Title: A Comparison of Vowel Overlap Metrics

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Multiple metrics have been proposed over the last decade as quantitative measures to facilitate more consistent assessments of vowel overlap. Measurement of vowel overlap has applications in fields such as sociophonetics, dialectology, and second-language speech learning. The ideal metric for measuring vowel overlap would be accurate and precise and take into account the density of the data being analyzed. However, there has yet to be an assessment of these metrics' performance along these criteria on a common set of data, which is crucial to understanding what advantages there may be to using one metric over another. In this study, we present preliminary findings which compare these proposed vowel overlap metrics according to these criteria. We compare the spectral overlap assessment metric (Wassink, 2006), which represents vowel categories as ellipses or ellipsoids and statistically assesses their overlap; the *a posteriori* probability metric (Morrison, 2008), which uses an *a posteriori* probability calculation and was created as an alternative to the spectral overlap assessment metric that accounts for density; the Vowel Overlap Analysis with Convex Hulls metric (Haynes & Taylor, 2014), another alternative to the spectral vowel overlap metric which models data with convex hulls and is intended to account for data which is not normally distributed or dense; and the older measures Euclidean distance and Pillai-Bartlett Trace that Nycz and Hall-Lew (2015) mention in a comparison of different vowel overlap metrics including the spectral overlap assessment metric. To perform the comparison, a set of test data was created using Monte Carlo simulation. Each of the metrics was then calculated on this set of test data and the results compared. These assessments were then compared to each other with appropriate statistical methods. We will discuss the implications of these findings for the suitability of the different metrics on measuring vowel overlap.

References

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