



Accuracy of Acoustic Voice Quality Index and its isolated Acoustic Measures to Discriminate the Severity of Voice Disorders

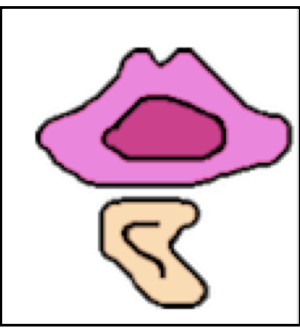
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INTRODUCTION

- Acoustic analysis with multiparametric approaches
 - World tendency¹⁻⁸
 - Higher reliability with the perceptual auditory analysis¹⁻³

AVQI – Acoustic Voice Quality Index



- Provides one score for the overall voice quality
- Good reliability among different languages³⁻⁸
- AVQI isolated acoustic measurements diagnostic accuracy among the different degree of vocal deviation is still unknown

Objective

- To evaluate the AVQI total score and its isolated acoustic measures accuracy in discriminating voices with different degrees of vocal deviation

METHODS

- Database – 258 individuals
 - 160 dysphonic and 98 non-dysphonic
 - Analysis of AVQI isolated acoustic measures, AVQI total score and G score
 - Smoothed cepstral peak prominence - CPPs
 - Harmonic-to-noise ratio - HNR
 - Shimmer local - Shim & Shimmer local dB -ShdB
 - General slope of the spectrum - Slope
 - Tilt of the regression line through the spectrum
- Perceptual auditory analysis
 - Median G score, previously rated by 5 voice specialist
 - Cohen Kappa > 0.605 ; Fleiss Kappa = 0.370

Statistical Analysis

Quadratic discriminant analysis and accuracy, sensitivity and specificity of performance measures were used to investigate discriminatory power of these measures, as well as cross-validation of random signals' combination with and without disturbance

RESULTS AND DISCUSSION

No deviation Vs With Deviation

- AVQI = 73.9%
- CPPs = 73.2%

AVQI & CPPs are reliable acoustic measures^{1,2,5-14}

Combined measures

- CPPs, HNR = 73.2%
- CPPs, HNR, Slope = 75.07%
- CPPs, HNR, Shim dB, Tilt = 73.9%
- CPPs, HNR, Shim dB, Slope, Tilt = 75.5%

The combination of 5 acoustic measures had the highest accuracy to differentiate between normal and deviated voice quality

