

Evidence for constraint promotion in acquisition: cases of vowel lengthening and onset constraints*

Mi-Hui Cho
(Pukyong National University)

Cho, Mi-Hui. 2002. Evidence for constraint promotion in acquisition: cases of vowel lengthening and onset constraints. *Studies in Phonetics, Phonology and Morphology*. 8-1. 149-164. Most researchers who adopt Optimality Theory in phonological acquisition account for the discrepancy between child system and adult system by different rankings. In particular, it is generally assumed that markedness constraints outrank relevant antagonistic faithfulness constraints in the initial state of child grammar. Then, the markedness constraints gradually demote to the extent that the faithfulness constraints outrank the markedness constraints when children become to produce adult forms. In this paper, however, it is shown that the demotion-only theory cannot give a principled account of onsetless words and vowel lengthening in developing child systems. Specifically, the markedness constraints such as Onset and Lengthen that require the presence of structure do not demote but promote when the markedness constraints are reranked because they are ranked low at the initial stage of acquisition. On the other hand, demotion-and-promotion theory not only accounts for onsetless syllables and vowel lengthening in developing systems but also gives an insight to categorize markedness constraints with respect to the presence and absence of structure. (Pukyong National University)

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1. Introduction

It has been shown by many scholars that Optimality Theory (McCarthy and Prince 1993ab, 1995 Prince and Smolensky 1993) in which a set of universal constraints is ranked differently depending on languages can be applied in the area of phonological acquisition. In Optimality Theory (OT, henceforth) universal constraints are of two types: faithfulness constraint and markedness constraint. While the former requires a correspondence between input and output, the latter requires an unmarked, common structure in the output. Based on the fact that very young children cannot produce adult forms with complex structure, it is generally assumed that constraints against marked structure outrank the relevant antagonistic faithfulness constraints at an initial stage of acquisition. Thus, for example, the markedness constraint *Complex that prohibits consonant clusters in a syllable dominates the relevant antagonistic faithfulness constraint that militates against deleting segments from the input because children

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frequently simplify sequences of consonants (Gnanadesikan 1995). Likewise, the markedness constraint NoCoda that prohibits a coda consonant dominates the relevant antagonistic faithfulness constraint since children often drop a coda consonant. Cluster simplification and coda deletion occur when children have difficulties in producing adult complicated forms. It is not uncommon for young children to simplify complex structures due to ease of articulation. During the course of development, however, constraints against marked structure such as *Complex and NoCoda have been inactive and thus demoted as the rankings between the markedness constraints and faithfulness constraints become reversed in fully developed adult systems where the relevant faithfulness constraints outrank the markedness constraints. This clearly supports the demotion of the markedness constraints *Complex and NoCoda, although Bernhardt and Stemberger (1998) claim instead that the approximation to the ambient ranking takes place by promoting the relevant faithfulness constraints.

The notion of constraint demotion has been supported by the majority of scholars, notably by Tesar and Smolensky (1998: 245). Notice, however, that the reverse rankings in adult systems where faithfulness constraints outrank markedness constraints are not always true because some markedness constraints such as Lengthen and Onset do outrank the relevant faithfulness constraints in adult systems. Specifically, the markedness constraints Lengthen that requires a long vowel before a voiced consonant and Onset that requires an onset consonant in a syllable are active and thus high ranked in fully developed systems. In a demotion-only acquisition theory this means that the markedness constraints Lengthen and Onset should be high ranked from the beginning of acquisition. Nevertheless, it will be shown in this paper that there is some evidence that the markedness constraints Lengthen and Onset are low ranked at the earliest stage and as a result, they become promoted during the course of acquisition. Then, this would support the promotion of some markedness constraints.

The purpose of this paper is to show evidence for the promotion of certain markedness constraints and to argue that the demotion-only theory is not adequate for accounting for onsetless syllables and vowel lengthening in developing child systems. Thus, it will be proposed that there are at least two kinds of markedness constraints: those with constraint promotion and those with constraint demotion. The organization of the paper is as follows. In Section 2 it will be shown that the markedness constraint Onset is low ranked in the beginning of acquisition due to the initial dominance of onsetless syllables across languages and consequently it is promoted when the child ranking approximates the adult ranking. Likewise, in Section 3 it will be shown that the markedness constraint Lengthen is not demoted but actually has to be promoted so that it dominates the relevant antagonistic faithfulness constraint in adult systems, by reanalyzing vowel lengthening in Dinnsen, McGarrity, O'Connor, and

Swanson (2000). Section 4 summarizes the conclusions reached.

