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A moraic analysis of lateral approximant in Korean*

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Lee, Sechang. 2023. A moraic analysis of lateral approximant in Korean. *Linguistic Research* 40(1): 67-91. The main purpose of this article is to present an account of symmetrical effect of Korean lateralization. We claim that the phenomenon can be adequately dealt with given our assumption that lateral approximant carries a mora and tends to form a geminate structure to preserve the mora. Syllable Contact Law as a universal OT constraint is rejected in favor of a geminate-inducing constraint. The constraint to the effect that a sequence of sonorant coronals is prohibited will be eliminated, too. We do not need to postulate two separate markedness constraints that militate against *nl* or *ln* sequence in Korean. By so doing, our basic intuition is captured that the tendency to avoid sequences of *nl* or *ln* results from one and the same constraint. When adjacent to labial or dorsal consonants, lateral approximant do not go through lateralization or gemination since it is to violate the high-ranking faithfulness of non-coronals. Some aspects of *l*-nasalization and word-initial *l*-avoidance will also be discussed. It is interesting to note that both of them seem to lend further support to our assumption about the geminate status of lateral approximant in Korean. (**Sookmyung Women's University**)

Keywords lateralization, nasalization, word-initial [l]-avoidance, syllable contact law, mora, gemination

1. Introduction

It is a well-known fact that there is a tendency to avoid *ln*-or *nl*-sequence in Korean and other diverse languages (Seo 2003). There is also a well-grounded generalization that the onset of a syllable must not have a greater sonority value than the coda of the immediately preceding syllable: the sonority contour must be falling. Much of recent phonological research adopts the idea along these lines that the syllable-contact generalization is responsible for the Korean lateralization because the sequence *nl* is

* I am grateful to the anonymous reviewers of *Linguistic Research* for their invaluable comments.

plainly sonority-rising. But this strategy resolves only a half of what we are up against. That is due to the fact that the sequence *ln* is simply sonority-falling but is also subject to lateralization. Many researchers had to postulate another constraint to deal with the lateralization in the sequence *ln*. The main disadvantage of this line of solution is that it fails to capture our intuition that we are dealing with one and the same phenomenon. We will suggest that the *ln*- and *nl*-sequences are closely related and that a simple proposal captures a generalization. Meanwhile, from some seemingly-unrelated data, we will provide some corroborating evidence in its favor.

2. Paradigm

Across syllable boundary, adjacent sonorant cluster /ln/ or /nl/ in Korean is bound to undergo the manner assimilation of either lateralization or nasalization. We start our investigation by briefly observing the context and extent of the phenomena to be dealt with:

(1) *n*-lateralization (mirror image)

a.	/non-li/	→	[nol.li]	'logic'
	/sun-li/	→	[sul.li]	'reasonableness'
	/pun-li/	→	[pul.li]	'separation'
b.	/pul-niŋ/	→	[pul.liŋ]	'inablility'
	/səl-nal/	→	[səl.lal]	'New Year's Day'
	/tal-nim/	→	[tal.lim]	'moon' (honorific)

(2) *l*-nasalization (transparent)

/kam-li/	→	[kam.ni]	'inspection'
/sam-lim/	→	[sam.nim]	'forest'
/siŋ-li/	→	[siŋ.ni]	'victory'
/pəm-lam/	→	[pəm.nam]	'flooding'

(3) *l*-nasalization (opaque) and nasalization

/kjək-li/	→	[kjəŋ.ni]	'isolation'
/p^{h}ok-lak/	→	[p^{h}oŋ.nak]	'nosedive'
/pəp-ljul/	→	[pəm.njul]	'law'
/cap-lok/	→	[cam.nok]	'a miscellany'

(4) Word-initial *l*-avoidance

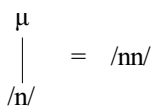
/l̲ak-wən/	→	[n̲a.gwən]	‘paradise’
/l̲æ-il/	→	[n̲æ.il]	‘tomorrow’
/l̲on-mun/	→	[n̲on.mun]	‘thesis’
/l̲u-mjəŋ/	→	[n̲u.mjəŋ]	‘false charge’

The alternation illustrated in (1) demonstrates the basic pattern of Korean lateralization: underlying /nl/ or /ln/ sequence surfaces as [l.l], which shows a bi-directional nature of lateralization at hand. The examples in (2) have an underlying sequence of non-coronals followed by a lateral approximant. In that case, the [l] nasalizes to an alveolar nasal [n]. The operation in (3) is opaque in that no source of nasalization is found in the underlying form. When the lateral approximant is situated at word-initial onset position as in (4), it typically appears as an alveolar nasal. Some additional data will be presented too, as we carry on analyzing.

