Phonologically Conditioned Phonetic Changes
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The consensus view of conditioned phonetic changes is that they begin as low-level phonetic biases which become compounded in the production-perception feedback loop (Ohala, 1981; Pierrehumbert, 2002, 2006; Bermúdez-Otero, 2007, inter alia). What happens later on during the course of the sound change is a matter of some debate, but according to our claim, this consensus view is not accurate for some cases of conditioned phonetic change.

In this paper, we claim that some phonetic changes are conditioned by abstract phonological features, not by low-level phonetic biases. We present two kinds of evidence to support our claim. First, we will present a case study where a conditioned phonetic change occurs in a context which is phonologically defined, but phonetically unnatural: the raising of /ay/ before underlyingly voiceless aps. Second, we will present a case study where a phonetic change did not occur in a phonetically favorable context, because it was not phonologically defined to do so: the (non)peripheralization of /ey/ before /l/. Our data is drawn from the Philadelphia Neighborhood Corpus (PNC), which currently contains vowel measurements from 295 Philadelphians born between 1888 and 1991 and interviewed between 1973 and 2010. In this paper, we will be analyzing 76,266 measurements of /ay/ and 44,834 measurements of /ey/.

The raising of /ay/ in pre-voiceless contexts is a well-known change in Philadelphia, labeled new and vigorous (Labov, 2001). It has been argued that pre-voiceless /ay/ raising is phonetically natural due either to pre-voiceless shortening (Joos, 1942; Chambers, 1973) or pre-voiceless offglide peripheralization (Moreton and Thomas, 2004). However, both pre-voiceless shortening and offglide peripheralization are neutralized in the context of flapped /t/ and /d/ (data from the corpus will be presented to support this neutralization). In contemporary Philadelphian English, /ay/ raising not only occurs in the phonetically unnatural context of flapped /t/, but also, according to an apparent time analysis of the PNC data, has always done so (see Figure 1). That is, the /ay/ raising change has been conditioned by underlying phonological voicing of the following segment, even when the effects of phonetic voicing have been neutralized.

The peripheralization of /ey/ in pre-consonantal position is another well-established change in Philadelphia. Figure 2 illustrates the apparent time trend for the relevant contexts of the change. If /ey/ precedes any other consonant except /l/ within the same word, it undergoes the change. However, despite the fact that /eyl/ does not undergo the peripheralization change, it appears to phonetically favor a raised /ey/. In fact, at the onset of the change, /eyl/ is significantly more peripheral than /eyC/. Despite its early and consistent bias in the innovative direction, /eyl/ does not end up undergoing the change. Our analysis of this fact is that the peripheralization of /ey/ is phonologically defined as occurring before a consonant, and /l/ does not count as a consonant due to heavy /l/ vocalization (Ash, 1982).

We conclude from the results of these case studies that abstract phonological representation plays a crucial role even in the very early stages of a phonetic change.

![Figure 1. /ay/ Raising by phonological (/t/ vs /d/) and phonetic (flap vs non-flap) context](image1.png)

![Figure 2. /ey/ Peripheralization by phonological context.](image2.png)