2. The Constraint of Onset

The markedness constraint Onset is different from the demoting constraints *Complex and NoCoda in that it does not simplify structures but adds structures, in this case, onset. Importantly, Onset cannot be high ranked from the beginning of development because it is frequently reported that children produce onsetless syllables at the earliest stage. For example, Grijzenhout and Joppen (1999) observe that words without initial consonants are present from the beginning of language acquisition in German, in accordance with the findings of Menn (1971) for English and Costa and Freitas (1998) for Portuguese. Likewise, Le Normand and Chevrie-Muller (1991) reported that a phonologically delayed French child, F.E. had produced words without a consonant at 3 years and 8 months. Accordingly, all words consisted of only vowels. After the V syllable stage, he began to produce CV syllables at 4 years and 9 months. Also, Hua and Dodd (2000) describe that in children speaking Modern Standard Chinese simple vowels emerge very early in development whereas syllable-initial consonants emerge very late. Consequently, syllable-initial consonant deletion is very common in the youngest group. Similarly, a longitudinal study of a Korean child conducted by the author shows that onsetless words prevail at an earliest stage of acquisition. In order to account for onsetless words at the earliest stage, the Onset constraint cannot be high ranked. Rather, it is low ranked enough to be violated. It is not surprising given that vowels are generally acquired before consonants because vowels are easier to produce than consonants (Jakobson 1941/1968, Davis and MacNeilage 1990, Le Normand and Chevrie-Muller 1991).

First, let us consider the German case in Grijzenhout and Joppen (1999). They argue that the first words in German child speech consist of CV or VC, based on the data collected from a child, Naomi. While CV-structure from adult CVC-words is accounted for by the constraints of Onset and NoCoda, VC-structure from adult VC-words is not accounted for by Onset and NoCoda. Rather, Onset and NoCoda are violated in VC-structure. Consequently, Grijzenhout and Joppen claim that Onset and NoCoda are demoted as in (1b) assuming that there is no constraint ranking at the earliest stage as in (1a), following Tesar and Smolensky's notion of minimal constraint demotion (1998).

- (1) The acquisition of rhyme structure and gradual constraint demotion (Grijzenhout and Joppen: 22)
 - a. Stage I: MaxIO, *Lab, *Cor, WordBin, Max-μ, **Onset**, NoCoda
 - b. Stage II: MaxIO, *Lab, *Cor, WordBin>> Max-μ, **Onset**, NoCoda
 - c. Stage III: MaxIO, WordBin>> Max-μ, **Onset**, NoCoda, *Lab, *Cor
 - d. Stage IV: MaxIO>> Max-μ, **Onset**, NoCoda, *Lab, *Cor>> WordBin

However, notice that VC-structure occurs at the earliest stage of language acquisition, according to Grijzenhout and Joppen. Hence, Onset and NoCoda are not actually demoted, but low ranked from the beginning as in Stage II. In other words, Stage I where there is no ranking among constraints is not a real developmental stage but is just assumed “for the sake of the argument” as admitted by Grijzenhout and Joppen (1999: 12). If Onset and NoCoda were really demoted, they should be ranked lower at the subsequent stages, Stage III and Stage IV than at Stage II. However, there is no explicit evidence that they are really demoted as in (1). Ironically, Grijzenhout and Joppen (1999: 22) also state that other constraints are ranked higher than Onset noting that V-initial syllables are as unmarked as CV-syllables in child grammar. Then, Onset would be actually promoted if Onset is high ranked in adult grammar.

A longitudinal study of a Korean child conducted by the author also shows that onsetless words prevail at an earliest stage of acquisition. However, differently from the German acquisition data by Grijzenhout and Joppen, there are several words consisted of only vowels as in (2a).