3. Proposal

When languages have a vowel length distinction, they exhibit a syllable weight distinction. This is well expected in moraic theories by Hayes (1989), Hyman (1985), and McCarthy and Prince (1995), among others. Moraic structure of languages can vary but, in languages with contrastive vowel length, long vowels are represented by two moras while short vowels by one mora. This moraic principle can be extended to consonants. Ordinary short consonants are represented as underlyingly moraless, giving the same moraic status as glides. Geminates almost always bear a mora (Hayes 1989: 257). To give an example, the following geminate is assigned a single mora underlyingly:

(5) Geminates bearing a mora



The remaining case is a non-geminate consonant linked to a single mora. That is, sonorant consonants can bear a mora by being syllabic. There are cases where even obstruents become syllabic. Consider the following data:

(6) Syllabic consonants (Ladefoged 2006)

a. sadden ['sædn̩], prison ['pɹɪzn̩], prism ['pɹɪzm̩], Jack and Kate ['ʤæk ŋ̩ 'keɪt]

b. little ['lɪtl̩], ladle ['leɪdl̩], table ['teɪbl̩]

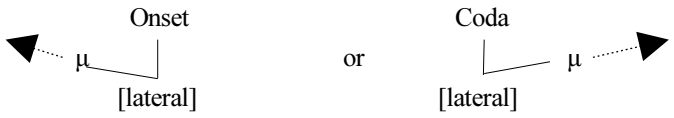
c. suppose [s̩'poʊz], today [t̩^{h}'deɪ]

Syllabic nasals and laterals are commonly attested in English words and phrases, as in (6a-b). Also, stops and fricatives may become syllabic whey they are in unstressed syllables, as in (6c).[1]

For the case of lateralization in Korean, it is not surprising that *l* itself could carry a mora inherently, considering that its relatively high-ranking in the sonority scale provided below in (10) and that the data such as syllabic nasals or syllabic laterals are witnessed in English, as in (6a-b). We propose that a universal constraint *MORAIC-*l*, formulated within the constraint-based framework of Optimality Theory (Prince and Smolensky 1993/2004, OT henceforth), operates in the following way:

(7) *MORAIC-*l*

Lateral approximant is moraic.



A mora is given to the lateral at the input in the first place. Configurations of the sort given in (7) are instable in that the mora is desperate to get a licensor. It is also predicted that some sort of licensing condition is required in the grammar for the mora to be linked to its licensor. This prediction is true. Thus, the mora should be licensed by a licensor in the preceding or following syllables, which usually results in lateralization in Korean.[2]

Typically, moraic consonants are typically not allowed. Thus, there should be a markedness constraint that prevents consonants from being moraic. That job is done by an independent constraint termed *μ_{CONS} in (8a) which is exploded into as many as separate constraints. For example, we would need in our grammar such a constraint

1 Of course, there are variations in pronunciation among people who pronounce these words and phrase.

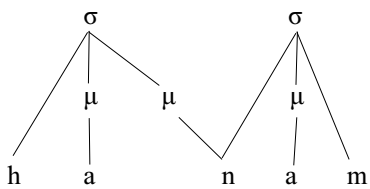
2 The configurations like (7) may have inherited the mora from the input or acquired through GEN. Irrespective of its origin, there is a need for a licensing condition which does not license a mora in such cases. The licensing of the mora is achieved only through gemination.

ranking as in (8b), in which the constraints are ranked on the reverse order of sonority scale in (10):

(8) Prohibition against moraic consonants
  a. *μ_{CONS}
    : Moraic consonants are not allowed.
  b. *MORAIC-*t* » *MORAIC-*n* » *MORAIC-*l*

The ranking logic runs as follows: moraic laterals are less marked than moraic nasals which are in turn less marked than moraic obstruents. To complicate matters further, we have to consider the case where the geminate structure is underlyingly present: [han.nam] 'the south of Han River', [kuk.ka] 'nation'.[3] Those underlying geminates must have linked structure from the beginning, just like the derived one. In other words, there is no surface difference between underlying and derived geminates:

(9) Geminate structure (genuine or derived)



The geminate structure like (9) is supposed to satisfy *μ_{CONS} because the mora in the middle is always licensed by the linked structure. Therefore, *μ_{CONS} is activated only when a mora linked to an underlying consonant fails to form a geminate structure in surface.

Readers can make reference to the following sonority scale in (10) for the current discussion:

3 I am grateful to an anonymous reviewer who suggested the examples and raised the issue.

(10) Sonority scale (Hogg and McCully 1987: 33)

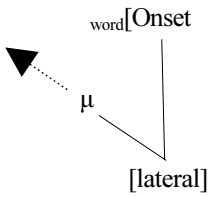
Sounds	Sonority values	Examples
low vowels	10	/a, ɑ/
mid vowels	9	/e, o/
high vowels	8	/i, u/
flaps	7	/ɾ/
laterals	6	/l/
nasals	5	/n, m, ŋ/
voiced fricatives	4	/v, ð, z/
voiceless fricatives	3	/f, ɵ, s/
voiced stops	2	/b, d, g/
voiceless stops	1	/p, t, k/

Utilizing the sonority scale in (10), we may expect to find the effect of word-initial *l*-avoidance in (4) with the following simple hierarchy of constraints:

(11) Ranking of word-initial *l* avoidance
*MORAIC-*l* » FAITHONS-[sonority]

The proper understanding of constraint domination sheds new light on the lateralization phenomena at hand. According to the ranking given in (11), the presence of moraic *l* forbids the appearance of *l* in word-initial position, as it entails a mora which fails to get its licensor as shown below:

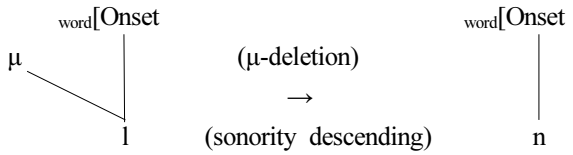
(12) Word-initial mora avoidance



A simple and natural strategy for the segment to survive at a minimum cost should be to give up on the mora. The solution follows from the ranking just given in (11). We can see that the cost for mora deletion is a minimum decrease along the sonority scale in (10).[4] This seemingly minor assumption leads to a contrast in Korean phonology: alveolar

nasal *n* is the non-moraic version of lateral approximant *l* in Korean, as depicted below:

(13) Avoidance of word-initial non-moraic version of *l*



Following this line of thought, the data in (4) will be analyzed in §4.3.

