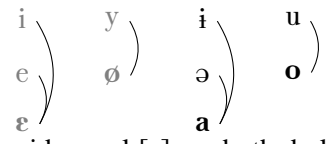
ICONIC VOWEL ALTERNATIONS IN KOREAN IDEOPHONES: A FORMAL ANALYSIS

SUMMARY. Korean ideophones often come in near-identical pairs that can be distinguished from one another by the quality of their vowels. Specific vowel qualities are iconically and systematically associated with diminutive and augmentative connotations, and alternate accordingly. There are nevertheless asymmetries in the system: vowels of the same height are assigned different connotations depending on their rounding, which has important consequences for the behavior of the system as a whole. In this work, we describe the precise pairings involved in these symbolic alternations, why they are paired as such, and how this informs the analysis of other peculiarities in the data that have yet to be explained in a satisfying way.

BACKGROUND. In Modern Korean, the remnants of productive vowel harmony in Middle Korean remains active root-internally within the class of ideophones. The Korean vowel inventory is divided into two classes which generally cannot co-occur in roots. These classes are historically referred to as "light" /ɛ, ø, a, o/ and "dark" /i, e, y, ɨ, ə, u/ (Kim-Renaud, 1976). The vowels connected by curved lines in the figure below are harmonic counterparts of one another. The light vowels, which are the lowest member of each pair, are in boldface text. The back vowels are our primary focus here, as they are the most widely attested, and their alternations and use today have been the least impacted by sound change.



There are three vowels in the unrounded column. The high vowel [ɨ] and the mid vowel [ə] are both dark, and both neutralize with light [a]. In the rounded column, there are only two vowels. The mid vowel [o] is thus the light counterpart of the high vowel [u]. Consequently, vowels of the same height ([ə] and [o]) behave differently in what otherwise appears to be a height harmony system: rounded mid vowels can only co-occur with low vowels, but unrounded mid vowels can only co-occur with high vowels. This system has been described by some scholars as "diagonal harmony" because the harmonic classes are divided by a diagonal line (Kim, 1978; Ahn, 1991). This peculiarity has presented a challenge for developing a unified phonological analysis which attributes these alternations to modulations of a single phonological feature. Kim (1978) and Ahn (1991) thus argue that it simply cannot be analyzed in traditional terms. Adding to the uniqueness of this system, the harmonic class of an ideophone is not inherent to the root nor imposed by an overt affix. Instead, ideophones can alternate between having light vowels and a diminutive connotation, or having dark vowels and an augmentative connotation, as in the examples from Naver Korean Dictionary below. Examples 1 and 2 demonstrate the alternation between the high and mid back rounded vowels in initial and non-initial syllables, as well as between the mid and low back unrounded vowels in each position. Example 3 demonstrates the alternation of the low back unrounded vowel with both its high and mid counterpart within the same word. (Note that [ɨ] can only alternate when in the initial syllable. This is illustrative of the behavior of neutral vowels, which will be addressed further in the full presentation.)

1. p^{h}**o**ŋta**a**ŋ ∼ p^{h}**u**ŋtə**a**ŋ 'plopping of a smaller ∼ bigger object into water'
2. k**a**ŋt**o**ŋ ∼ kə**u**ŋt**u**ŋ 'lightly jumping with shorter ∼ longer legs'
3. t**a**ls*k**a** ∼ t**ɨ**ls*k**ə** 'moving less ∼ more in excitement'

Kim (1978) argues that Modern Korean's "highly irregular" diagonal system is a "historical vestige" of a regular backness harmony system, and that an abstract analysis effectively reconstructing that older system is required. While there are convincing arguments against the backness harmony analysis of Middle Korean, there is evidence that it instead had a regular RTR harmony system (Ko, 2013). Nevertheless, we will show that using RTR alone as the harmonizing feature of Modern Korean fails to capture newly innovated patterns. Alternatively, Ahn (1991) suggests that diagonal harmony can be analyzed without such abstraction, but the way in which it is done must be different from analyses of canonically vertical and horizontal harmony systems. We align with this perspective and propose that the expressive, rather than purely phonological, nature of Korean vowel harmony plays a fundamental role in how the irregular classification is derived.