- (2) S. H. (“.” refers to a syllable boundary.)
- a. V.V-structure
 - [o.i] for adult [ko.gi] 'meat' (1 year 6 months)
 - [o.i] for adult [coŋ.i] 'paper' (1 year 6 months)
 - [e.a], [i.ə.i.ə] for adult [i.ri.wa] 'come here' (1 year 7 months)
 - [ə.i] for adult [u.yu] 'milk' (1 year 8 months)
 - b. CV.V-structure
 - [k'a.a] for adult [sa.gwa] 'apple' (1 year 6 months)
 - [mo.i] for adult [mən.mən.i] 'dog' (1 year 6 months)
 - [k'o.i] for adult [kyə.ʃa] 'mustard' (1 year 6 months)
 - [t'e.a] for adult [cən.hwa] 'telephone' (1 year 7 months)
 - [ʃi.e] for adult [ʃi.gye] 'clock' (1 year 7 months)
 - [t'a.u] for adult [t'al.gi] 'strawberry' (1 year 7 months)
 - c. V.CV-structure
 - [i.c'a] for adult [ki.c^ha] 'train' (1 year 6 months)
 - [ə.c'a] for adult [mo.ʃa] 'hat' (1 year 6 months)
 - [ə.c'a] for adult [kyə.ʃa] 'mustard' (1 year 7 months)
 - [o.gi] for adult [ko.gi] 'meat' (1 year 7 months)

The occurrence of onsetless words in Korean acquisition data shows that Onset is easily violated at an early stage compared to NoCoda. In particular, (C)V.V-structure from adult CVC.(C)V-words clearly shows that Onset is frequently violated whereas NoCoda is obeyed at this stage.

It has been observed by many scholars that coda consonants in adult words delete at an earliest stage of child language. This is also true for the Korean child S. H., as shown in the data (3).

- (3) S. H. between 1 year 6 months and 1 year 7 months
- | | |
|---|---------------------------------|
| [i] for adult [ip] 'mouth' | [p'e] for adult [pal] 'foot' |
| [p'a] for adult [pap] 'cooked rice' | [p'aba] for adult [kabaŋ] 'bag' |
| [meme] for adult [yaŋmal] 'socks' | |
| [p'i], [p'ip'o] for adult [yənp ^h il] 'pencil' | |
| [ʃi] for adult [son] 'hand' | [ʃi] for adult [ʃin] 'shoes' |
| [k'i] for adult [kyul] 'tangerine' | [k'o] for adult [k'ot] 'flower' |
| [k'a] for adult [k ^h al] 'knife' | [k'i] for adult [kim] 'laver' |
| [k'o] for adult [kuk] 'soup' | [k'o] for adult [k'əp] 'cup' |
| [k'a] for adult [sut.k'al] 'spoon' | |
| [k'ik'i] for adult [kimc ^h i] 'Korean hot vegetable salad' | |

The data indicate that the constraint NoCoda is high ranked at this early stage. If NoCoda is seldom violated while onset is violated, then this means that NoCoda should outrank the constraint Onset.

In addition to NoCoda and Onset, the markedness constraints *C and *V which bans the occurrence of consonants and vowels, respectively would play a role in child language because young children prefer as little structure as possible. The constraint *C outranks the constraint *V given that consonants have more complex structure than vowels in terms of obstruction in the mouth. If consonants have more structure than vowels, then consonants are more marked than vowels. As mentioned in the previous section, consonants are also more difficult to produce than vowels and thus consonants are more marked than vowels. Similarly, consonants are generally acquired later than vowels thus being more marked. Finally, consonants are optional whereas vowels are obligatory in forming a syllable. Consequently, a syllable without a consonant is better than a syllable without a vowel. Therefore, the occurrence of consonants is more marked than that of vowels. The rankings of the constraints described up to now are summarized below.

- (4) Constraint rankings at an earliest stage
*C, NoCoda >> Max, Onset, *V

The ranking between NoCoda and *C is undecided. Since consonants delete due to the high ranking of NoCoda and *C, the faithfulness constraint Max that penalizes segment deletions is dominated. However, the ranking among Max, Onset, and *V is undetermined.

Let us analyze [o.i] for the adult word [coŋ.i] 'paper' in (2a) with the constraint rankings proposed.