From these considerations, then, there is strong motivation for the mirror-image occurrence of lateralization and word-initial *l* avoidance phenomenon in Korean. EVAL scans the output candidates and introduces a violation of *MORAIC-*l* when a moraic *l* is not incorporated into a geminate structure. In word-initial onset position, however, *l* is not allowed because the *l* in that position fails to have the linked mora licensed through gemination. The violation could be avoided at a minimum cost by giving up on the mora. This result will be achieved through the simple ranking of relevant constraints shown in (11).

Finally, the faithfulness constraints MAX-IO(dorsal) and MAX-IO(labial), which disallow the deletion of dorsal or labial consonant, universally enjoy a higher position in the constraint hierarchy than MAX-IO(coronal):

(14) Universal ranking of place faithfulness[5]
MAX-IO(dorsal), MAX-IO(labial) » MAX-IO(coronal)

4. Analysis

4.1 Symmetrical nature of lateralization

As a point of departure for an explanation as to why Korean lateralization takes place,

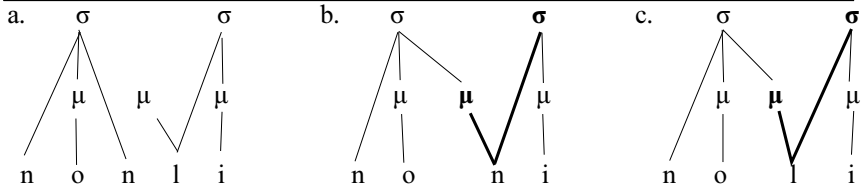
4 According to the sonority scale in (10), laterals have a sonority value of 6 while nasals have a value of 5. The difference in sonority between them should be minimal.

5 As reported and discussed in detail in the literature, coronals are favorite target of place assimilation cross-linguistically (Bailey 1970, Kiparsky 1985, Cho 1990, Jun 1995, among others).

let us begin with a simple example. The tableau in (15) is the core of our proposal in this article, which will be fleshed out in crucial respects as we proceed:

(15) /nonli/ → [nol.li] 'logic'

/nonli/	*MORAIC-*t*	*MORAIC-*n*	*MORAIC-*l*	MAX(lat)	MAX(nas)
a. non.li			*!		
b. non.ni				*!	
☞c. nol.li					*



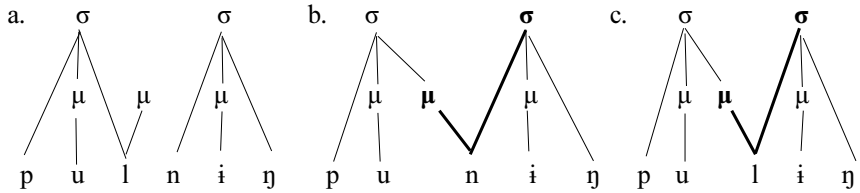
The choice is among the three major candidates. The faithful candidate (15a) is eliminated by the *MORAIC-*l* since the mora carried by *l* fails to get a licensor through gemination.[6] Of the remaining two candidates bearing a geminate structure, our current ranking dictates that the one with lateralization rather than nasalization incurs the less expensive violation. Candidate (15c) is chosen as optimal under the ranking at hand.

The challenge in this subsection is to make sense of the symmetrical behaviour of lateralization. The next tableau illustrates the analysis of mirror-image effect of lateralization in terms of the interaction of the same set of constraints:

(16) /pulniŋ/ → [pul.liŋ] 'inability'

/pulniŋ/	*MORAIC-*l*	MAX-IO(lateral)	MAX-IO(nasal)
a. pul.niŋ	*!		
b. pun.niŋ		*!	
☞c. pul.liŋ			*

6 We do not consider any candidates with mora-carrying nasals in (15) because they would crucially violate *MORAIC-*n* which is ranked higher than *MORAIC-*l*. Due to space limitation and visual perspicuity, we will not include the *MORAIC-*n* as well as *MORAIC-*t* in the relevant tableaux to come.

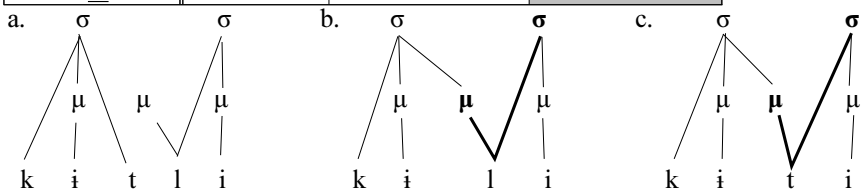


(16a) is in violation of *MORAIC-*l* by failing to form a geminate structure with the following *n* in the onset. The rest of the evaluation is the same as in (15). It turned out that we are not in need of separate markedness constraints to account for the mirror-image phenomenon of Korean lateralization. The only markedness constraint *MORAIC-*l* is entirely responsible for the bi-directional application of lateralization.[7]

The target of lateralization is not restricted to an adjacent *n*. The following tableau shows that an alveolar stop *t* also comes under the influence of mora-bearing *l* and undergoes gemination:

(17) /tikɨtliɨl/ → [ti.kɨl.li.ɨl] 'the letters /t/ and /l/'

/tikɨtliɨl/	*MORAIC-*l*	MAX-IO(lateral)	MAX-IO(stop)
a. ti.kɨt.li.ɨl	*!		
☞b. ti.kɨl.li.ɨl			*
c. ti.kɨt.ti.ɨl		*!	



