

The perception and production of two vowel mergers in Cowlitz County, Washington

Recent literature has revealed ongoing variation in Pacific Northwest English. In particular, back vowels (cf. Ward 2003; Becker et al. 2013; McLarty & Kendall 2014) and pre-velar front vowels (cf. Wassink et al. 2009; Riebold 2015; 2015, and others) have received considerable attention. In this paper I present recent data from Cowlitz County, Washington that shed light on other mergers involving these vowels.

As explained in the *Atlas of North American English* (Labov, Ash & Boberg 2006), some form of the conditioned merger of /e, ε, æ/ before intervocalic /r/, sometimes known as the *Mary-merry-marry* merger, is found in most varieties of North American English. While many speakers merge all three, some leave one distinct from the other two. Additionally, *ANAE* discusses another collection of conditioned mergers involving /u, ʊ, o, ʌ/ before /l/, some of which are known as the *pool~pull*, *bull~bowl*, and *hull~hole* mergers, with the note that further study should be done to better understand them (2006:73). They have been the focus in studies in Ohio (Arnold 2015), Kansas City (Strelluf 2014), Utah (Di Paolo & Faber 1990; Baker & Bowie 2010), and California (Hall-Lew 2010), but they continue to be relatively understudied generally.

As part of a larger interview, 40 natives of Cowlitz County, ages 18–78, read a 31-item word list and 22 minimal pairs which targeted these mergers. After being manually transcribed and aligned at the word-level, the files were processed using DARLA (Reddy & Stanford 2015) which incorporates Prosodylab-Aligner (Gorman, Howell & Wagner 2011) for forced alignment and FAVE (Rosenfelder et al. 2014) for formant extraction. Normalized formant measurements at the midpoint of the vowels' duration were used for analysis, and the degree of overlap among the vowels were measured with Pillai scores (Hay, Warren & Drager 2006; Hall-Lew 2010) and Bhattacharyya's affinity (Bhattacharyya 1943; Calenge 2006; Johnson 2015; Stanley & Renwick 2016).

The data show contrasting patterns in these mergers. In the word list, speakers had the *bull~bowl* merger (/ʊl/=/ol/), leaving *pool* (/ul/) and *hull* (/ʌl/) distinct. Not surprisingly though (Labov 1966), as speakers paid more attention to speech in the minimal pair task, these two classes were separated, and a four-way distinction was seen. Speakers were generally aware of this distinction since the majority did not consider the minimal pairs to be homophonous. In the front vowels, speakers only had a *merry-marry* merger, leaving *Mary* (/er/) higher and fronter. Surprisingly though, the separation between these classes greatly diminished in the minimal pair task, and speakers had a full *Mary-merry-marry* merger both in production and in perception of their own speech, perhaps because they were unaware of a possible distinction.

The results from this study both establish the status of these vowel mergers in an area with little linguistic research and highlight the importance of speakers' awareness of vowel contrasts and how this can affect their production and perception. In conclusion, this study contributes to the ongoing dialectology in the Pacific Northwest and its contributions to the phonological system of English.