(5) [o.i] for adult [coŋ.i] 'paper' at an early stage

	*C	NoCoda	Max	Onset	*V
a. coŋ.i	**	*!		*	**
b. co.i	*!		*	*	**
c. oŋ.i	*	*!	*	**	**
d. o.i			**	**	**

Candidate (a) is ruled out because it has too many consonants including one coda consonant, thus violating *C and NoCoda. Likewise, candidates (b) and (c) incur fatal violations of *C and NoCoda and thus are eliminated. Accordingly, candidate (d) becomes the winner since it complies with the high ranked *C and NoCoda. This shows that the low ranked constraints Max and Onset do not participate in the selection of the optimal output and thus, they are low ranked at an earliest stage.

The next question we need to consider is why the data in (2b) and (2c) do have one onset consonant despite of violating *C. If the child omits all consonants resulting in V.V-structure, there would be so many homophones. Then, it would be very difficult to differentiate a substantial number of vocabularies in the child's system. In order to avoid this, the child may choose the functional constraint of Contrast¹ given below for ease of perception in some cases at the expense of violating *C, which facilitates ease of articulation.

(6) Contrast: Avoid weak contrasts.

In a developing child system with only vowels, contrast could be maximized by having more consonants. However, notice that the child compromises the two conflicting constraints of Contrast and *C by pronouncing only one consonant, but not two consonants at this stage. The reconciliation of the two conflicting demands between ease of perception and ease of articulation has also been observed in fully developed adult languages by the researchers such as Lindblom (1990), Kohler (1991), Flemming (1996), and Hume and Johnson (to appear). According to Hume and Johnson, weak contrasts can be avoided by enhancing or sacrificing contrast. While epenthesis, dissimilation, and metathesis enhance contrast, assimilation and deletion sacrifice contrast. The Korean child may avoid weak contrast resulting from V.V-structure by pronouncing one more consonant.

¹ There is a similar constraint that avoids weak contrast in fully developed adult languages. For example, the constraint of Recoverability is proposed in order to avoid ambiguity from the hearer's point of view in Kang (1999). One might ask a question of why Contrast is not evaluated in the word in (5). According to basic assumptions in the theory of first language acquisition, changes in child systems occur not in an across-the-board fashion but gradually resulting in lexical diffusions. Consequently, Contrast may be ranked high to play an active role in some words whereas ranked low in some other words.

In a CV(C).CV(C) sequence of adult words the child produces only one consonant and vowels, resulting in CV.V-structure in (2b) or V.CV-structure in (2c). Then, we need to investigate which consonant would be pronounced between two onset consonants. It is the onset consonant which maximizes contrast in the system that survives. Specifically, let us consider [t'a.u] for adult [t'al.gi] 'strawberry' below.

(7) [t'a.u] for adult [t'al.gi] 'strawberry'

	Contrast	*C	NoCoda	Max	Onset	*V
a. t'al.gi		***!	*			**
b. t'a.gi		**		*		**
c. t'a.u		*		**	*	**
d. a.gi	*!	*		**	*	**
e. a.i	*!			***	**	**

Candidate (e) is eliminated because V.V-structure causes too many homophones in the child system violating Contrast. Likewise, candidate (d) fatally violates Contrast because the child already had many cases of vowel plus velar consonant sequences as in (2c) [o.gi] for adult [ko.gi] 'meat' around 1 year and 7 months. In addition, she has a word [a.k'a] for adult [a.ga] 'baby' consisted of vowel plus velar consonant around 1 year and 7 months. To summarize, both V.V-structure and V.CV-structure words in the case of adult [t'al.gi] weaken contrasts because they would create too many homonyms. On the other hand, candidates (a) and (b) which do not violate Contrast are out because they have too many consonants violating *C. Therefore, candidate (c) with one consonant becomes the winner.

Next, let us consider [i.c'a] for adult [ki.c^ha] 'train'.

(8) [i.c'a] for adult [ki.c^ha] 'train'

	Contrast	*C	NoCoda	Max	Onset	*V
a. ki.c'a		***!				**
b. ki.a	*!	*		*	*	**
c. i.c'a		*		*	*	**
d. i.a	*!			**	**	**

Along the same line with the tableau (7), candidate (d) fatally violates Contrast due to V.V-structure. However, differently from (7) it is candidate (b) with a velar consonant and vowel sequence that violates Contrast because the child already had several cases of velar consonant and vowel sequences such as [k'a.a] and [k'o.i] as in (2b).² By contrast, candidate

² Although the constraint of Contrast seems to be universal, it may be applied differently between child system and adult system. This is because vocabulary inventories in child systems are building, while those in adult systems are fully built. Thus, the evaluation of

(c) with a vowel and coronal consonant does not weaken contrasts in this case and thus, is optimal.