The [t.l] sequence in (17a) incurs the most expensive violation. The remaining two

7 An anonymous *Linguistic Research* reviewer has pointed out that the faithfulness ranking between MAX-IO(lateral) and MAX-IO(nasal) could be independently motivated by combining the fact that *l* is more resistant to deletion than *n* and that the position of syllable onset is perceptually more salient than that of syllable coda. But we would like to claim that phonetics does not seem to be a feasible way around this issue because of the bidirectional nature of *nl*- or *ln*-lateralization, as the tableaux in (15-16) show: *l* survives without regard to its position in the syllable structure. It is then highly significant that crucial evidence for the ranking argument is provided indirectly by the dominating *MORAIC-*l* which forces the bidirectional lateralization in this subsection. In a nutshell, the ranking between those two faithfulness constraints is based on sonority scale and phonologically confirmed by the operation of *MORAIC-*l*.

candidates satisfy *MORAIC-*l*,[8] hence they are passed on for evaluation by the next-lower-ranked constraint in the hierarchy, MAX-IO(lateral). The sequences of [t.t] in (17c) is ruled out and so (17b) emerges as victorious. Once again our gemination-based analysis makes possible a simple and effective account of the lateralization. But this is not quite the end of the story, since there are some important ramifications and consequences to consider.

4.2 Sonority-descending phenomena

Let us change to a slightly different sort of examples now, but ones that will ultimately return to our main theme. Consider what happens when a non-homorganic nasal *m* abuts a lateral approximant *l*. The situation is portrayed in (18):

(18) /kamli/ → [kam.ni] 'supervision'

/kamli/	MAX(lab/dor)	*MORAIC-*l*	MAX(lat)	FAITHONS-[sonority][9]
a. kam.li		*!		
b. kal.li	*!			
☞c. kam.ni			*	*
d. kam.ti			*	*!*

The fully faithful candidate (18a), by failing to form a geminate structure, fatally violates *MORAIC-*l*. (18b) trades violation of *MORAIC-*l* for worse infraction, a fatal exchange given MAX-IO(labial)'s higher position in the hierarchy. So, lateralization is evidently an unavailable option. Out of the two remaining candidates, the one with the less deviation of onset sonority, (18c), is selected as optimal. Here, we do not see the optimal candidate (18c) as a result of nasalization. The nasalization in the winner is viewed as only apparent, not real. The second element in the optimal [m.n] sequence results from a minimal (i.e., one-step) decrease from *l* along the sonority scale and it has nothing to do with nasalization. Nasalization typically targets adjacent obstruent, not approximant. Note also that (18d) gets two violations of FAITHONS-[sonority] because of [t] which

8 (17c) vacuously satisfies *MORAIC-*l* by not possessing *l* in the output.

9 We invoke Hogg and McCully's formulation of sonority faithfulness in terms of the sonority scale illustrated in (10). In the analysis at hand, we assume that FAITHONS-[sonority] evaluates onset, assigning one violation mark to a candidate with just one step away along the sonority scale from the input consonant. Two violation marks are assigned to any candidates with more than one-step deviation in sonority scale.

decreased more than two steps of sonority value in (10).

Let us finally consider another example in light of the notion 'sonority-descending'. Most puzzling of all, the emergence of nasals should be the case of an opaque interactions of relevant constraints, as illustrated below in (19):

(19) /kjəkli/ → [kjəŋ.ni] 'isolation'

/kjəkli/	MAX (lab/dor)	AGR (nas)[10]	*MORAIC-*l*	MAX(lat)	FAITHONS-[son]
a. kjək.li			*!		
b. kjək.ni		*!		*	*
☞c. kjəŋ.ni				*	*
d. kjəl.li	*!				
e. kjək.ti					**!

Producing lateralization at the cost of deleting /k/ violates MAX-IO(dorsal), as shown in (19d). (19a) is ruled out of the competition due to the presence of moraic *l* in onset position, which fails to form a geminate structure. The second element of the 'obstruent+nasal' sequence in (19b) is the result of decreasing sonority by one step from /l/, earning a violation from FAITHONS-[sonority]. The candidate should be a typical target of nasal assimilation. Thus, it gets a violation mark from AGREE(nasal) by not going through nasal assimilation. Of the remaining candidates, FAITH-[sonority] is instrumental in deciding in favor of (19c).[11] It means that the satisfaction of FAITH-[sonority] is purchased in exchange for deleting the *l*'s mora in the input: FAITH-[sonority] » FAITH(μ).[12] (19e) incurs two violations in a crucial way from

10 AGREE(nasal) says that if a segment bears the feature [nasal], then the immediately preceding or following obstruent must also bear [nasal]. This conception of constraint is based on the ideas of Eisner (1999), Lombardi (1999), Bakovic (2000), and Pulleyblank (2004), to mention a few. For the Korean case at hand, IDENT-ONSET(sonorant) is necessarily high-ranked enough to prevent nasalization in data like /panto/ → [pan.do], *[pan.no] 'peninsula'. I am grateful to an anonymous reviewer for drawing our attention to this issue, which I had previously overlooked.

