Variability in language input: Effects on the robustness of novel word representations

The pronunciation of words can differ drastically depending on the origins of the speaker. While New Yorkers might produce the words "cot" and "caught" with two distinct vowels, Californians tend to use the same merged vowel for both words. Given our modern society where individuals from different regional backgrounds co-reside in close proximity, successful communication relies on the ability to navigate multiple pronunciations of the same word as a function of the accent of the speaker. This task is far from trivial. Research examining listeners' word recognition across accents has revealed that in the absence of prior exposure to the speaker, listeners are slower (Floccia, Goslin, Girard, & Konopczynski, 2006) and less accurate (Bradlow & Bent, 2008) at recognizing familiar words in an unfamiliar compared to the native accent. This might have important consequences for learning novel words in the face of accent variability.

While research has explored the effect of multiple pronunciation variants on the developmental trajectory of vocabulary learning (Muench & Creel, 2013), no work to date has tested for potential consequences on lexical representations. On the one hand, lexical representations need to be specific in nature to avoid conflating two phonological neighbors (e.g., /kæt/ and /hæt/) as the same word. On the other hand, lexical representations should be flexible enough to allow listeners to cope with accent variability. It stands to reason that listeners' novel word representations become increasingly more specific during the language learning process (cf. White, Yee, Blumstein, & Morgan, 2013), but that the exact amount of flexibility and specificity is dependent on the variability in the input. That is, when hearing a single accent during word learning, listeners' representations might be relatively constrained, making it easy to distinguish between correctly pronounced words and mispronunciations. When hearing multiple accents during word learning, however, the greater variability in the input might lead to greater lexical flexibility, potentially resulting in more tolerance for deviation in the pronunciation of words.

To test whether this is indeed the case, monolingual English-speaking adult participants (*N*=80) learned 15 new, phototactically legal CVC-words containing a front vowel in either one or two accents. Accents differed in vowel height, such that one accent employed consistently higher vowels than the other. To ensure high rates of word learning, participants heard each word 8 times each by two speakers during training. After training, the flexibility of these newly-built word representations was tested, using a third, previously unheard speaker. Participants were tested on their recognition of the two accent variants as well as mispronunciations that featured a dramatic front-to-back vowel change and unrelated filler items.

Although the rate of word learning did not differ between mono-accent and bi-accent participants during training (cf. Muench & Creel, 2013), performance at test was dependent on the number of accents listeners had been exposed to. Participants easily recognized the exact pronunciation variant(s) they had heard during training and correctly rejected the filler trials, independent of accent group. However, participants trained on two accents were more likely to accept mispronunciations than those trained on a single accent (*p*s < .01; see Figure 1). These findings suggest that increased variability leads to greater flexibility (allowing language learners to accept the two accent variants of the learned words) as well as reduced specificity (making them more susceptible to mispronunciations). Nonetheless, despite the reduced specificity observed in the recognition of words for the bi-accent group, not all phonological detail was lost. In fact, the large number of (correct) rejections for mispronunciation trials even in the bi-accent group suggests that while mispronunciations are sometimes accepted as alternative versions of the learned words, this is not the standard. Similar to lexical acquisition in infants (e.g., Van der Feest & Johnson, 2016; Van Heugten, Paquette-Smith, Krieger, Johnson, 2018), novel word representations acquired by adults are therefore simultaneously flexible and specific, even in the presence of accent variation.
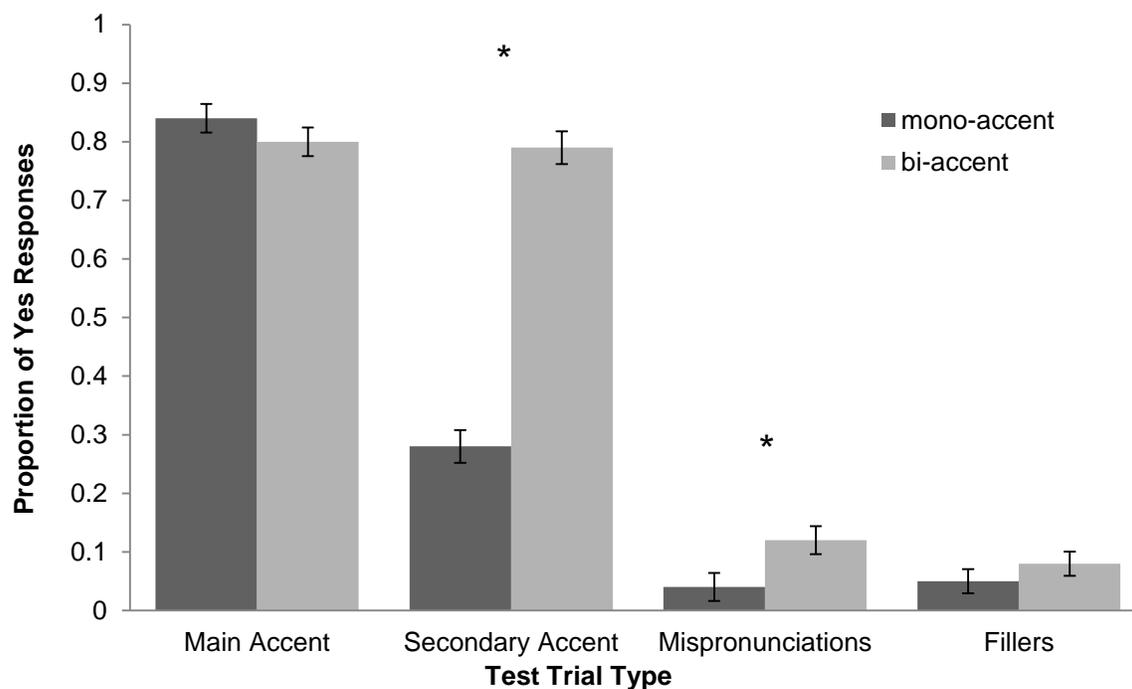
Figure 1. The acceptance rate (measured as the proportion of yes responses) for each test trial type (main accent variant, secondary accent variant, mispronunciations, and fillers), plotted separately for each accent group (mono-accent vs. bi-accent). Error bars in this figure represent the standard errors of the mean difference scores.

References

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