ANALYSIS. It has been agreed upon by various scholars that the dark∼light alternations are triggered by the presence of some kind of morpheme–containing both a semantic specification as well as a phonological one–which controls the harmonic class and connotation of the ideophone (McCarthy, 1983; Lee, 1992). We adopt this position and propose that the alternations are the realization of a morphological process licensed by a morpho-syntactic feature, either [DIM] (for diminutive) or [AUG] (for augmentative), in the input. A single sound-symbolic constraint, which we formulate as EXPRESS[F] (Cole and Kisseberth, 1994), gets

its definition from this feature and evaluates *each* vowel of the ideophone root in the input, thus enforcing harmony. Specifically, EXPRESS[DIM] motivates vowels to raise their F1 frequency in order to iconically encode the concept of smallness, following Ohala's (1994) frequency code hypothesis. Ko (2022) analyzes Korean's progression from a pure RTR system to one with both height and RTR contrasts. Since both lowering and retraction raise F1, we propose that these changes led to the replacement of a single *articulatory* target for harmony (RTR) with an *acoustic* target (high F1), achieved by different articulatory means now than it was previously. EXPRESS[DIM] raises F1 by maximally penalizing candidates that are neither [−HIGH] nor [+RTR] (lowest F1, least diminutive), partially penalizing those that are either [−HIGH] *or* [+RTR] (mid-range F1, somewhat diminutive), and not penalizing [−HIGH +RTR] ones (highest F1, most diminutive). Though we argue that sound symbolism drives these alternations, we do not take a particular stance on the use of acoustic features in phonology (*cf.* e.g. Flemming 1995). The F1 of an output is here determined by the different value combinations of two *articulatory* features, but the exact nature of the features employed is not of particular concern. What is crucial is the ability for EXPRESS[DIM] to reference a non-binary dimension along which candidates can be situated from lowest to highest F1. This allows candidates that only partially express [DIM] to prevail over candidates that don't express it at all when the fully expressive candidate is otherwise unavailable. The ideal diminutive unrounded vowel, [−HIGH +RTR] [a], is optimal (Tableau 1, left), but the ideal diminutive rounded vowel [−HIGH +RTR] [ɔ] violates the independently motivated markedness constraint *[+ROUND ↑F1], similar to Kaun's (1995) *ROLO. (The feature [↑F1] is simply a shorthand representation for the articulatory feature combination [–HIGH +RTR].) Nevertheless, [−HIGH −RTR] [o] has a higher F1 than [+HIGH −RTR] [u], so it is chosen as the next best option (Tableau 1, right). Not all the rankings shown in the following tableaux are justified by these particular inputs.

DIM + i	*[+RD ↑F1]	XP[DIM]	ID[HI]	ID[RTR]
a. i		*!*		
b. ə		*!	*	
c. ☞ a			*	*

DIM + u	*[+RD ↑F1]	XP[DIM]	ID[HI]	ID[RTR]
a. u		**!		
b. ☞ o		*	*	
c. ɔ	*!		*	*

Tableau 1: Diminutive Derivations of High Unrounded and Rounded Inputs

EXPRESS[AUG] is defined in opposition to the output of EXPRESS[DIM]: a violation is incurred for each vowel that is identical to its correspondent in the diminutive form. This definition presupposes that the diminutive is determined *prior* to the determination of the augmentative. This is similar to output-output faithfulness (Benua, 1997), but instead requires the augmentative to be *distinct* from, rather than faithful to, the diminutive in order to preserve the iconic meaning contrast between forms. Exactly why this is the case will be detailed in the full presentation, but it is necessary to capture the existence of multiple augmentative counterparts for a single diminutive vowel only if it would not result in an additional neutral vowel.

