

# 4pSC12

# Cross-Language Perception of Rate Induced Resyllabification

Kyoko Nagao    Byung-jin Lim    Kenneth de Jong  
*Department of Linguistics, Indiana University*

## MAIN POINTS

- Examined**  
 Non-native perception of rate-induced resyllabification and consonant voicing in different syllable positions.
- Found**
- Non-native listeners exhibit perceptual resyllabification even more clearly than native listeners.
  - Voicing categorizations is influenced by the existence of native categories and is syllable-position dependent.
  - Subjective evaluation of performance is sensitive to length of stay in the U.S., but isn't a good index of accuracy.

## BACKGROUND

**Perceptual resyllabification**  
 As speech rates increase

- Coda (VC) structures are perceived as onset (CV) structures.
- /p/ is perceived as /b/.

(Stetson, 1951; Tuller & Kelso, 1991; de Jong, et al. 2001)

'eep', 'eep', 'eep', ...[perceptual shift], 'bee', 'bee'  
 Slow speech -----> Fast speech

## Cross-language comparison

- Syllable Structures**  
 Japanese has fewer coda structures.(CV-biases)
- Voicing contrasts**  
 - Different VOT values are used for categorizing voicing contrasts in different languages.  
 - Syllable initial three-way distinctions in Korean stops.  
 - No voicing contrast in Korean codas.

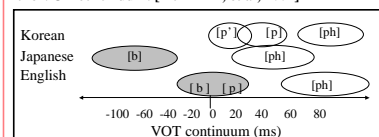
## Listeners' self-evaluation

It might be alternative index of categorizability.

Table 1. Cross-language comparison: syllable affiliation & voicing contrast

Onset Coda	English		Japanese		Korean	
	Voiced	Voicless	Voiced	Voicless	Voiced	Voicless
	✓	✓	Geminates		Neutralized Only	

Fig. 1. Schematic phonetic categorization for voicing on the VOT continuum. [from Lim, et al, 2001]



## RESEARCH QUESTIONS

- Syllabification**
- Do non-native listeners exhibit perception of resyllabification?
    - Do changing speech rates affect listeners' categorization of syllabic structures?
- Voicing**
- We expect VOT effects on onsets, e.g. Japanese bias toward voiceless stops, but...
    - Is non-native categorization affected by syllabic position?
- Confidence**
- Is accuracy of listeners' categorization consistent with listeners' subjective perception?

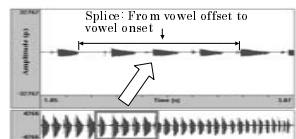
## METHODS

- Speech materials:**
- Four native speakers of American English.
  - Repeated syllables with accelerating speech rates from 450 ms/σ to 200 ms/σ controlled by a metronome.
  - 4 different syllables were repeated.

	Coda structure (VC)	Onset structure (CV)
/b/	eeb	bee
/p/	eep	pea

- Each utterance contains approximately 25 syllables.

Fig 2. An example of spliced stimuli -'pea'.



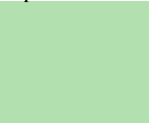
Spliced three syllables per stimulus. 372 stimuli in total.

## Procedure:

Listeners	Non-native		Native
	Japanese	Korean	English
N(Male:Female)	14 (4:10)	13 (5:8)	18 (0:18)
Age(Mean)	21 - 31 (24.4)	24 - 31(28)	18 - 23(20)

- Tasks:**
- ① Four-alternative forced choice test
  - ② Listeners' self-estimated confidence in their responses

Fig 3. Display for the experiment.

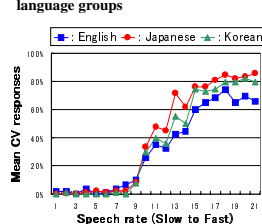


## RESULTS - Identification

### Syllabification (Fig. 4)

1. Perceptual shifts were observed in the Japanese and Korean listeners.
2. The stimuli for which the perceptual shift occurred for the Japanese and the Koreans were the same ones for the English listeners.
3. Rate effects are bigger for the non-native listeners.
4. The strongest preference over CV responses was found in Japanese listeners.

Fig 4. Identifications of syllable structures for VC inputs by the three language groups



### Voicing

#### Japanese Onsets (Fig. 5)

- ① For onsets, /b/ → /p/ at fast rates.
- ② Japanese preference for /p/ responses --expected from VOT differences. (Korean shows bias toward /b/.)

#### Korean Codas (Fig. 6)

- ① For codas, /p/ → ? at fast rates.
- ② Korean reduction in discrimination - /p/ and /b/ shifted toward 50 % categorization. (Japanese doesn't show this effect.)

Fig 5. Japanese bias toward /p/ for CV inputs.

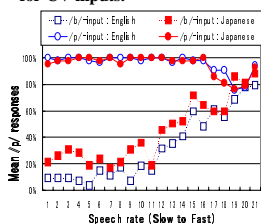
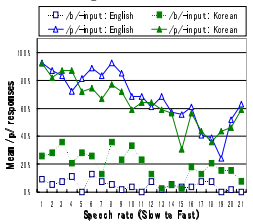


Fig 6. Korean voicing responses for VC inputs



## RESULTS - Confidence

1. Mean confidence level decreases as speech rate increases (Fig. 7).
2. Koreans are less confident, even though their voicing hits for CV's are similar to the English (Fig. 8).
3. Non-native listeners of English who stay in the U.S. longer showed higher mean confidence levels, even though their voicing hit rates do not improve (Fig. 9).

Fig. 7. Relationship b/w speech rates and listeners' confidence in their responses for CV inputs

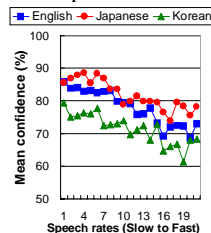


Fig. 8. Relationship b/w speech rates and listeners' accuracy in their responses for CV inputs

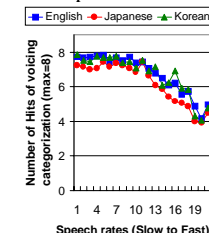
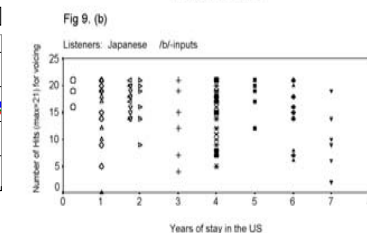
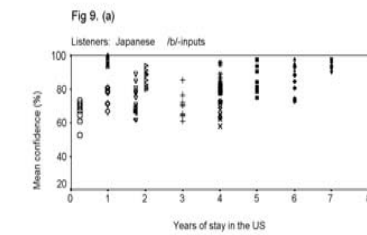


Fig. 9. Relationship b/w listeners' length of stay in the US and (a) confidence levels (b) accuracy.



## SUMMARY

1. Perceptual resyllabification is not language dependent. Categorization shifts are, in fact more clear in non-English listeners.
2. Voicing categorization is affected by native categories.
3. Identification of consonants is syllable-position dependent in Korean.
4. There are apparent cultural effects on listeners' confidence.
5. Experience with English seems to increase the listeners' confidence, but not necessarily their accuracy.

## CONCLUSIONS

1. Non-natives are able to acquire near native-level perception of English syllabification.
2. Persistent effects of native language are more apparent in voicing categorization. This is even more true as speech rate increases.
3. Listeners' self-evaluation doesn't index accuracy well.

## References

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