- Weighing the acoustic measures in a multiparametric approach is essential¹

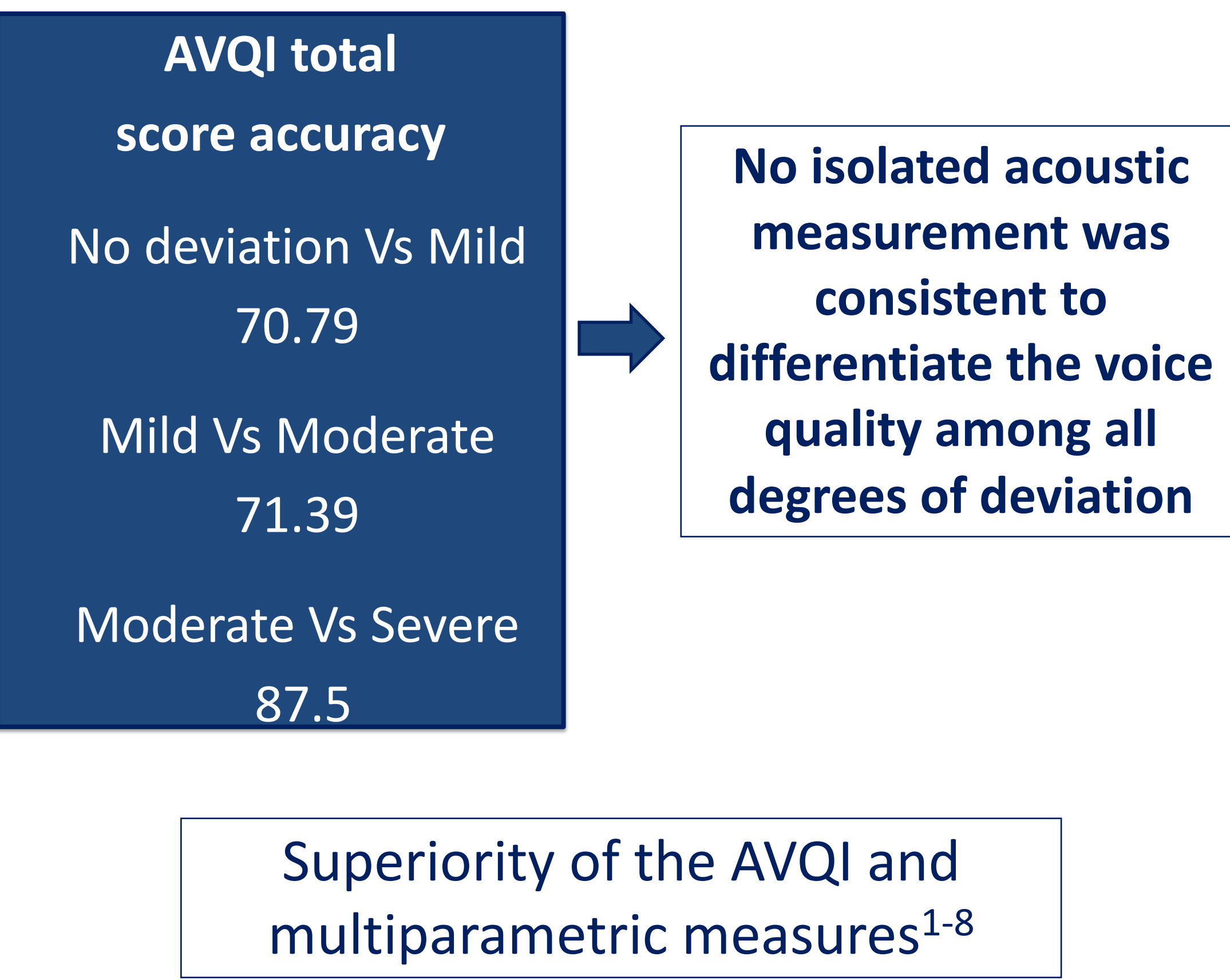
Degrees of Deviation

Acoustic Measures	Accuracy %
No deviation and Mild CPPs, ShdB	72.86 ± 3.26
Simmer dB, LTAS slope, LTAS tilt	70.99 ± 3.70
CPPs, HNR, LTAS tilt	70.55 ± 5.47
CPPs, HNR, ShdB, LTAS tilt	74.29 ± 2.77
CPPs, HNR, LTAS slope, LTAS tilt	70.71 ± 3.90
CPPs, HNR, ShdB, LTAS slope, LTAS tilt	72.31 ± 2.80

Combined acoustic measures were better to discriminate among the degrees of deviation when compared to the AVQI total score

Acoustic Measures	Accuracy %
Mild and Moderate	
ShdB, LTAS slope	71.53 ± 5.70
Shim, ShdB, LTAS tilt	74.17 ± 4.64
HNR, LTAS slope, LTAS tilt	75.69 ± 2.73
Shim, ShdB, LTAS slope, LTAS tilt	76.11 ± 4.57
HNR, Shim, ShdB, LTAS slope, LTAS tilt	73.75 ± 4.90

Acoustic Measures	Accuracy %
Moderate and Severe	
Shim, LTAS tilt	93.00 ± 3.59
HNR, Shim, Ltas tilt	95.50 ± 3.02
Shim, ShdB, LTAS slope, LTAS tilt	93.50 ± 4.48
HNR, Shim, ShdB, LTAS slope, LTAS tilt	93.00 ± 3.59
All	86.00 ± 6.14



CONCLUSION

- AVQI is a robust tool to discriminate among different degrees of deviation
 - More accurate between voices with moderate and severe deviations
- Isolated acoustic measures are more accurate to discriminate voices with more deviation
- AVQI acoustic measures with the same weight are more accurate to discriminate voices with different deviations

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