Phonetic shift /ɔr/ phonemic change? American English mergers over 40 years

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In this paper we analyze the vowel formants of a speaker over four decades to show phonemic change through time. Other real-time studies (Harrington, Palethorpe & Watson 2000; Harrington & Reubold 2015) have found that the vowel spaces of UK English speakers shift over the lifetime, likely as a consequence of interaction with speakers of other dialects or social classes. We focus on an understudied variety of English, spoken in the western United States, to investigate a pair of phonological mergers, the *cord-card* merger and the *hoarse-horse* merger.

The cord-card merger is a result of a historical three-way contrast of /or/, /ɔr/, and /ar/ collapsing down to just two. In most varieties of North American English, /ɔr/ shifted upward to merge with /or/, forming the hoarse-horse merger. But in others, /ɔr/ moved downward and merged with /ar/ to form the cord-card merger (Labov, Ash & Boberg 2006). In northern Utah, both mergers occurred, in succession: first the cord-card merger and then the hoarse-horse merger. We investigate them in a real-time study, focusing on a single speaker for whom many hours of good-quality recordings are available. Our speaker is the late Tom Perry, a notable leader in the Mormon church, who was born in Logan, Utah in 1922 (cf. Bowie 2008). Because the cord-card merger was complete in Salt Lake City by the 1930s (Helquist 1970), in speech from Perry's younger years we anticipate finding the cord-card merger. However, this merger quickly reversed in Utah and has since been replaced by the hoarse-horse merger (Lillie 1998; Bowie 2010); if Perry also followed this trend, we predict that recordings from later years will reflect it.

To determine whether Perry's realization of this merger changed over time, we analyze 36 hours of talks he gave over 43 years. These recordings come from semi-annual religious conferences (available at lds.org; cf. Bowie 2010, 2015) and speeches presented at Brigham Young University (speeches.byu.edu), all of which are publically available for download. We used the DARLA web interface (Reddy & Stanford 2015), which transcribes the recordings using in-house software, and then passes them to the Prosodylab-Aligner (Gorman, Howell & Wagner 2011) for automatic alignment. Potential cord-cord words, which we defined as those with pre-rhotic /o/ or /a/ in stressed position (n=7,678), were hand-checked for accurate transcription and formant values from the point of maximum intensity in the vowel were used for analysis. These words were then classified as either /or/, /ɔr/, or /ar/ based on their historic three-way pronunciations (Walker 1807) in order to predict the phonetic category membership, with the assumption that the /ɔr/ class was pronounced as [ar] in Salt Lake City in the 1930s.

Using this data, we tested whether the /ɔr/ class was significantly different than the /ar/ class in each of the 43 years. Plotting the first two formants in the vowel space, we show that Perry initially had a three-way distinction in the vowels. Over time however, the /ɔr/ class of words shifts upward from [ar] towards [or], suggesting a change to the hoarse-horse merger. Pillai's scores and Bhattacharyya's affinity (Bhattacharyya 1946, Calenge 2006, Johnson 2015) for each year confirm this trend, but then also reveal a reversal towards a three-way pattern in later years (Figure 1).

We therefore conclude that Perry had a three-way distinction in the 1970s, an unusual pattern in American English (Labov, Ash, & Boberg 2006). We also conclude that over time he raised the /ɔr/ class towards a hoarse-horse merger but then switched back to the three-way split (cf. Harrington & Reubold 2015). Some vowel raising may be the result of aging, causing F1 to lower (Xue & Hao 2003), but this does not explain why /ɔr/ was initially affected much more than /or/ and /ar/. Instead of physiological changes, we attribute this to sociolinguistic factors—namely that the speaker has shifted his vowels in the direction of the surrounding community. Thus, in the midst of an ongoing change to the more mainstream hoarse-horse merger, we show that not only do phonetic changes occur, but also that phonological recategorization can occur in the course of a speaker's lifetime.

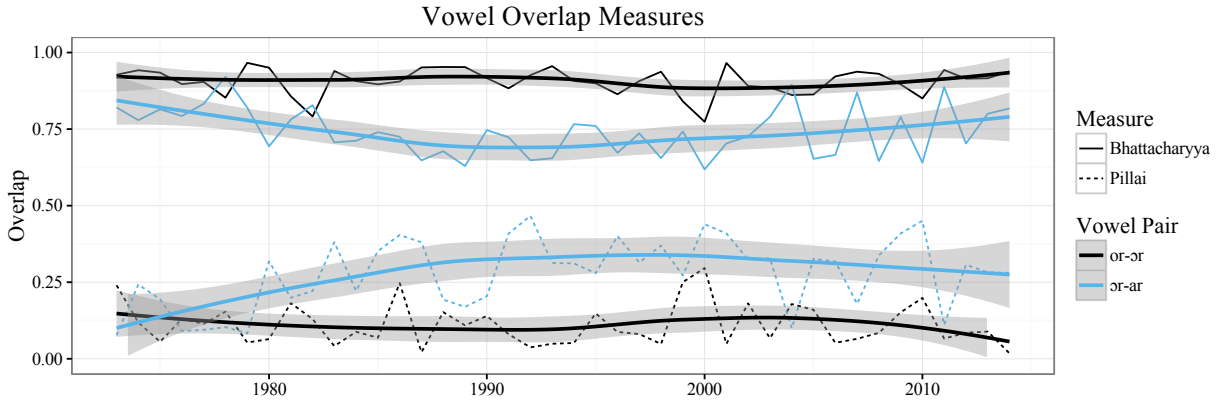

Figure 1: Overlap measures over time for or-ɔr (hoarse-horse) and ɔr-ar (cord-card). Lower Pillai scores and higher Bhattacharyya affinity for a vowel pair implies greater overlap between the vowels.

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