Mechanisms of Vowel Production: Auditory Goals and Speaker Acuity

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Acoustic recordings were made of vowel productions by 20 young adult speakers of American English to investigate the effects of speaker and speaking condition on produced contrast. The vowels /ɪ/, /I/, /E/, /Θ/, /A/ and /ʊ/ were embedded in "compound words" consisting of two CVC syllables, in which each syllable comprised a real word. The compound words were embedded in a carrier phrase and were spoken in normal, clear, and fast conditions. To investigate relations between contrast and acuity, the subjects' auditory acuities for vowel spectra and durations were also measured, using discrimination tests with stimuli from synthetic continua.

Vowel contrast decreased with speaking condition, from clear to normal to fast. Speakers who had greater spectral contrasts in clear vs. fast speech also tended to have greater vowel durations in clear vs. fast speech. As found previously, speakers with greater spectral acuity produced vowels with more spectral contrast than speakers with lesser spectral acuity. There was no relation between speaker spectral and temporal acuity and how condition changes were implemented: higher spectral acuity speakers did not change between conditions with the preferential modification of spectra; higher temporal acuity speakers did not change between conditions with the preferential modification of durations.