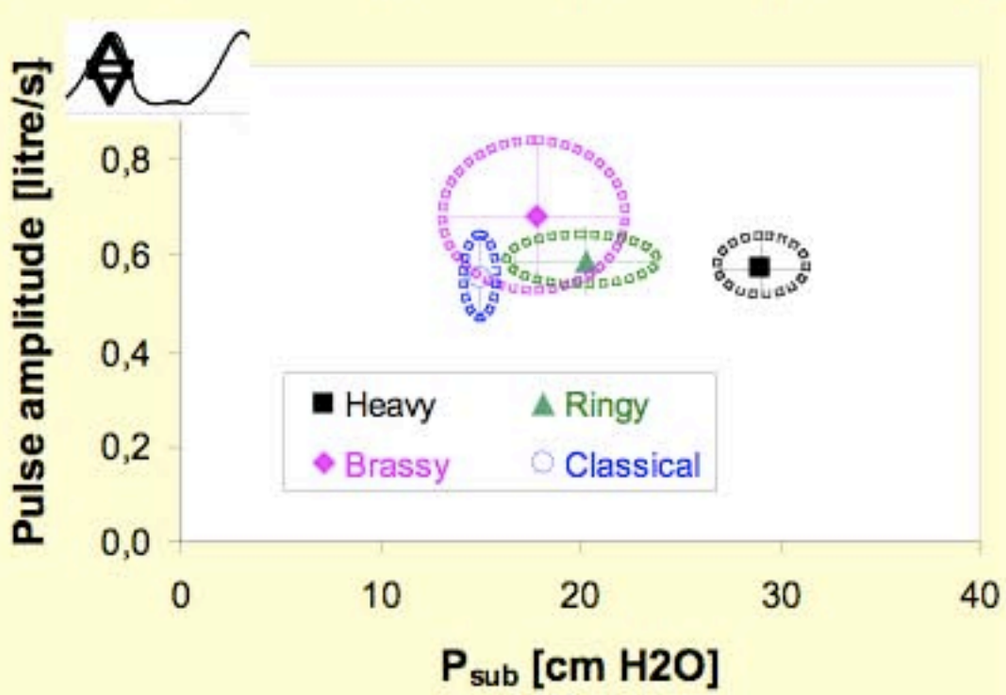


Voice Source Characteristics

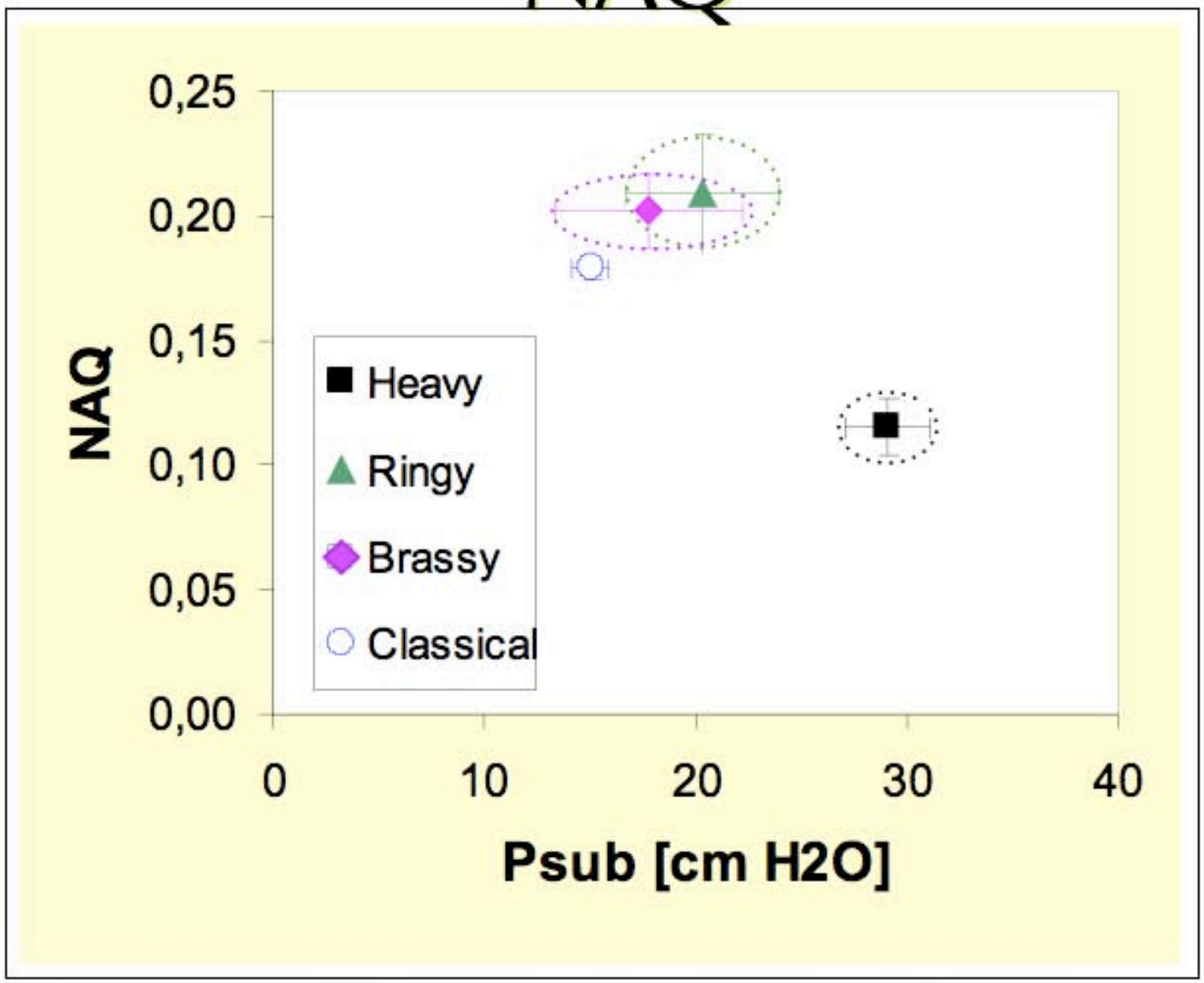




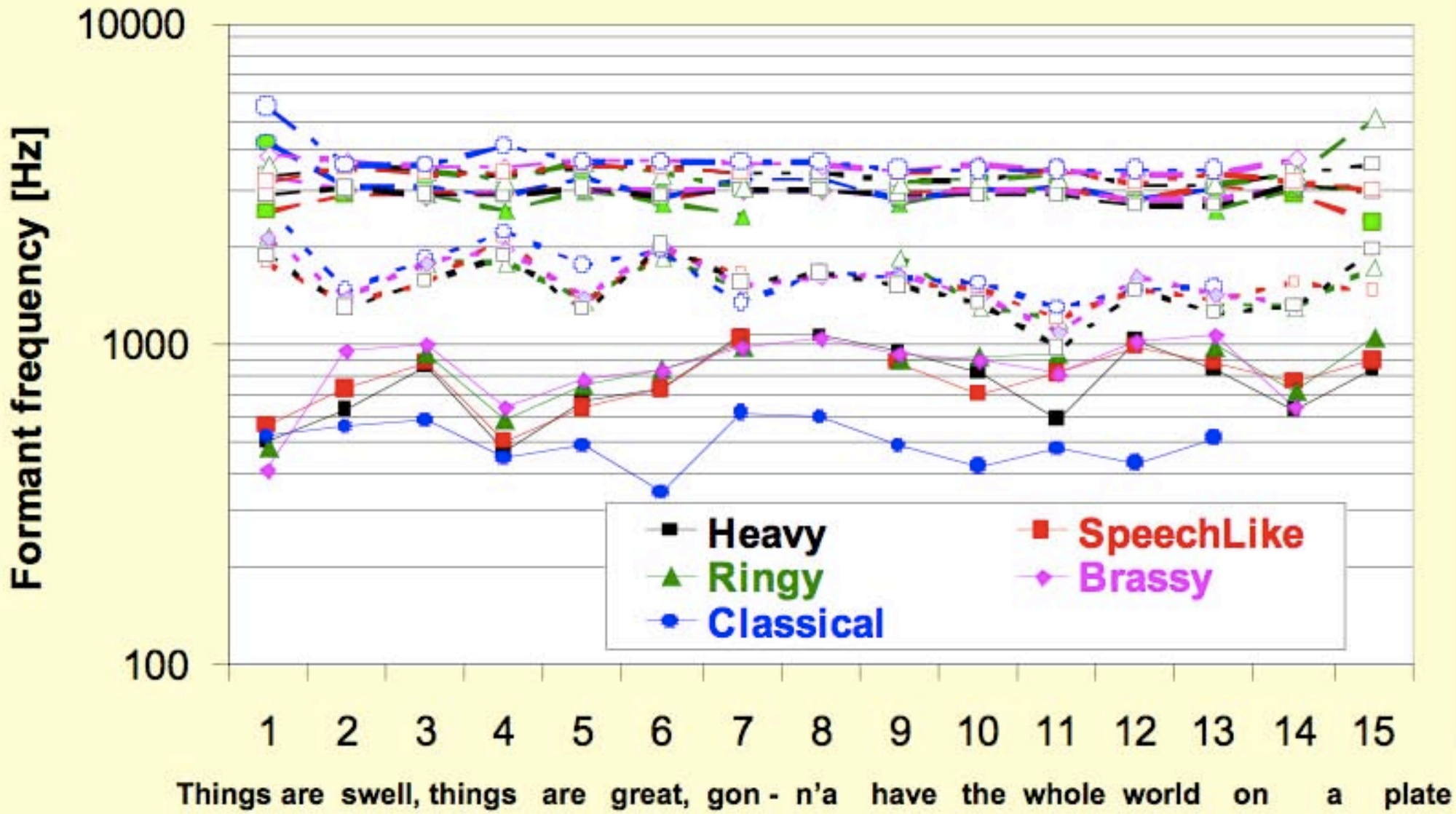




Normalized Amplitude Quotient
NAQ



Formant Frequencies



Conclusions

Clear voice source differences

	Psub	MFDR	Closed Q	H1-H2	Pulse Amplitude	NAQ
Heavy	High	High	High	Low	Medium	Low
Brassy	Medium	Low	High	Medium	High	High
Ringy	Medium	Medium	Medium	Medium	Medium	High
Classical	Low	Medium	Low	High	Medium	High

Formant frequency difference:

F1 low in classical

Thank you...

PAS 5 - *Physiology & Acoustics of Singing*

Stockholm, Sweden, August 10-13, 2010

www.speech.kth.se/pas5

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