

Formal/Speech Perception
Not All Epenthetic Contexts Are Equal: Differential Effects in Japanese Illusory Vowel Perception (497 words)

Introduction: Japanese listeners have a strong tendency toward perceptually epenthesizing [u] (IPA=[ɯ]; we transcribe [u]) to repair consonant cluster violations [1-4]. For example, Dupoux et al. [1] showed that when presented with [ebzo], Japanese listeners reported hearing [ebuzo] significantly more often than did control French speakers. It has been claimed that [u] is the default epenthetic vowel because it undergoes devoicing and is perceptually less sonorous [5,6]. However, some phonological contexts disallow epenthetic [u]. In particular, [o] is epenthesized after coronal consonants [t, d] ([fa.i.to]/*[fa.i.tu]) [7]. What do Japanese speakers perceive when they hear consonant clusters containing coronals? Our findings suggest that velar and coronal epenthetic contexts are not homologous, and the interaction between context and the category of the epenthetic vowel is critical.

Procedure: All stimuli had the frame [eCVma]. Six consonants were used: [t, d], [k, g] and the nasals [m, n] acted as fillers. Vowels were either [o], [u] or missing. A female native Japanese speaker recorded the stimuli with overt vowels (e.g. *etoma*, *etuma*). The consonant clusters (e.g. *etma*) were created via splicing out the vowels. Thus, each consonant cluster could either be *et~~o~~ma* (double strikethrough indicates deleted vowel) or *et~~u~~ma*. We used an AX discrimination task on auditory-presented stimuli. Sixteen native Japanese speakers and 14 native English speaker controls participated.

Results: The mean A' scores for English and Japanese participants ranged between A'=0.998 and A'=0.583 (see Figure 1). Japanese subjects showed significantly poorer discrimination between *ekuma/ek~~u~~ma* ($\Delta A'=0.09$; $t(28)=-1.52$; $p<0.05$) and *eguma/eg~~u~~ma* ($\Delta A'=0.12$; $t(28)=-2.29$; $p<0.01$) than English subjects. Collapsing across voicing (no effects of voicing were found), Japanese speakers performed significantly better at discriminating coronals with epenthetic [o] than velars with epenthetic [u] ($\Delta A'=0.1$; $t(15)=3.15$; $p<0.01$). Additionally, Japanese subjects' good discrimination of *etuma/et~~u~~ma* (A'=0.95) and *eduma/ed~~u~~ma* (A'=0.97) indicates that, with coronals, [u] is not perceptually epenthesized. Japanese listeners also discriminated between *ekuma/ek~~o~~ma* (A'=0.97) and *eguma/eg~~o~~ma* (A'=0.94), suggesting that not all perceptual cues to vowel identity were eliminated.

Discussion: These findings suggest there is a strong interplay between vowel category and epenthetic context. This is evident given that Japanese speakers were poor at discriminating epenthetic [u] after velars, but were quite good after coronals regardless of whether the vowel category was appropriate ([o]) or not ([u]). We found that perceptual epenthesis after coronals was not observed, suggesting not all epenthetic contexts are equal when it comes to speech perception. We replicated Dupoux [1-4], though listeners did better than anticipated, likely due to the fact that participants were listening to manipulated Japanese speech and were more sensitive to fine phonetic detail. Finally, methodologically, it is impossible to remove all perceptual cues to the category of the vowel [8,9].

Conclusion: In contexts where [u] is not the appropriate epenthetic vowel (i.e., after coronals), we failed to find illusory vowel perception. These results suggest that illusory vowel perception occurs only with the vowel [u] and in contexts that require epenthetic [u], suggesting that listeners are sensitive to both the contexts that require repair and the distributional properties of vowel tokens in the language.

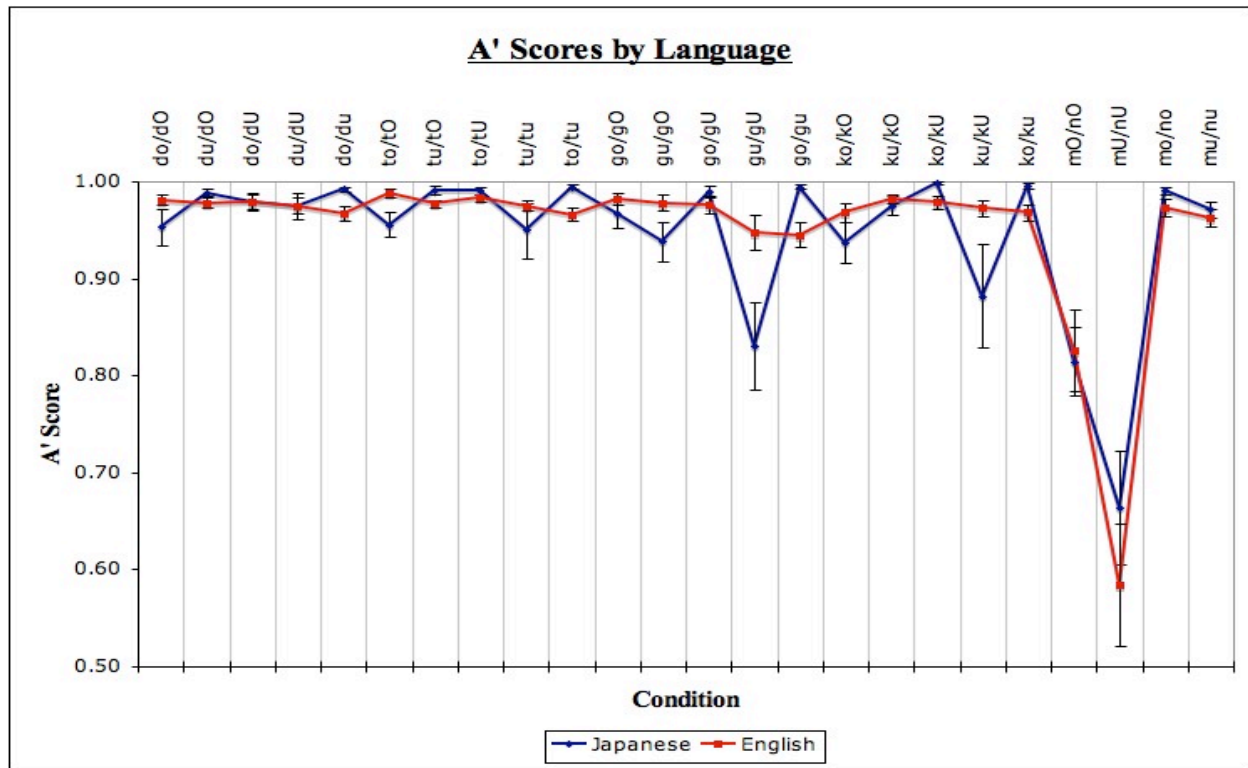


Figure 1: Note: Capital Vowel=Deleted Vowel

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