What I intend to show here is that the constraint Onset is not high ranked from the beginning since onsetless words are universally predominant at an earliest stage of acquisition. Thus, the constraint Onset is frequently violated in early development. However, onsetless words gradually disappears having onset consonants at a later stage, as the child become to produce the ambient adult language. This indicates that Onset that is low ranked at an initial stage should be promoted at a later stage. In order to confirm whether Onset that is ranked low in child Korean is actually promoted or not in adult Korean, let us consider adult Korean. If Onset is higher ranked in adult Korean than in child Korean, then it is promoted.

In adult Korean the constraint Onset is not much violated but rather obeyed based on the following facts. First, vowel-initial suffixes are chosen if a preceding stem ends in a coda consonant whereas consonant-initial suffixes are chosen if a preceding stem ends in a vowel, as given below.

- (9) Allomorph selection in adult Korean
- a. suffixes after a consonant final stem
 - ton + i 'money + nominative marker' [to.ni]
 - ton + il 'money + accusative marker' [to.nil]
 - ton + in 'money + topic marker' [to.nin]
 - b. suffixes after a vowel final stem
 - pi + ka 'rain + nominative marker' [pi.ga]
 - pi + lil 'rain + accusative marker' [pi.lil]
 - pi + nin 'rain + topic marker' [pi.nin]

The selection of allomorphs can be viewed as satisfying the constraint Onset. That is, when the stem ends with a coda consonant, a vowel-initial suffix is chosen as optimal because in that way Onset is not violated.

Second, an onset consonant can be inserted in order to avoid onsetless syllables. In specific, [n] is optionally inserted before a morpheme beginning with /i/. It is also possible that a coda consonant of a preceding syllable becomes an onset consonant of a following onsetless syllable, as shown below.

- (10) Optional n-insertion in adult Korean
- puək^h 'kitchen + il 'work' [puəŋ.nil]/[puə.gil]
 - k'oc^h 'flower' + ip^h 'leaf' [k'on.nip]/[k'o.dip]
 - hot^h 'single' + ipul 'bedclothes' [hon.ni.bul]/[ho.di.bul]
 - cisikita 'to mash' [cin.ni.gi.da]/[ci.di.gi.ta]

Contrast violations should be based on the vocabularies of the child at a certain point of time. However, the specific ways of evaluating the Contrast constraint violations in acquisition need further research, thus remaining as an open question.

The insertion of [n] occurs due to one of strategies in order to comply with the constraint Onset. It is frequently observed in fully developed languages that an onset consonant is inserted in spite of violating the Dep constraint that prohibits the insertion of a segment (Prince and Smolensky 1993). Another strategy to avoid onsetless syllables is to syllabify a preceding coda consonant as an onset of the following vowel-initial syllable.

Because Onset tends to be obeyed in adult Korean whereas it is most frequently violated in child Korean, it is ranked higher in adult Korean than in child Korean. Also, it has been shown by many Korean phonologists that the constraint Onset is active and thus highly ranked in adult Korean based on glide formation and syllabification (Kang 1999 among others). In adult systems structure is elaborated by the Onset constraint and as a result, a coda consonant of a preceding syllable becomes an onset consonant of a following vowel-initial syllable if available. Or an onset consonant may be inserted. Therefore, it should be viewed that low ranked Onset in developing systems becomes promoted in fully developing systems.

As far as I know, no researchers explicitly have categorized markedness constraints depending on their characteristics. While some markedness constraints prefer a simple form for a certain reason such as ease of articulation, some other markedness constraints prefer a complex form due to distinction or elaboration. Thus, markedness constraints are at least of two types: those that require the absence of structure such as *Complex and NoCoda, and those that require the presence of structure such as Lengthen and Onset. The constraints requiring the presence of structure are the ones that emerge later and so get promoted. Therefore, not all markedness constraints are demoted. The categorization of markedness constraints is given below.

