The role of variation and gender in retuning perceptual categories

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Exposure to phonetic variation can cause temporary and long-term retuning of perceptual categories, and it is hypothesized that this may be one of the underlying mechanisms of sound change. In selective adaptation (e.g., Eimas & Corbit 1973), repeated exposure to a speech sound reduces the range of potential targets that are categorized as that sound, thus narrowing the category. In perceptual adjustment (e.g., Norris, McQueen & Cutler 2003), repeated exposure to an ambiguous speech sound results in a shift in the phoneme boundary, thus increasing the acceptability of potential targets in the acoustic space between two sounds. A third form of perceptual re-tuning, which I will call "perceptual broadening," occurs when exposure to broad variation in a speech sound expands the boundaries of that sound category to include a greater number of potential targets (as hypothesized in Kleinschmidt & Jaeger 2012). This concept could explain the loss of non-native contrasts during early language acquisition, as well as more temporary re-tuning in an experimental paradigm.

Three experiments designed to recreate sound change in the laboratory also demonstrated effects of perceptual broadening. The first experiment showed broadening of the /v/ category among trained participants, who heard 3 repetitions of 80 different tokens containing word-initial /v/, relative to participants who did not receive training. Behavioral and eye-tracking measurements showed greater endorsement of /f/ and /b/ tokens as instances of /v/ for trained participants. The second and third experiments were designed to elicit a perceptual split of /t/ before /w/ (towards a front variant, /ʦ/, and a retracted variant /ʧ/), depending on the gender of the talker. Participants who heard only a single variant during training displayed perceptual adjustment, in which the boundaries of the /t/ category (before /w/ as well as before /u/) shifted in the direction of the training variant, and more tokens of that type of variant were acceptable as instances of /t/ than for untrained participants. But participants who heard male voices using the front variant (ʦ), and female voices using the retracted variant (ʧ), showed increased acceptance of /ʦ/ spoken by men, but not by women. They also accepted more /ʧ/ tokens as instances of /t/ for female talkers, relative to the untrained group, but also accepted more/ʧ/ tokens for male talkers. Participants who were trained with women using /ʦ/, and men using /ʧ/displayed overall perceptual broadening, in which the /t/ category expanded to accept both variants spoken by talkers of either gender as instances of /t/. It is hypothesized that because the men's retracted productions had the lowest frequency spectral average, and women's front productions had the highest, the range of variation was greater in this scenario than when the distribution of variants was reversed. The greater range of variation caused perceptual broadening for participants in this condition. When the distribution of variants was along socially expected lines (male retracted, female front), gender may have been disregarded as a relevant factor in adapting to the new pattern, but when the distribution was unexpected (male front, female retracted), the least expected variant (/ts/) was sorted according to gender.

References

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