

A new acoustic index of dysarthric vowel articulation
A comparison with vowel space area in individuals with and without Parkinson's disease
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Background and aims: Vowel space area (VSA) has been used as an acoustic index of dysarthric vowel articulation. However, this index has yielded inconsistent results in terms of sensitivity to dysarthric speech. The purpose of this study was to compare the VSA to a new acoustic index that hypothetically, through a process of normalization, reduces speaker variability and increases sensitivity to vowel centralization associated with dysarthric articulation.

Methods. Archived acoustic data of 25 dysarthric individuals with idiopathic Parkinson's disease (IPD) and of 14 healthy controls (HC) without speech impairment were used. The VSA was constructed from the formants F1 and F2 of the vowels /i/, /u/, and /a/. The new acoustic index was of the form $(F2i+F1a)/(F2u+F2a+F1u+F1i)$, constructed from the same vowels and formants as the VSA.

Results: The new index showed greater sensitivity than the VSA to dysarthric vs. normal vowel articulation, in terms of effect size (-0.81 (large) vs. -0.55 (medium)), level of statistical significance (t-tests $p=0.00006$ vs. 0.01241) and coefficient of variation (CV= 0.07 vs. 0.28-0.45), respectively.

Conclusion: The new index may be considered as an alternative or as a complimentary acoustic index to the VSA.