

Phonation Across Languages

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What is the overall acoustic phonetic space for vowel phonations? In this talk I will highlight some results from a decade of cross-language research at UCLA.

The initial contributions of the project were new tools for voice analysis: for acoustic analysis, VoiceSauce, and for electroglottographic analysis, EggWorks. These tools have been freely available online and have become widely used.

Using these tools, the project provided descriptions of phonations in several languages, including tone languages in which phonation cross-classifies with tone, and tone languages in which phonation varies non-contrastively as a function of voice pitch or tone. Jianjing Kuang showed that using correlated phonations allows speakers to expand their pitch range, allowing more, and more distinct, tone categories than would be comfortable in only modal voice. Other studies have shown that listeners may or may not use such correlated phonation as a cue for a tone.

Based on extensive acoustic analysis, a set of 11 languages' phonations were mapped into a single phonetic space, which exhibits dispersion (languages with more categories use more of the space). While the simplest system lies on a single dimension and the most complex system involves three dimensions, the space is largely two-dimensional, and these two dimensions can be interpreted phonetically (e.g. dimension 2 is like a traditional breathy-to-creaky continuum). All of our original speech recordings have also been freely available, and more recently a Shiny app allows anyone to add their own data to our dataset, and re-run our analyses.

The dimensions of the phonetic space can also be related back to the acoustic measures that structure them, thus indicating which acoustic measures are most important across languages. These analyses suggest a small set of six most-informative acoustic parameters that we can now recommend for cross-linguistic comparisons of phonations.