

American English V+/l/ and V+/r/ Sequences: Segments and Gestures

In this paper we present a laboratory phonology study of final V+/l/ and V+/r/ sequences in American English stressed monosyllables. Our main objective is to find out whether these sequences undergo a phonological rule of epenthesis/insertion/intrusion or a phonetic process of coarticulation. Working within the framework of Articulatory Phonology (Browman and Goldstein, 1986, 1989, 1990a, 1990b, 1992a, 1992b; Goldstein and Fowler, 2003), our analysis focuses on explaining the presence of the VC transitions in the sequences in relation to the vowel and the consonant as well as on examining the role of speaking rate.

Gick and Wilson (2011, 2006) consider the presence of the transitional schwa-like element that is often perceived after high front vowels in V+/l/ and V+/r/ sequences as the result of the tongue movement required in passing through a schwa-like configuration. Browman and Goldstein (1992b) make reference to the influence exerted by neighboring segments on their *targetless schwa*. Wells (2000) uses the terms *pre-l breaking* and *pre-r breaking* to refer to cases of schwa epenthesis in sequences containing high front and back vowels, whereby monophthongs become diphthongs and diphthongs become triphthongs. Lavoie and Cohn (1999) state that monosyllables consisting of non-low tense pure vowels or diphthongs followed by a liquid can be pronounced with either one or two syllables. Hall (2003, 2006) distinguishes between schwa intrusion and schwa epenthesis/insertion. In her view, intrusive vowels are phonologically invisible, are inserted late in the phonological derivation, cannot act like syllable nuclei, do not add a syllable to the word and do not involve the addition of a vowel segment. Moreover, they are not likely to occur in the most marked types of CC clusters, tend to occur between heterorganic consonants, copy only over sonorants or gutturals and are either copy vowels or neutral and schwa-like in quality.

Six native speakers of American English performed two readings each at two different rates (slow vs. fast) of ten randomized repetitions of the carrier sentence “Say ___ for me again.”, where the target word was one of *feel, bill, pale, fell, pal, Poll, Paul, hole, pull, pool, hull, furl, pile, howl, boil, fear, fair, par, pore, poor, hire* and *power*. The data were analyzed using the Praat speech analysis software (Boersma & Weenink, 2010). Praat scripts were designed to obtain first derivatives of F1, F2 and F3 formant traces. Velocity maxima and minima were taken as indicators of formant change and provided a means for automatic segmentation of the VC sequences into three parts: vowel, transition and consonant. Manual segmentation based on spectrographic observation and auditory perception complemented this procedure. Duration and midpoint F1, F2 and F3 measurements were taken for transition-vowel, transition-consonant and speaking rate comparisons. One-way ANOVAs, post-hoc Tukey tests and two-way factorial ANOVAs were used for the statistical analyses.

Our results lead us to conclude that we are in front of a generalized process affecting all final V+/l/ and V+/r/ contexts. These results show significant durational differences between the slow and fast productions as well as significant transition-vowel and transition-consonant spectral differences. They also prove the existence of a significantly variable transitional vocalic element whose formant values tend to resemble more those of the preceding vowel the faster the speaking rate. Therefore, despite the existence of three distinguishable parts, we consider the sequences under study to consist of two segments linked by a transitional element that is more or less variable as a function of speaking rate, the preceding vowel and, to a lesser extent, the following consonant. We propose that the presence of this transitional element can be best explained as the result of VC coarticulation, which entails the overlapping, blending and, in extreme cases, even disappearance of sounds. This view is more in accordance with the continuous nature of speech production than with a categorical process such as that of epenthesis/insertion. Speaking rate differences can then be explained in terms of articulation dynamics, with the implication that an increase in speaking rate entails a decrease in time for articulatory gestures to attain their targets.

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