The level of perception of illusory vowels

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**BACKGROUND**

- Stop-nasal sequences are illegal in Korean; stop is nasalized.
  e.g., Kukmul → kuNmul ‘soup’
- Nasalization may also occur in English stop-nasal sequences.
  e.g., jacknife → dʒɛŋnaipī
- But, in English voiced stop-nasal sequences Korean L2 learners were more likely to epenthesize a vowel.
  e.g., magnet → mag-net
- Hwang 2010
  Insertion of vowels after voiced stops is an effect of misperception—since in Korean voiced stops occur only intervocally as an allophone of voiceless obstruents.
- Categorization of items on continua from no vowel to a full vowel as an English vowel.

**RESEARCH QUESTIONS**

At what level does misperception take place?

Does Korean listeners’ misperception of voiced stop-nasal sequences result from

1. the failure to hear the acoustic differences between voiced stop-nasal sequences and voiced stop-V-nasal sequences

OR

2. the failure to realize that the differences are relevant to linguistic categorization?

**EXPERIMENT**

- **Participants:** 11 English native speakers, normal hearing
  10 Korean native speakers, normal hearing
- **Stimuli:** (i) igna-igna, ikna-ikna continua that ranged from no vowel to a full vowel (100ms) at intervals of 20ms.
  igna - igna - igna - igna - igna - igna
  ikna - ikna - ikna - ikna - ikna - ikna
  0ms - 20ms - 40ms - 60ms - 80ms - 100ms
- (ii) vowel duration manipulated from a full vowel
- (iii) produced by a Korean English bilingual who could pronounce the Korean epenthetic vowel [i]
- **Task:**
  (i) Categorization task
  two alternative forced choice (2AFC)
  Taps into phonological processing
  (ii) ERP: Mismatch Negativity (MMN)
  Indicates brain response to change in an auditory stimulus. MMN is elicited even in the absence of attention to stimulus (e.g., while watching a silent movie).
  Only the endpoint items on the continua were used.
- **Procedure:** experiment conducted in a sound-treated room
categorization task preceded the ERP session

**RESULT**

(i) Categorization task

<table>
<thead>
<tr>
<th>Figure 1a. kn-kin</th>
<th>Figure 1b. gn-gin</th>
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<tbody>
<tr>
<td><img src="image1" alt="Language" /></td>
<td><img src="image2" alt="Language" /></td>
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- Korean listeners reported they heard a vowel about 60% of the time even when there was no vowel at all, but only when the stop was voiced.
  English-speaking listeners began to report hearing a vowel in [i] when the vowel was longer than 20ms.
- These results replicated those of Hwang 2010.

(ii) ERP: Mismatch Negativity

<table>
<thead>
<tr>
<th>Figure 3. Korean group</th>
<th>Figure 4. English group</th>
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<tbody>
<tr>
<td><img src="image3" alt="Standard Deviant" /></td>
<td><img src="image4" alt="Standard Deviant" /></td>
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- Both Korean and English listeners displayed significant MMN responses to the ‘vowel’ and ‘no vowel’ contrast in stop-nasal sequences whether the stop is voiced or voiceless.
- Voicing of the stop did not affect their pre-attentive discrimination of the pair.

**DISCUSSION**

- At the preattentive level, both Korean and English listeners showed similar responses to the ‘vowel-no vowel’ difference.
- At the level of phonological processing, Korean listeners were influenced by the structural constraints of their native language, which allows voiced obstruent only in prevocalic position.
- Although voicing is not contrastive in Korean, participants clearly were influenced by voicing.

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