11 This analysis is unusual in that the source of nasalization is not found in the input in the first place. A conceptually more appealing claim would be that stepwise derivations from /k.l/ to [ŋ.n] take place in a harmony-improving way. This example is a good place to employ Harmonic Serialism analysis because the derivation is not so shallow: the underlying and surface form in derivation differ by the effect of more than one operation in (McCarthy 2010). This result will be achieved if the story goes like the following. The input *l* becomes *n* by losing its mora and lowering its sonority by just one step along the scale. Then, the preceding *k* is ready to assimilate in nasality to the following *n*. Space does not permit arguing the point in detail, but it should be worthwhile to investigate further.

FAITHONS-[son] since [t] is more than two steps away from /l/ in sonority scale.

4.3 Word-initial *l*-avoidance

A similar state of affairs exists in the word-initial *l* avoidance phenomenon wherein FAITHONS-[sonority] plays a crucial role. Consider the following tableau:

(20) /l̲akwən/ → [n̲a.gwən] 'paradise'

/l̲akwən/	*MORAIC-*l*	FAITHONS-[sonority]	MAX-IO(μ)
a. l̲a.gwən	*!		
☞b. n̲a.gwən		*	*
c. t̲a.gwən		*!*	*

The forms (20b-c) avoid the emergence of word-initial *l* at the expense of faithfulness. Compared with the segment [t] in (20c), deleting mora as well as changing the /l/ into [*n*] in (20b) should be the better way to violate the minimum amount of sonority along the sonority scale, which turns out to be the optimal outcome. This is the automatic consequence of our assumption made earlier in (13).[13]

4.4 Learnability

The richness of the base guarantees the free combination of linguistic primitives in the input (Prince and Smolensky 1993/2004: 205, 225). Since there are no language-particular restrictions on the input forms, consonants as well as vowels can be moraic under the circumstances. Let us consider *learnability* issues. 'Lexicon optimization' in Prince and Smolensky (ibid.) reassures that the underlying forms familiar to learners are identifiable in the rich base, giving the actual input-output pair the most

12 We combine MAX-IO(μ) and DEP-IO(μ) into a 'cover' constraint FAITH(μ) 'no deletion or epenthesis of mora'.

13 Word-initial /l/-deletion in Sino-Korean words is pointed out to me by an anonymous reviewer: /sali/ → [sa.ri] (事理) 'sense' vs. /liju/ → [i.ju] (理由) 'reason'. The /l/-deletion in the latter case is commonly attested when the /l/ is immediately followed by /i/ or /j/: [jo.ri] (料理) 'cooking', [ju.hɛŋ] (流行) 'vogue', [jən.sip] (練習) 'practice', [jaŋ.sik] (糧食) 'food', [je.cəl] (禮節) 'etiquette', etc. This also can be interpreted as a result of intuitive appreciation of moraic *l* and attempt to eliminate it in word-initial position. But it is not clear why it ended up with the deletion of the whole segment. There must be clearly something general and natural about our phonological system which connects the /l/-deletion and high-front vocoids, which we shall leave for future research.

harmonic mapping. But this is not so much a principle of grammar but a learning strategy. As a matter of fact, learners attend to the alternations within a paradigm or something and find evidence for the input form. We argue that this is what happens in the Korean lateralization case we have been dealing with. The actual input form with a mora can be selected by lexicon optimization. We compare the mappings from the two inputs, applying the *tableau des tableaux* technique by Itô, Mester, and Padgett (1995). The following *tableau des tableaux* asks which input maps more harmonically to the output:

(21) Tableau des tableaux: Evaluating outputs of different inputs

Input	Output	...	FAITHONS-[sonority]	FAITH(μ)
a. nonli	☞nonl.li			***!
☞b. nonli	☞nonl.li			**

a. Input → Output

b. Input → Output

Each structure of the two input-output pairings is given below the tableau (21). The "..." in the third column of the tableau abbreviates all the constraints dominating FAITH-[sonority] in the current constraint hierarchy. None of all those constraints decides the competition. Since (21b) incurs a proper subset of (21a)'s marks in terms of more

insertion, the former is more harmonic.[14] Therefore, (21b) with an input mora is selected as the actual input form, occulting (21a) without the mora. The learner chooses (21b) as the input-output pair because the pair is least offensive to the current grammar of ranked constraints.

5. Further discussion

The several tableaux just reviewed carry a couple of implications concerning the occurrence of nasalization and the status of intervocalic *l*. We will suggest in brevity a possible line of future investigation, but a definite analysis of this implications must await further study. Let us now take up each of these issues in turn.

5.1 Nasalization and output-output correspondence

There are some cases where a sequence of /nl/ apparently does not conform to the lateralization pattern discussed so far. This problematic alternation happens when a morpheme boundary intervenes, as the examples in (22) make clear:

(22) *l*-nasalization

/ɨmun+lon/	→	[ɨ.mun.non]	'phonology'
/sin+lamjən/	→	[sin.na.mjən]	'Shin Ramyun'

Taking Kang (2002) as a point of departure, Sohn (2008) invokes output-output correspondence to produce nasalization instead of lateralization:

(23) /ɨmu<u>n</u>+<u>l</u>on/ → [ɨ.mu<u>n</u>.<u>n</u>on] 'phonology' (Sohn 2008: 38)

/n-l/	SyllCon	SonUni[15]	Max-OO (nas/cod)[16]	Max-IO(lat)	Max-IO(nas)
a. nl	*!	*			
b. ll			*!		*
☞c. nn				*	

14 As to the moras assigned to the vowels, they are either given in the input or assigned later through GEN. This representational difference between the two has no empirical consequences.

