

Formal/phonology,phonetics

On neutral vowels in Korean vowel harmony

Korean exhibits an interesting vowel harmony as in (1) (Sohn 1999). It is a (nonautomatic) assimilatory process whereby one vowel becomes harmonious with another one in the neighboring syllable. That is, Yang or “bright” vowels (/a,o/) pattern with Yang vowels, while Yin or “dark” vowels (/ə.../) pattern with such vowels. At present, this type of vowel harmony exists only in the ə/a alternation in verbal suffixes (1b), in onomatopoeic and mimetic expressions, including color terms, which is often called sound symbolism (1a).

Of interest is that Yin vowel /i/ and neutral vowel /i/ occur either with Yang vowels or with Yin vowels. Here an interesting question is whether the intervening (transparent-looking) vowels (/i, i/) are coarticulated with the surrounding Yang or Yin vowels, or/and whether these neutral vowels can be specified phonologically differently. We will test a hypothesis that the vowels (/i, i/) may be different in terms of articulation according to their surrounding vowels as a result of V-to-V coarticulation. Specifically, it is expected that /i, i/ in Yang vowel contexts will be articulated in the lower position than those in the Yin vowel environments as a result of height coarticulation.

Two native Korean subjects (male and female) participated in production of the words in (1) five times and their sounds were recorded in the phonetics lab. F1 values of /i/ and /i/ were compared between in Yang vowel contexts and Yin vowel contexts. In total, 290 tokens were analyzed and F1 values were measured at three time points of the vowels (i.e. onset, medial, offset).

First, results showed that the two neutral vowels were not significantly different between in Yang vowel contexts and in Yin vowel contexts ($p > 0.05$) as illustrated in Fig. 1-6 in (2). That is, although the vowels exhibit consistent anticipatory coarticulation (Fig. 1, 2, 5), the differences are small and noncontrastive enough not to allow phonologically different specifications. This unexpected result disconfirms our hypothesis, implying that phonological transparent vowels /i/ and /i/ may be the most resistant to coarticulation due to the large amount of tongue body raising. That is, both vowels are phonetically transparent unlike Finnish vowel harmony (Kim 2005) or Hungarian vowel harmony (Gafos and Benus 2003). Further, unlike Finish and Hungarian cases, Yang and Yin vowels do not seem to consist of phonetically natural classes in vowel harmony. Thus, it is difficult to determine whether neutral vowels /i, /i/ belong to Yang or Yin vowels, and to specify the two vowels in a phonologically different manner. The phonological neutrality of the two vowels is confirmed through the comparison of F1 values of /i/ and /i/ only the stems without affixes as illustrated in (3). Phonetic insensitivity to coarticulation is also confirmed in articulation from ultrasound images in (4). I suggest another possible interpretation i.e. intergestural timing organization in those words is lexically specified and so fixed.

Second, as in Fig. 1,2,5, and 6, the consistent coarticulation patterns reveal anticipation over carryover effects (Fig. 3). However, as in Keating (1996), if two-level model theories are adopted and coarticulation is left only at language-specific phonetics, it is difficult to expect the directionality of anticipation effects in Korean neutral vowels. So I follow Whalen’s (1990) that anticipatory effects are preprogrammed, and Barry (1991, 1992) that cross-linguistically different low-level phonetic processes such as gestural weakening or overlap are to some extent under the cognitive control of the speaker and low-level phonetic variation may not all be accounted for by phonetic theory, but by phonological theory. Although the neutral vowels are not allowed to be specified in phonological representations, the directionality of coarticulation patterns implies that formal constraints on V-to V coarticulation can intertwined with phonological constraints as suggested by Gafos (2002) in (5) along with a relevant ranking in (6).

In sum, this study makes some contributions. First, it reveals the phonetic natures of two neutral vowels, confirming that those are not phonologically specified in featural composition. Second, despite the neutral status of the vowels, it shows that the directionality of V-to-V coarticulation can still be formulated in gestural grammar.

