

# Control of Speech Timing in Korean: Durations of Vowels in/after Closed and Open Syllables

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This paper explores syllable-level control of speech timing in Korean. Specifically, we report the result of a production experiment which examines the duration of vowels following, as well as preceding, geminate and singleton consonants.

In many syllable-timed languages, vowels tend to be shorter in a closed syllable than in an open syllable (Closed Syllable Vowel Shortening, hereafter CSVS. See Maddieson 1985 for relevant references). Japanese, one of the mora-timing languages, does not exhibit CSVS, but it has another type of speech timing control: Vowels in the syllable after a closed syllable are likely to be shorter than those following an open syllable (we refer to this as “post-CSVs,” as in Kubozono & Matsui 2003) (Han 1994).

Korean is one of the languages known to show CSVS. For example, Maekawa (1997) reports that the vowel /a/ in /ka.ni/ is shorter than that of /ka.ni/ (a dot denotes a syllable boundary). Maekawa (1997) also shows that the durational differences in speech production are also used as a cue for perceiving syllable weight (light vs. heavy) in speech perception. On the other hand, previous studies on Korean speech production have not fully explored durational differences between vowels in the syllable following a closed syllable and that following an open syllable. If post-CSVs is specific to mora-timing languages, it is predicted that Korean does not show post-CSVs.

In order to clarify whether post-CSVs as well as CSVS exists in Korean, we conducted a production experiment in which 8 native speakers of Korean uttered 45 two-syllable words (12 target words in this experiment were shown in Table 1). These words were embedded in a carrier phrase, /\_\_ka ətijejo?/ (“Where is \_\_?”) and were uttered 10 times. Durations of each segment of the tokens from each speaker were measured and are summarized in Table 2.

Statistical analysis revealed that all participants showed CSVS (i.e., vowels in closed syllables (V<sub>1</sub>) are likely to be shorter than those in open syllables. Post-CSVs is also observed, but there was a considerable individual variability in duration of V<sub>2</sub>: 5 out of 8 speakers exhibit post-CSVs, while 3 speakers do not show post-CSVs (in fact, one speaker (K1) shows inverse relationship between syllable structure and vowel duration), suggesting that post-CSVs is less stable than CSVS in Korean. The result indicates that post-CSVs is not necessarily specific to mora-timing languages.

**Table 1. Target words in the production experiment**

C <sub>1</sub> V <sub>1</sub> C <sub>2</sub> V <sub>2</sub>	/pa.ma/	/pe.me/	/po.mo/	/pa.pa/	/pe.pe/	/po.po/
C <sub>1</sub> V <sub>1</sub> C <sub>2</sub> C <sub>3</sub> V <sub>2</sub>	/pam.ma/	/pem.me/	/pom.mo/	/pam.pa/	/pem.pe/	/pom.po/

**Table 2. Mean durations of V<sub>1</sub> and V<sub>2</sub> and results of statistical analysis**

Speaker	From	V <sub>1</sub>			V <sub>2</sub>		
		C <sub>1</sub> V <sub>1</sub> C <sub>2</sub> V <sub>2</sub>	C <sub>1</sub> V <sub>1</sub> C <sub>2</sub> C <sub>3</sub> V <sub>2</sub>	<i>p</i>	C <sub>1</sub> V <sub>1</sub> C <sub>2</sub> V <sub>2</sub>	C <sub>1</sub> V <sub>1</sub> C <sub>2</sub> C <sub>3</sub> V <sub>2</sub>	<i>p</i>
K1	Seoul	204	94	< 0.001	116	131	< 0.001
K2	Seoul	66	56	< 0.001	115	93	< 0.001
K3	Seoul	104	57	< 0.001	131	126	= 0.062
K4	Incheon	96	50	< 0.001	116	110	< 0.05
K5	Ansan	63	53	< 0.001	95	88	< 0.01
K6	Busan	56	32	< 0.001	93	96	= 0.161
K7	Daegu	69	54	< 0.001	94	89	< 0.01
K8	Pohang	76	67	< 0.001	86	85	= 0.436

## References

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