Uncovering the Origins of Nucleus Raising in Liverpool English: Dynamic Analysis of Diphthongs
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Varieties of English across the world, such as Canadian English (Chambers 1973), have developed PRICE nucleus raising before voiceless consonants, so that the vowels in the words right and tide are produced differently but are perceived as the same. PRICE nucleus raising in different varieties are often independent innovations, and this observation has lead to a range of proposals to account for the origins and development of PRICE nucleus raising. However, it is often difficult to empirically evaluate these proposals as little or no recorded data exist for the time period before nucleus raising was present. Furthermore, a dynamic acoustic analysis of the PRICE vowel is necessary for uncovering the phonetic precursors to these processes. The present paper examines a recently described instance of PRICE nucleus raising in Liverpool English (Knowles 1973, Cardoso 2015) using a dynamic acoustic analysis of the PRICE vowel to better understand the origins of these processes.

Trudgill (1986) suggests that PRICE nucleus raising in varieties of Canadian English originated from new-dialect formation. A new dialect emerges from the intensive contact among several different source varieties, where small adjustments in individuals' speech occur over several generations (Trudgill 2004). Liverpool English, a relatively recent case of new-dialect formation, emerged in the mid-19th century as a result of extensive and prolonged immigration mostly from the surrounding areas of Lancashire and from Ireland (Cardoso 2015). Therefore, if PRICE nucleus raising in Liverpool English is the result of new-dialect formation, speakers born shortly after the dialect was formed would be predicted to exhibit PRICE nucleus raising.

Moreton & Thomas (2007) propose that PRICE nucleus raising is the result of different co-articulatory pressures from the following consonant, which are reanalysed in future generations. Their findings suggest that the offglide of PRICE before voiceless stops is peripheralised, which translates into a diphthong that is composed of a short nucleus and a long offglide. Subsequent generations reanalyse the short nucleus as a raising of the nucleus. Therefore, if PRICE nucleus raising in Liverpool English is the result of phonetic co-articulatory pressures, it would be predicted that speakers of Liverpool English would begin with a difference in the ratio of nucleus to offglide before voiceless consonants compared to voiced consonants, but not nucleus raising. In this proposal, PRICE nucleus raising should emerge gradually over time.

The current investigation provides a dynamic acoustic analysis of the PRICE vowel in the Origins of Liverpool English Corpus (Watson & Clark forthcoming), a dataset with speakers born shortly after new-dialect formation in Liverpool, and a recently collected corpus (Cardoso 2015). These datasets are used to evaluate the predictions of the two proposals for the origins of these processes.

Previous research on PRICE nucleus raising has used either impressionistic analysis or static single point formant measurements. However, the production of diphthongs is a complex dynamic process and is therefore better represented using a dynamic approach. A dynamic acoustic analysis looks at changes in the qualities of vowels across their entire duration, and can take into account fine-grained patterns of temporal variation. This approach has featured prominently in recent work on other varieties of English, such as Haddican et al. (2013) and Docherty et al. (2015).

The present dynamic acoustic analysis uses multiple measurements along the trajectory of the diphthong, Euclidean distance between the nucleus and offglide, and the inflection point of the diphthong. Diphthong trajectories are used to determine the fine-grained details of the PRICE vowel along its entire duration. The Euclidean distance indicates the amount of diphthongisation, which may be used to estimate offglide peripheralisation. Inflection point is a measure that represents the ratio of nucleus to offglide for the diphthong. These measurements are then subjected to statistical testing in linear mixed effects models, to determine statistically significant patterns in the production of the PRICE vowel across different speakers and environments.

My findings suggest that PRICE nucleus raising is not present in the oldest speakers of the current investigation (Fig.1). Therefore, PRICE nucleus raising in Liverpool English is likely not the result of new-dialect formation. Despite the absence of nucleus raising for the older speakers, I did find a difference in the inflection points for PRICE before voiceless consonants and voiced consonants.
Furthermore, nucleus raising before voiceless consonants and nucleus lowering before voiced consonants is found to emerge gradually in apparent time (Fig. 2), which results in a clear difference in the height of the nucleus of PRICE before voiceless consonants compared to voiced consonants for young speakers (Fig. 3). These results provide some support for the proposal by Moreton & Thomas (2007), that PRICE nucleus raising begins as a phonetic co-articulatory pressure from the following voiceless consonant.

References


