Individual acoustic cues to distinctive features: an approach to quantifying and categorizing large samples of dynamic speech data

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Recent decades have seen the emergence of substantial evidence that speakers and listeners represent, control and make use of systematic patterns of subfeatural variation in the surface phonetic forms of words and their sounds. Quantifying this phonetic variability is challenging, because many dimensions are changing at once and many contributing factors have been identified. One promising metric is based on the modification of individual acoustic cues to distinctive features, following up on the proposal by Stevens (2002) that individual feature cues are the focus of the initial steps in human speech perception. Drawing on the work of Halle (1995), Stevens proposes that certain aspects of the speech signal provide particularly useful information for identifying the distinctive features of the speaker's intended words, and thus for accessing the appropriate lexical items. He identifies two major types of feature cues, i.e. *acoustic landmarks* (abrupt spectral changes which signal manner features such as [consonantal], [vocalic], [obstruent] etc.) and *other acoustic cues* (acoustic patterns, often found in the vicinity of landmarks, which signal place and voicing features), as well as other acoustic events (such as the onset and offset of pulses signaling vocal fold vibration; irregular pitch periods; and formant changes resulting from the opening and closing of the velopharyngeal port). We will present results from hand-labelling of individual feature cues in read and spontaneous speech, and from algorithms for automatic detection of these cues, providing quantitative measures of this aspect of systematic context-governed surface phonetic variation.

Halle, M. (1992), Phonological features. In W. Bright (ed.), International encyclopedia of linguistics Vol. 3. 207– 212. Oxford: Oxford University Press.

Stevens, K.N. (2002), Toward a model for lexical access based on acoustic landmarks and distinctive features. The Journal of the Acoustical Society of America 111 (4). 1872-1891.