15 Sonority Uniformity (SonUni): A sequence of alveolar sonorants of different sonority rank is disallowed.

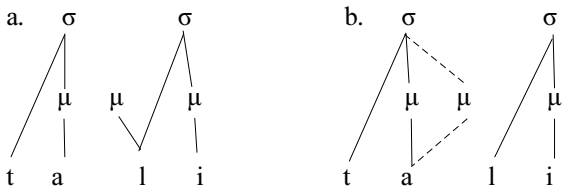
She claims that the marginal speech form [i.mul.lon] is produced when speakers fail to recognize the stem /lon/ as an independent word. Once output-output correspondence is out of picture, the suboptimal output in (23b) is promoted to the optimal status.

While we do not explicitly rule out this scenario, the more natural answer to this question is available within the framework we are adopting here. When the whole expression is used as a word repeatedly, the original meaning can recede from collective memory. The morpheme boundary melts away, and speakers no longer sense its parts. If some speakers still hear the two morphemes inside the word [i.mun.+non] 'phonology', Sohn's OO-correspondence might be activated or the input /l/ loses its mora and turns into [n] along the lines discussed in §4.3 above. But if speakers glom the morphemes together in their minds, it is expected that they will be tempted to react just the way we have been dealing with /nl/ sequence, resulting in lateralization. Once again our analysis would make possible a simpler and more elegant account of the alternations.

5.2 Remaining issues

Against our claim of lateralization in terms of gemination, there are cases in which a lateral approximant /l/ surfaces as [r] instead of gemination when it is located between two vowels. At first sight this would seem to be a serious problem to our proposed analysis. We shall, however, see directly that the violation is more apparent than real. Consider the following schematic representations:

(24) /tali/ 'a bridge' → [ta.ri], *[tal.li]



(24a) is in violation of *MORAIC-*l* due to the mora that *l* carries. It seems that the only way to rescue the mora should be relinking the mora to the preceding vowel as in (24b), resulting in a long vowel which is prohibited.[17] Alternatively, it might be that the *l* gives

(Sohn 2008: 37)

16 Max-OO(nas/cod): The feature [+nasal] of an output segment in the coda is realized in the corresponding output. (Sohn 2008: 38)

up on its mora and turns out to be something else. Surrounded by its intervocalic environment, the *l* increases its sonority by one step along the sonority scale, which results in [r]. This suggests that we are still missing something at §4, but at present we know of no viable alternative. We would like to leave this as a question for future research.

Before drawing this section to a close, let us consider one further issue: asymmetrical nature of lateralization. Some English loanwords show different behavior with respect to /nl/- and /ln/-sequence.

(25) Lateralization in English loanwords
  a. 'online' → [ɔl.lajn], [ɔn.najn]
  b. 'all night' → [ɔl.lajt], *[ɔn.najt]

In (25a), either [l.l]- or [n.n]-sequence is realized. In (25b), however, only [l.l]-sequence is allowed. It apparently causes a crash with the symmetrical nature of Korean lateralization we have been arguing for.[18] In reply to this criticism, our claim can be defended in most cases of this kind. At the segmental level of phonological organization, it is required that an empirically and conceptually adequate description make reference to the strata or sub-lexicons, which should be equipped with their own independent mini-phonologies (Itô and Mester 1995). For example, the overall lexicon can be divided into a native part and a foreign part and each has its own constraint hierarchy. Those loanwords in (25), therefore, could have a ranking of constraints different from what we have proposed. This interesting issue also deserves further research.

6. Earlier OT treatments

This section offers the necessary background for our preceding analysis in §4. We discuss here in detail a couple of previous treatments that provide insight into our current theoretical framework and also raise problems.

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17 We should assume that such a universal constraint as *LongVowel is high-ranked enough.

18 I am grateful to an anonymous reviewer for calling this issue to my attention. In fact, this whole subsection is benefited from reviewers.

6.1 Syllable contact generalization

An extensive discussion and analysis of Korean lateralization phenomenon has been provided by Davis and Shin (1999, D&S henceforth) within the OT framework. Their entire work is based essentially on the Syllable Contact Law by Vennemann (1988) to the effect that rising sonority is universally avoided over a syllable boundary, which enables them to develop their following version of constraint[19]:

(26) Syllable Contact (SyllCon) (D&S 1999: 286)
"The onset of a syllable must not be of greater sonority than the last segment in the immediately preceding syllable." (That is, avoid rising sonority over a syllable boundary.)

Their proposal of SyllCon as a universal constraint in OT makes a strong argument, namely that it is undominated in the constraint ranking of Korean. In our following discussion, it will be shown that this prediction is empirically borne out but raises certain problems.