(11) Categories of markedness constraints

- a. constraints that require the absence of structure emerge early and result in demotion in a fully developed language (e.g., *Complex, NoCoda)
- b. constraints that require the presence of structure emerge late and result in promotion in a fully developed language (e.g., Lengthen, Onset)

Thus, the notion of minimal constraint demotion proves to be ephiphenomenal. In the next section the constraint of vowel lengthening that requires the presence of vowel length is considered.

3. The Constraint of Lengthen

According to Dinnsen, McGarrity, O'Connor, and Swanson (2000), some children maintained a statistically significant vowel length distinction before omitted final voiced obstruents whereas some other maintained no

statistically significant vowel length differences, as shown below.

(12) Based on the data in Weismer, Dinnsen and Elbert (1981)

a. Child A (age 7;2) makes vowel length distinctions.

i.	kæ:	'cab'	ka	'cop'
	ki:	'kid'	pæ	'pat'
	dɔ:	'dog'	dʌ	'duck'
ii.	kæbi	'cabby'	kapou	'copper'
	kidou	'kidder'	pæti	'patty'
	dɔgi	'doggie'	dʌki	'ducky'

b. Child C (age 3;10) neutralizes vowel length distinctions.

i.	dɔ	'dog'	wɛ	'red'	i	'eat'
	dæ	'dad'			peɪ	'plate'
	bɛ	'bed'			tʌ	'truck'
ii.	dai	'doggie'			iin	'eating'
	dæi	'daddy'			wʌm	'looking'

In the system of Child A vowel length differences are maintained and vowel lengthening and final consonant omission interact opaquely. That is, for example, the correct output such as [kæ:] is non-surface-apparent because a long vowel occurs in an environment other than before a voiced consonant.³

In order to account for the opacity occurring in Child A within a constraint-based model Dinnsen, et al. propose the following rankings adopting Sympathy Theory proposed by McCarthy (1999).

(13) The opaque case of [kæ:] 'cab' in Child A (Dinnsen, et al.)

Rankings: NoCoda, Ident[weight]>>Lengthen>> Max, Ident[weight]

'cab'/kæb/	NoCoda	✱Ident [weight]	Lengthen	Max	Ident [weight]
a. kæb	*!	*	*		
b. ✱kæ:b	*!				*
c. kæ		*!		*	
d. ✱kæ:			*	*	*

The markedness constraint of NoCoda that prohibits a coda consonant outranks the relevant antagonistic faithfulness constraint Max because the optimal output has no coda. Similarly, the markedness constraint of Lengthen which allows a long vowel only before voiced consonants outranks the relevant antagonistic faithfulness constraint Ident[weight].⁴

³ In a rule-based account it is a counterbleeding relation because the lengthening rule must apply before the deletion rule. If the deletion rule were applied first, lengthening would be blocked resulting in a wrong form *[kæ].

⁴ Notice that the constraint Ident[weight] here does not necessarily correlate with moraic weight.

However, the high ranking of the markedness constraints NoCoda and Lengthen cannot select the empirically correct opaque output candidate (d) which preserve a correspondence in vowel length with the failed flower candidate (b). Consequently, the sympathy constraint $\text{✱Ident}[\text{weight}]$ is ranked above the Lengthen constraint since it is more important to resemble the vowel length of the flower candidate than to comply with the Lengthen constraint. The reason for why candidate (b) is selected as a flower candidate is because it obeys the selector, designated faithfulness constraint ✱Max and is more harmonic than candidate (a) with respect to the rest of the constraint rankings. In the tableau (13) candidates (a) and (b) with a final consonant are excluded due to the constraint NoCoda. Between the two candidates (c) and (d) it is candidate (c) with a short vowel that is eliminated because it violates the sympathy constraint ranked above Lengthen. Therefore, candidate (d) with a long vowel is selected as optimal, although it violates Lengthen.

Differently from Child A, Child C shows neither vowel length distinctions nor opacity effects. According to Dinnsen, et al., this system is analyzed by lowering the sympathy constraint $\text{✱Ident}[\text{weight}]$ below the markedness constraint ✱VC . This ranking is motivated by the minimal demotion of the sympathy constraint whereby a slightly different ranking of all the same constraints are presumed. The following tableau illustrates the transparent case of *dog* in Child C.

(14) The transparent case [dɔ] in Child C (Dinnsen, et al.)

