A recipe for phonetically conditioned sound change

Most theorists distinguish between sound changes where an association between sounds (*phonetically-conditioned sound change*) is responsible, and those arising from association between sound and another category (*analogical change*). This analysis is problematic because it treats phonetically-conditioned sound change and analogy as distinct. I argue that analogy and phonetically-conditioned sound change utilize the same mechanism: mental associations of sounds with other linguistic (e.g., sounds, words) and non-linguistic (e.g., talker characteristics) contexts. To discover the processes underlying sound change, we must first learn how associations develop between sounds in a language and other objects, both linguistic (e.g., phonetic environment, semantic relationship) and extra-linguistic (e.g., talker characteristics such as gender, dialect).

In this experiment, I use existing variation in pronunciation of the stop+approximant /tw/ cluster as a springboard to replicate sound change in the laboratory so that we may see the effect of various associations on phonetically conditioned sound change. In American English, alveolar stops may become alveo-palatal affricates before /j/. Many American English speakers also palatalize and affricate /t/ before /r/. In order to examine sound change before it is a change in progress, we should look to variation that may occur but has not yet reached a point in which the variation has been assigned to any variable. Approximants are known to increase the degree and length of aspiration in preceding stops. The lip-rounding that accompanies /w/ may spread to the preceding stop, which, by lengthening the front cavity, may create the percept of a retracted /t/. If the aspiration is strengthened, the resulting sound may be similar to an alveo-palatal affricate. However, the aspiration could be fronted, as the place of articulation transitions from the alveolar to bilabial place of articulation, developing into a more anterior frication, yielding /ts/. Both a front and a retracted variant may then arise from the coarticulation of /t+w/.

Using the perceptual learning technique as in Norris, McQueen and Cutler 2003 (i.a.), we can create a change in the perception of a phoneme under laboratory conditions. Additionally, a shadowing task, such as that employed in Goldinger 1998 (i.a.), in which participants repeat a word after they hear it, it is possible to reproduce a mini-sound change in the laboratory, in both perception and production. In this experiment, a lexical decision task reveals differences in accuracy and response times based on which variant was used in the training phase and the frequency of the word. Participants who were trained on the retracted variant show greater acceptance of and faster response times to words with the training variant, and less acceptance of and slower response times to words with the untrained variant, relative to the control group. This effect is especially robust in low-frequency words. The results of an identification task, which tests the variant /t/ pronunciation before the vowel /u/, show that the sound change can be generalized to a new phonetic environment, with the retracted variant trained group showing less acceptance of the front variant as an exemplar of /t/. One interesting aspect of these results is that the control group and front variant trained group seem to accept a greater range of variation that is centered around the traditional alveolar pronunciation, but that the retracted group shows acceptance for a narrower range of variation, with the center shifted towards a retracted pronunciation. That is, not only did the /t/ boundary move to include the retracted variant, but that it seems to have pulled the front end of the phonemic category back as well.

References

Goldinger, Steven. 1998. Echoes of echoes? An episodic theory of lexical access. *Psychological Review* 105: 251–279.

Norris, Dennis, James McQueen, and Anne Cutler. 2003. Perceptual learning in Speech. *Cognitive Psychology* 47(2): 204-238.