AUG + i	*[+RD ↑F1]	XP[AUG]	ID[HI]	ID[RTR]
a. ☞ ɨ				
b. ə			*!	
c. a		*!	*	*

AUG + u	*[+RD ↑F1]	XP[AUG]	ID[HI]	ID[RTR]
a. ☞ u				
b. o		*!	*	
c. ɔ	*!		*	*

Tableau 2: Augmentative Derivations of High Unrounded and Rounded Inputs

For rounded vowels, the outputs are the same regardless of the height of the input: the diminutive will always be the lowest member, [o], and the augmentative will always be *not* [o], for which [u] is the *only* option (Tableau 2, right). For unrounded vowels, the existence of two augmentative options means that the height of the augmentative depends on the height of the input: the diminutive will always be the vowel with the highest F1, [a], but the augmentative will be [ɨ] or [ə] for high or non-high inputs, respectively. This is determined by IDENT[HIGH] ([+HIGH] scenario shown in Tableau 2, left).

CONCLUSION. Our analysis of ideophonic vowel harmony in Modern Korean is able to capture the asymmetric behavior of unrounded and rounded vowels by establishing the appropriate feature space and the active constraints on surface vowels, as well as building in a mechanism that enforces the creation and maintenance of semantic distinctions through sound-symbolic phonological contrasts. We argue that the interplay between constraints promoting sound symbolism and general, independently motivated constraints is what derives the unnatural harmonic classes as well as other peculiarities of this system, such as the variable behavior of unrounded and rounded neutral vowels. This analysis thus contributes to the literature on the incorporation of sound symbolic constraints in the core grammar, which is required in order to capture the crucial differences between purely phonological and expressive phenomena (Alderete and Kochetov, 2017).

This abstract is to be considered for an in-person talk or poster in the main session of WCCFL 43, 2025.

REFERENCES. Ahn, S.-C. (1991). On the description of a diagonal vowel harmony process: A particle analysis. *Linguistic Research*, 10:1–22. Alderete, J. and Kochetov, A. (2017). Integrating sound symbolism with core grammar: The case of expressive palatalization. *Linguistics Society of America*, 93(4):731–766. Benua, L. (1997). *Transderivational Identity: Phonological Relations Between Words*. PhD thesis, UMass Amherst. Cole, J. and Kisseberth, C. (1994). An optimal domains theory of harmony. *Studies in the Linguistic Sciences*, 24(2). Flemming, E. S. (1995). *Auditory Representations in Phonology*. PhD thesis, UCLA. Kaun, A. (1995). *The Typology of Rounding Harmony: An Optimality Theoretic Approach*. PhD thesis, UCLA. Kim, C.-W. (1978). "Diagonal" vowel harmony?: Some implications for historical phonology. In Fisiak, J., editor, *Recent Developments in Historical Phonology*. Mouton Publishers. Kim-Renaud, Y.-K. (1976). Semantic features in phonology: Evidence from vowel harmony in Korean. In *CLS 12*, pages 397–412. Ko, S. (2013). The end of the Korean vowel shift controversy. *Korean Linguistics*, 15(2):199–221. Ko, S. (2022). Vowel harmony. In *The Cambridge Handbook of Korean Linguistics*, pages 177–214. Lee, J.-S. (1992). *Phonology and Sound Symbolism in Korean Ideophones*. PhD thesis, Indiana University. McCarthy, J. (1983). Phonological features and morphological structure. In *Papers from the Parasession on the Interplay of Phonology, Morphology, and Syntax*. Naver Korean Dictionary (2024). https://dict.naver.com/. Ohala, J. J. (1994). The frequency code. In Leanne Hinton, J. N. and Ohala, J. J., editors, *Sound Symbolism*, pages 325–347. Cambridge University Press.