Rankings: $\text{✱VC} \gg \text{Lengthen}$, $\text{Ident}[\text{weight}] \gg \text{✱Max}$, $\text{dent}[\text{weight}]$

'dog'/dɔg/	✱VC	Lengthen	$\text{✱Ident}[\text{weight}]$	✱Max	$\text{Ident}[\text{weight}]$
a. dɔg	*!	*	*		
b. ✱dɔ:g	*!				*
c. ✱dɔ			*	*	
d. dɔ:		*		*	*!

The markedness constraint NoCoda in Child A is replaced by the more general markedness constraint of ✱VC because Child C does not have any postvocalic consonant including word-medial onset as in the data (12bii). Along the same lines with the opaque case of Child A, the selector constraint is ✱Max and as a result, candidate (b) is the sympathetic flower candidate. According to the rankings proposed by Dinnsen, et al., candidates (a) and (b) with a postvocalic consonant are eliminated due to the high ranked constraint ✱VC . Between the remaining two candidates (c) and (d) candidate (c) violates the sympathy constraint $\text{✱Ident}[\text{weight}]$ whereas candidate (d) violates the markedness constraint Lengthen, resulting in a tie. Consequently, the selection passes down to the lower ranked faithfulness constraints. Since candidate (d) with a long vowel further violates $\text{Ident}[\text{weight}]$

in addition to Max, candidate (c) emerges as optimal.

The ranking proposed for Child C, where the markedness constraint Lengthen has higher ranking compared to that of Child A, is odd given that Child C does not have a length distinction, as shown below.

- (15) Individual differences in rankings proposed by Dinnsen, et al.
- Child A has both opaque and transparent cases and vowel length distinctions are maintained.
NoCoda, *Ident[weight]>>**Lengthen**>> Max, Ident[weight]
 - Child C has only a transparent case and vowel length distinctions are neutralized.
*VC>>**Lengthen**, *Ident[weight]>> Max, Ident[weight]

In the standard assumptions of OT there are length distinctions if the markedness constraint Lengthen dominates the antagonistic faithfulness constraint Ident[weight] as in Child A. Otherwise, Lengthen cannot be high ranked. This means that Lengthen in Child A cannot be higher ranked in the system of Child C because Child C cannot distinguish length differences. As mentioned by Dinnsen, et al., the chronologically younger Child C represents a relatively early stage of development whereas the somewhat older Child A represents a more advanced intermediate stage. Then, it is expected that the elaborating well-formedness constraint of Lengthen is higher ranked in the more advanced system of Child A, compared to the primitive system of Child C.

The sympathy constraint is high ranked in the rankings of Child A due to opacity effects. Since Child C does not show overt opacity effects, Dinnsen, et al. minimally lower the sympathy constraint resulting in a tie with Lengthen. However, as admitted by Dinnsen, et al., the sympathy constraint may be further lowered because it is not crucial in the transparent case of Child C. Thus, below I propose new rankings for Child C in which Lengthen and the sympathy constraint are further lowered.

- (16) Rankings for Child C (Neither vowel length distinctions nor opacity effects): *VC>> Max, Ident[weight]>>**Lengthen**, Ident[weight]

With these rankings let us consider the transparent case [dɔ] ‘dog’ in Child C.

- (17) The transparent case [dɔ] in Child C

‘dog’/dɔg/	*VC	★Max	Ident [weight]	Lengthen	*Ident [weight]
a. dɔg	*!			*	*
b. *dɔ:g	*!		*		
c. dɔ		*			*
d. dɔ:		*	*!	*	

Here note that the determination of the selector constraint, the sympathetic flower candidate, and the sympathy constraint is the same as in the analysis of Dinnsen, et al. keeping all the universal constraints that applied originally. The only difference is the rankings; the markedness constraint *Lengthen* is ranked below the antagonistic faithfulness *Ident[weight]* because the system of Child C is not elaborated enough to have vowel length distinctions. Likewise, the sympathy constraint \otimes *Ident[weight]* is ranked too low to play an active role in the case without opacity effects. Thus, according to the rankings proposed above, candidates (a) and (b) with a postvocalic consonant are eliminated due to the high ranked constraint **VC*. Between the two candidates (c) and (d) candidate (d) fatally violates both of the faithfulness constraints *Max* and *Ident[weight]*, while candidate (c) violates only one of the faithfulness constraint *Max*. In addition, candidate (d) violates *Lengthen*, while candidate (c) violates the sympathy constraint. Accordingly, candidate (c) becomes the winner.

