The effect of semantic context and phonetic enhancements on the perception of word-final nasal consonants by L1 Brazilian Portuguese/L2 English learners

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Phonological contrasts in the second language (L2) that do not exist in the first language (L1) can lead to difficulties in both speech production and perception in the L2. In Brazilian Portuguese (BP), the nasal consonants /m/ and /n/ are illegal in coda position, and whenever the graphemes <m> or <n> appear in this position, the preceding vowel is nasalized but the consonant is not articulated. BP learners of English exhibit difficulty in distinguishing between coda /m/-/n/ in English perception and production (e.g. Kluge et al., 2007).

Here, we examine whether speaking style (clear vs. conversational) and semantic context (high vs. low predictability sentences) may facilitate the recognition in noise of target words containing the nasal contrast in coda position for L1 BP/L2 English listeners. Bradlow & Alexander (2007) showed that sentence recognition in noise was improved for non-native listeners of various L1s by the combined acoustic-phonetic and semantic enhancements, but there was no benefit from each type of enhancement on its own. However, that study did not account for specific difficulties that listeners might encounter as a result of their L1 phonological systems. The present study seeks to test whether the two enhancements aid listeners in resolving a perceptual difficulty arising from the specific L1/L2 phonological mismatch.

Native English (n=26) and non-native L1 BP/L2 English listeners (n=21) participated in a word recognition in noise task. Fifteen English /m/-/n/ minimal pairs (30 target words) were selected, and high- and low-predictability contexts were created for all words (60 unique sentences) with the target word as the last word of the sentence (e.g. "A green lemon is called a lime." vs. "This is his favorite lime."). A female native speaker of American English read all sentences first in conversational and then in clear speaking styles (following Smiljanic & Bradlow, 2005). Recordings were mixed with speech-shaped noise at -2 dB signal-to-noise ratio (SNR) for native listeners and +2 dB SNR for non-native listeners to elicit similar levels of recognition accuracy for both groups. Each listener heard all 120 sentences (30 sentences x 2 styles x 2 contexts) presented in random order and typed the last word.

Accuracy for all four sentence types and two listener groups is shown in Figure 1. For both native and non-native listeners, a mixed-effects linear regression was conducted and interpreted using Tukey's post-hoc comparisons. For both natives and non-natives, Style (clear>conversational, p<.0001) and Predictability (high>low, p<.0001) were significant predictors of target word accuracy. Also, for natives, targets in high-context conversational sentences were identified correctly more often than those in low-context clear sentences. Non-natives, however, performed similarly on high/conversational and low/clear sentences.

These findings show that L1 BP/L2 English listeners benefited from acoustic-phonetic, semantic, and combined enhancements when recognizing /m/-/n/ coda pairs. The fact that native listeners benefited more from semantic context alone (high-predictability conversational relative to low-predictability clear sentences), but non-natives did not, suggests that the latter group could not utilize the semantic information to the same degree in the absence of the acoustic-

phonetic enhancements. The increased benefit of context for non-natives in clear speaking style, where sentences tend to be longer and segments are hyperarticulated, supports this conclusion.

References

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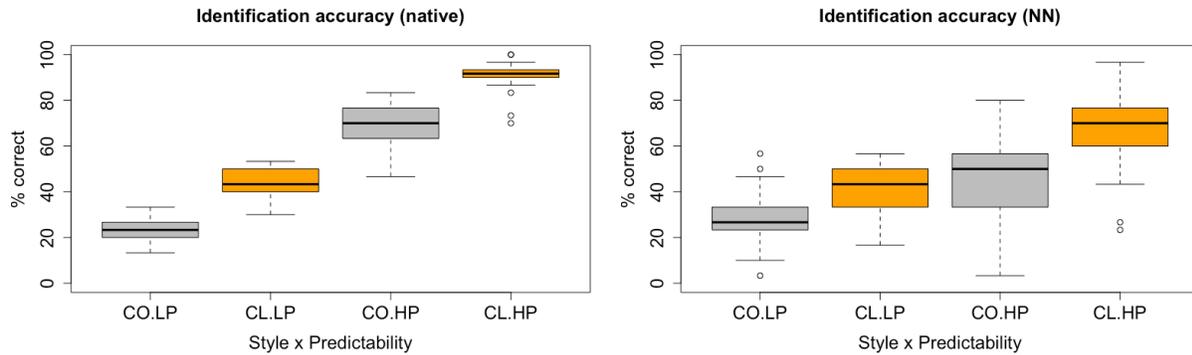
Figure 1. Identification accuracy for native English (left) and L1 BP/L2 English (right) listeners for conversational (CO) and clear (CL) speaking style and low (LP) and high (HP) predictability sentence context.