(1)	(i) <i>Yang vowels</i>	(ii) <i>Yin vowels</i>	(iii) <i>Glosses</i>	(iv) <i>Vowel patterns</i>
a. i	[pɔdirapta]	[pud i rəpta]	‘be soft’	o..i..a / u..i..ə
	[talgirak]	[təlgi rək]	‘with a rattling noise’	a..i..a / ə..i..ə
	[pændilgərɪda]	[pændilgərɪda]	‘shine’	a..i..ə / ə..i..ə
	[pɔlgicɔkcɔk]	[pɔlgicɔkcɔk]	‘reddishly’	o..i..o / u..i..u
b. i	[k’ɔmci rəkərɪda]	[k’umci rəkərɪda]	‘move a little’	o..i..a / u..i..ə
	[kɔmsildəda]	[kɔmsildəda]	‘wriggle a little’	o..i..ɛ / u..i..ɛ

(2)

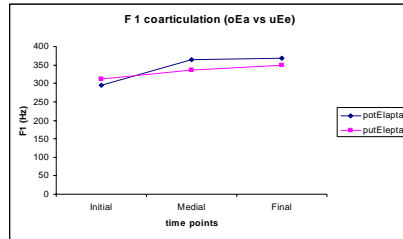


Fig. 1

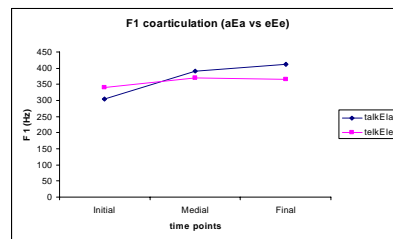


Fig. 2

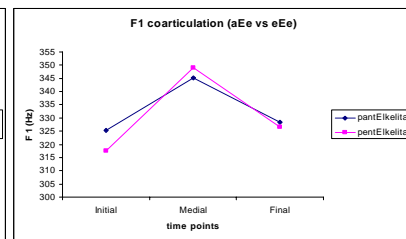


Fig. 3

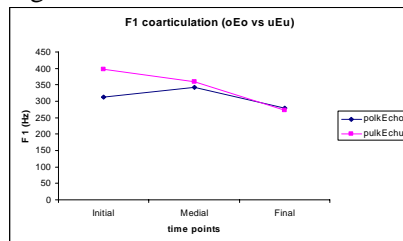


Fig. 4

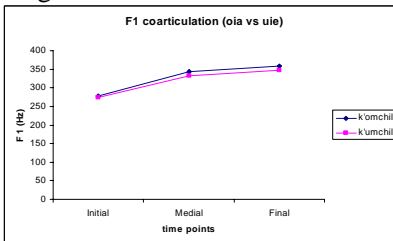


Fig. 5

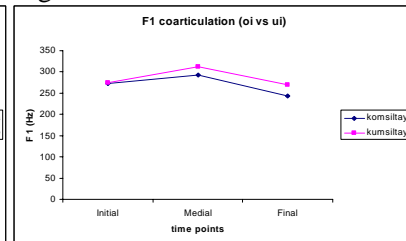
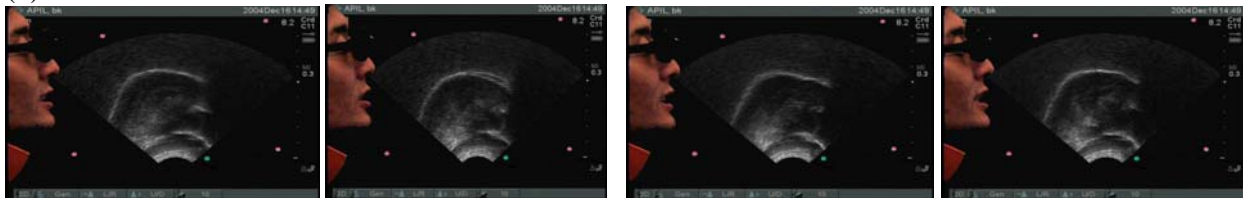


Fig. 6

(3)	Vowel contexts	T-Test	Vowel contexts	T-Test
	podɪ vs pudɪ	p.= 0.35	talgi vs təlgi	p.= 0.69
	k'omci vs k'umci	p.= 0.84	komsil vs kumsil	p.= 0.66

(4)



[i] in /panti/ [i] in /panti/ [i] in /komsil/ [i] in /kumsil/

- (5) a. IDENT (target) : The gestural target of an input segment must be preserved in its output correspondent.
 b. V1-to-V2 : The release of the V1 gesture must be synchronous with the onset of the V2 gesture.
 c. V2-to-V1 : The target of V2 gesture must be synchronous with the onset of the V1 gesture.
- (6) V2-to-V1, Vowel Harmony >> IDENT (target) >> V1-to-V2

Selected references

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