The lateralization of the input string /nl/ establishes the ranking argument regarding the SyllCon and relevant faithfulness constraints, as shown below in (27):

(27) /nonli/ → [nol.li] 'logic' (D&S 1999: 293)

/nonli/	SyllCon	Max-[lateral]	Max-[nasal]
a. non.li	*!		
b. non.ni		*!	
☞c. nol.li			*

Let us in turn consider the following tableau in (28). Owing to the universal status of SyllCon, it is still undominated and the input sequence /tl/ is realized as [l.l] due to the interaction with faithfulness constraints:

19 Different versions of the same OT constraint have been invoked by many researchers (Alderete 1995; van Oostendorp 1995; Bat-El 1996; Urbanczyk 1996; Green 1997; Landau 1997, Rose 1997, among others).

(28) /tikɨtliɨl/ → [ti.kɨl.li.ɨl] ‘the letters /t/ and /l/’ (D&S 1999: 296)

/tikɨtliɨl/	SyllCon	Ident-Onset [sonorant]	Ident- [place]	Max- [lat]	Max- [nasal]	Ident- [sonorant]
a. ti.kɨt.li.ɨl	*!					
b. ti.kɨn.ni.ɨl				*!		*
c. ti.kɨn.li.ɨl	*!					*
☞d. ti.kɨl.li.ɨl						*
e. ti.kɨt.ti.ɨl		*!		*		*

This line of consideration has the benefit of accounting for the fact that an opaque candidate (29e) emerges as victorious:

(29) /kjək-li/ → [kjəŋ-ni] ‘isolation’ (D&S 1999: 295)

/kjəkli/	SyllCon	Ident-Onset [sonorant]	Ident- [place]	Max- [lat]	Max- [nasal]	Ident- [sonorant]
a. kjək.li	*!					
b. kjək.ni	*!			*		
c. kjəl.li			*!			*
d. kjəŋ.li	*!					*
☞e. kjəŋ.ni				*		*
f. kjək.ti		*!		*		*

The tableaux in (28) and (29) combine to argue that as many as five different faithfulness constraints conspire to guarantee the satisfaction of the highest-ranked SyllCon, which seems not quite likely to us. We consider this option running counter to our basic intuition that something as simple as assimilation or gemination should be described as a simple mechanism.

Now that we have begun to have some reason to believe that D&S may not be on the right track, it is not surprising to encounter some problems with the tableau, which will lead their analysis to a refinement. Consider the following tableau:

(30) /pulniŋ/ → [pul.liŋ] ‘inability’ (D&S 1999: 299)

/pulniŋ/	SyllCon	Ident-Onset [sonorant]	Ident- [place]	Max- [lat]	Max- [nasal]	Ident- [sonorant]
☹a. pul.niŋ						
b. pul.tiŋ		*!			*	*
c. pun.niŋ				*!		
d. pul.liŋ					*!	

The same ranking of constraints fails to produce lateralization from the input string /ln/. The tableau should have settled matters in favor of (30d) as the real input. This tells something that we already suspected: the current ranking of constraints cannot express our intuition that the two lateralizations observed in (28) and (30) are mirror image.

In order to retain explanatory force, D&S must disallow the output *ln* sequence in (30a) in the evaluation of major candidates. So, they had to introduce additional constraint saying that the *ln* sequence in the output is seen as a kind of an OCP[20] effect as in (31):

(31) Similarity – *[+son, +cor], [+son, +cor][21] (D&S 1999: 300)
A sequence of coronal sonorant consonants is disallowed.

As expected, the top-ranked constraint Similarity turns out to be decisive. The following tableau in (32) certifies it:

(32) /pulniŋ/ → [pul.liŋ] ‘inability’ (D&S 1999: 300)

/pulniŋ/	SyllCon	Ident-Onset [son]	Simil-arity	Ident- [place]	Max- [lateral]	Max- [nasal]	Ident- [son]
a. pul.niŋ			*!				
b. pul.tiŋ		*!				*	*
c. pun.niŋ					*!		
☞d. pul.liŋ						*	

20 The Obligatory Contour Principle is a principle of Universal Grammar. Leben (1973) originally proposed the OCP with a view to accounting for the fact that tone languages do not allow the same tones to be adjacent to each other.

21 The motivation of the Similarity as an OT constraint is essentially based on the work of Pierrehumbert (1993).

The full range of lateralization phenomena at hand is accounted for by D&S through the interaction effects between those two markedness constraints (i.e., SyllCon and Similarity) and five other independently required faithfulness constraints, as shown above.

Unfortunately, it is not clear that this line of argument can be made with certainty. D&S's basic argument is two-fold: (i) the adoption of SyllCon as an undominated OT universal constraint implies that the sonority-rising *nl* sequence (but not *ln* sequence) violates the SyllCon and (ii) both the *nl* and *ln* violate the Similarity since each of them consists of a sequence of coronal sonorants.

In a nutshell, D&S attribute the failure of *ln* sequence to the working of the Similarity while that of *nl* sequence to Syllcon. Unhappiness with this state of affairs is reflected on the fact that we are missing a generalization. That is, if we relate lateralization to the workings of those two separate undominated markedness constraints, we would clearly fail to capture our important intuition that we are essentially treating one and the same phenomenon.[22] The intuition has long been called into attention as a mirror image:

(33) Lateralization (Kim-Renaud 1974: 225)

$$\begin{pmatrix} +\text{nas} \\ \\ +\text{cor} \end{pmatrix} \rightarrow [+\text{lat}] \ \% \ \_\_\_\_\_ \ [+\text{lat}]$$

(A coronal nasal becomes lateral adjacent to a lateral.)

