CROSS-LINGUISTIC NORMALIZATION

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This paper reviews some of the algorithms for vowel normalization that have been proposed in the literature (Gerstman 1968, Harshman 1970, Lobanov 1971, Nearey 1977) and evaluates them on the basis of their ability to reduce the variance between speakers. It also examines the suitability of each for use in cross-linguistic or dialect studies. Assuming that the published observations of phoneticians are valid indications of the relative quality of vowels in different languages, then a good normalization procedure should not introduce spurious trends into the data. The more highly valued of two normalization procedures is the one which removes more of the variance from the data without appreciably altering the vowel patterns in the languages under study.

Data sets from six Germanic languages--Danish, Dutch, English, German, Norwegian, and Swedish--are utilized in this study. All are taken from published sources. Only the frequencies of the first three formants are available in all of the data sets; consequently, the present investigation is limited to those normalization procedures which utilize these parameters only.

It is concluded that no one normalization procedure is consistently better than others at removing the inter-speaker variance. Some languages are best normalized by one procedure, others by another procedure. The Harshman PARAFAC procedure is least efficient in removing the variance, but it is the only one which does not introduce procedural artifacts into the data. Because it does not depend on the formant means or standard deviations--which vary from language to language--as correction factors, the PARAFAC procedure is best suited to cross-linguistic comparisons.

References

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