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Prosodic modifications of the internal phonetic structure of monosyllabic CVC words

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Prosody serves an important function in speech communication: prosodic phrasing groups words into pragmatically and semantically coherent smaller chunks and prosodic prominence encodes discourse-level status and rhythmic structure of a word within a phrase. The acoustic characteristics in the speech signal are the primary source for listeners to decode prosodic structures and recover pragmatic and discourse meaning as intended by speakers. Words at the prosodic phrase boundary and under prominence are where the acoustic information is rich. As one of the major acoustic characteristics of prosody, this study reports how prosodic phrase boundary and prominence influence the temporal structure of the monosyllabic CVC word using speech excerpts from the Buckeye corpus of spontaneous conversational American English.

97 untrained, non-expert listeners were recruited from undergraduate courses at University of Illinois at Urbana-Champaign. Using RPT (rapid Prosody Transcription), the transcribers marked prosodic prominences and boundaries while listening to the speech excerpts extracted from the Buckeye corpus of conversational speech of American English. Their transcriptions were done in real time. After collecting prosody transcriptions, the reliability of RPT was evaluated with Fleiss' kappa intertranscribers' agreement scores. Then, the durations and intensities of subsyllabic components (C, N, and O) were measured and the relationship between prosodic scores and the acoustic measures were examined by using non-parametric Spearman's correlation.

The results confirm findings from prior studies, showing that (1) monosyllabic CVC words are lengthened before a prosodic phrase boundary and under prominence, and (2) all subcomponents of a syllable, that is, the onset, nucleus, and coda of the monosyllabic word, are elongated, further show that (3) the magnitude of lengthening associated with prosody varies as a function of syllable position, (4) the magnitude of lengthening of subcomponents of monosyllabic CVC words varies as a function of prosodic characteristics, (5) the intensities of monosyllabic CVC words are reduced before a prosodic phrase boundary but no systematic relationship with prosodic prominence. Duration of the nucleus of the word is most strongly affected by both prosodic prominence and boundary and the onset and the coda of the word is also affected but to a lesser degree. The degree of durational effect of prosodic phrase boundary on the coda is larger than on the onset duration while the degree of durational effect of prosodic prominence on the onset is larger than on the coda. On the other hand, the degree of intensity effect of prosodic phrase boundary is the greatest on the coda, followed by the nucleus and the onset in order, while there is no effect of prosodic prominence on intensity profiles of CVC monosyllabic words. The findings indicate that prosody shapes the phonetic structure of a syllable of a monosyllabic CVC word.

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