By incorporating the SyllCon and Similarity into the theory, D&S seriously weakens one of our fundamental goals, which is to seek a formalism capable of expressing frequently-attested common processes in terms of simple descriptive apparatus. So, we tried to eliminate both undominated markedness constraints in favor of a new simple and universal one, *MORAIC-*l*. D&S's claim should be descriptively adequate, but a theory

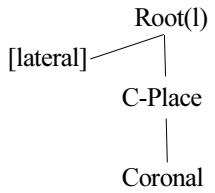
22 We would also like to draw readers' attention to the following. In constructing an OT grammar, every universal constraint should come for free while language-specific constraints come at a cost since they put a burden on our grammar. Kang (2000) posits a language-specific constraint such as [n%l] to the effect that the adjacency of nasal and lateral is not allowed. Kang (2002) analyzes certain type of data D&S did not consider. But her argumentation still crucially depends on D&S's SyllCon and Similarity. Also, Sohn (2008) adopts D&S's SyllCon and proposes a constraint named SonUni which is virtually identical with D&S's Similarity. As a matter of fact, D&S's proposal have had considerable influence over subsequent works.

that seeks the most economical grammar -- one with the simplest apparatus compatible with the data -- would almost inevitably be led to postulate just one relevant constraint responsible for the phenomenon. To capture our linguistic intuition of symmetrical nature of Korean lateralization, this seems like a step in the right direction to us.

6.2 Licensing constraint

An attempt has been made to overcome some of the major limitations of D&S's way of treating Korean lateralization phenomenon. Lee (2018) proposed a phonological representation for the Korean lateral as follows:

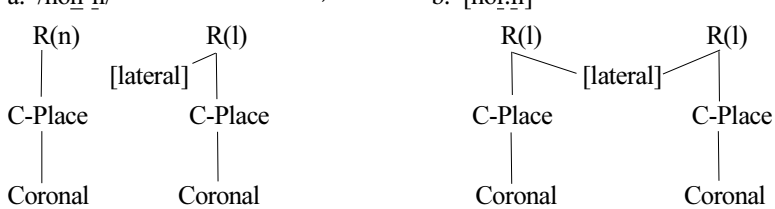
(34) Phonological representation of /l/ (Lee 2018: 371)



The [lateral] in (34) is supposed not to be licensed by the dominant Root node but can be licensed by being linked to a neighboring consonant. For example, the syllable-initial [lateral] in (35a) cannot be licensed because it is singley associated to its dominating Root node. On the other hand, the [lateral] in (35b) is licensed by its doubly-linked structure:

(35) Lateralization and gemination of [lateral] (ibid.: 372)

a. /non-li/ → b. [nol.li]



In his analysis, a constraint named LICENSE([lateral]) is enforcing the licensing of [lateral]

in such a way that the feature always finds itself in a linked structure. It does not matter whether the [lateral] in question precedes or follows its target of association. The success of this LICENSE([lateral]) in overcoming the difficulties associated with mirror image is due to the wise formulation of the constraint, with structural effects that guarantee lateralization. In spite of the LICENSE([lateral])'s success in capturing the mirror image effect, a fundamental question still remains of what functional and phonetic factors motivate bi-directional application of lateralization in the first place. That is to say, we have to ask what makes only the lateral approximant always prefer a structure like (35b) to (35a). What LICENSE([lateral]) claims is circular because what needs to be accounted for is already contained in the constraint itself. What we seem to need is a single constraint that provides us with an internally well-motivated explanation for the mirror image.

There is another aspect of Lee's analysis we would like to improve on. A tableau showing the activity of LICENSE([lateral]) is given below:

(36) /kjə<u>k</u>-<u>l</u>i/ → [kjə<u>ŋ</u>-<u>n</u>i] 'isolation' (ibid.: 374)

/kjək-li/	LICENSE([lateral])	FAITH-[sonority]	SyllCon	…
a. kjək.li	*!		*	
b. kjək.ni		*	*!	
c. kjəŋ.li	*!	*	*	
☞d. kjəŋ.ni		*		
e. kjək.ti		**!		

The crucial decision is passed down to the lower-ranking constraint SyllCon which correctly selects candidate (36a) as optimal. Lee (2018) failed to get rid of SyllCon from his analysis. We would like to eliminate the SyllCon as well as Similarity completely from the tableau. This desire was the driving force for our analysis in §4.

7. Conclusion

The main body of this article focuses on issues of mirror-image lateralization in Korean. It is argued that the gemination approach of lateralization is an improvement on previous approaches. In spite of the universal nature of SyllCon, the constraint failed to capture a mirror-image effect of lateralization and additional constraint Similarity had to

be introduced. Our approach provides a unified account of a diverse range of lateralization or nasalization processes involving homorganic coronal sonorants, and it does so in a highly restrictive fashion. We can guarantee this outcome by replacing D&S's SyllCon and Similarity with *MORAIC-*l*. Lateral approximant *l* is expected to induce gemination effects because it inherently carries a mora. In the context where the *l* is obliged to lose the mora, therefore, it cannot retain its lateral status any longer and will be turn out to be something else (i.e., alveolar nasal *n*). Our analyses of the word-initial *l* avoidance, *l*-nasalization, and asymmetry effect of lateralization, all of these conspire to suggest that we are following a course that is likely to result in simplicity and intuitive plausibility.

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