To summarize, the following rankings are proposed for phonological phenomena involving vowel lengthening, based on the following evidence. That is, *Lengthen* cannot be ranked high in systems without vowel length distinctions than in systems with vowel length distinctions but ranked below the antagonistic faithfulness constraint *Ident[weight]*. This is because the systems with length distinctions are more elaborated in terms of vowel length and consequently, *Lengthen* should be high ranked to be overt. By contrast, *Lengthen* should be ranked low enough to play an inert role in systems without length distinctions.

- (18) a. Systems without vowel length distinctions that have only the transparent case: Child C
VC* >> *Max*, *Ident[weight]* >> *Lengthen***, \otimes *Ident[weight]*
 b. Systems with vowel length distinctions that have both opaque and transparent cases: Child A
NoCoda, \otimes *Ident[weight]* >> ***Lengthen*** >> *Max*, *Ident[weight]*

One of the motivations that Dinnsen, et al. rank *Lengthen* and the sympathy constraint immediately below the undominated markedness constraint **VC* in the system of Child C comes from the notion of minimal constraint demotion (Tesar and Smolensky 1998). Following the notion of minimal constraint demotion, Dinnsen, et al. try to schematize the rankings depending on the stages of development, as given below. Detailed constraint rankings are also presented below the schematized rankings for expository convenience.

- (19) Stages of development (Dinnsen, et al.)
 Stage 1: *Markedness* >> *Sympathy* >> *IO Faith* (Child C, transparent outputs)
VC* >> *Lengthen***, *Ident[weight]* >> *Max*, *Ident[weight]* (Child C)

Stage 2: Sympathy>>Markedness>>IO Faith (Child A, opaque outputs)
 NoCoda, Ident[weight]>>**Lengthen**>> Max, Ident[weight] (Child A)
 Stage 3: Sympathy>>IO Faith>>Markedness (archtypical fully developed
 language, transparent outputs)

According to Dinssen, et al., at Stage 1 with undifferentiated vowel length the particular markedness constraints Lengthen and *VC are ranked above sympathy. The subsequent Stage 2 with the emergence of long vowels is characterized by the demotion of Lengthen below the sympathy constraint because it is the most minimal change in ranking.

However, as claimed in the previous section and summarized in (18), the markedness constraint Lengthen at an earlier (or less elaborated) stage is low ranked because there is no vowel length distinctions. By contrast, it becomes high ranked at the later (or more elaborated) as length distinctions emerge. Thus, Lengthen at an earlier stage is not demoted but, in fact, promoted at the later stage. This clearly shows that not all markedness constraints are demoted; there is room for some markedness constraints to be promoted during the course of development if they are not high ranked throughout the stages of development (that is, if they are low ranked at an earlier stage).

4. Conclusions

Most researchers who adopt OT in phonological acquisition account for the discrepancy between child system and adult system by different constraint rankings. In particular, it is generally assumed that markedness constraints outrank relevant antagonistic faithfulness constraints in the initial state of child grammar. Then, the markedness constraints gradually demote to the extent that the faithfulness constraints outrank the markedness constraints when children become to produce adult forms. Although the so-called demotion-only theory claimed by a majority of researchers presents a more restrictive theory of acquisition, it had been shown that the demotion-only theory cannot give a principled account of onsetless words and vowel lengthening in developing child systems. Specifically, the markedness constraints such as Onset and Lengthen that require the presence of structure do not demote but promote when the markedness constraints are reranked because they are ranked low at the initial stage of acquisition. On the other hand, demotion-and-promotion theory not only accounts for onsetless syllables and vowel lengthening in developing systems but also gives an insight to the categorization of markedness constraints with respect to the presence and absence of structure.

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Division of English Language and Literature
 Pukyong National University
 599-1 Nam-Gu Daeyeon3-Dong
 Pusan, 608-737, Korea
 Fax: +82-51-628-2791
 Tel: 051-620-6620
 e-mail: mhcho@pknu.ac.kr

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