Cophonology in Sino-Japanese Vowel Harmony

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Cophonology (Anttila 2002, Zoll & Inkelas 2005), prespecification (Inkelas 1995, Inkelas et al. 1997), and lexical indexation (Pater 2006) represent three major proposals for handling exceptions in OT. This study examines regular and exceptional facts of vowel harmony in Sino-Japanese $(C_1)V_1C_2V_2$ stems. C_2 is either /t/ (*t*-stem) or /k/ (*k*-stem), and vowel harmony is normally observed only in *k*-stems. On the other hand, exceptional data exhibit vowel harmony only in *t*-stems. This paper argues that cophonology is the most efficient among the three approaches in explaining both regular and exceptional examples.

In $(C_1)V_1C_2V_2$ stems, V_2 is restricted to [i] and [u], and their distribution is highly predictable. V_2 is [u] in predominant *t*-stems. In most *k*-stems, the backness value of V_2 agrees with that of V_1 (Tateishi 1990). This is summarized and exemplified in (1) and (2). Vowel harmony usually occurs only in *k*-stems.

In order to explain the pattern in (1), I make three assumptions. First, front vowels are specified for Cor (Hume 1992, 1996) while back vowels are Dor. Second, Agree demands vowel harmony of V_1 and V_2. Finally, harmony is strictly local, and C_2 participates in harmony. Vowel harmony skipping C_2 is ruled out by undominated NoGap (Archageli & Pulleyblank 1994, Ito, Mester & Padgett 1995; Walker 1998).

I analyze the pattern in (1) with cophonology, where *t*-stems and *k*-stems are adjudicated by different constraint rankings. Vowel harmony in *k*-stems is captured by the ranking in (3). V_2 harmonizes with V_1 when the latter is back. This is because harmony can occur without violating NoGap, given that V_1 and C_2 are both dorsal. In (4) and below, harmonized segments are italicized. (4b) is selected because Agree is undominated. (5) shows my analysis of *k*-stems with front V_1. Vowel harmony is impossible here without breaching NoGap because V_1 is coronal while C_2 is dorsal. The optimal form chooses [i] due to *[u] » *[i]. This suggests that vowel harmony in (5) is ostensible, and real harmony occurs only when V_1 is back.

In contrast, [u] is chosen by *t*-stems irrespective of V_1. This suggests the ranking in (6). The analysis is provided in (7) and (8). When V_1 is front, V_1 and C_2 are both coronal segments. This means that vowel harmony can take place without incurring NoGap violation. But harmony is blocked by high ranked *[i].

The difference between *t*-stems and *k*-stems is consistent with cophonology in which a grammar has multiple constraint rankings and each item or a class of items picks a certain ranking. The pattern in (1) cannot be captured with a single constraint hierarchy since a monolithic ranking would expect the uniform presence or uniform absence of vowel harmony in both *t*-stems and *k*-stems.

Cophonology is further supported by exceptional data. In (9a) and (9b), V_2 is [i] although C_2 is /t/. The examples in (9c) are exceptional *k*-stems since V_1 and V_2 disagree in backness. The generalization here is that vowel harmony occurs in *t*-stems, but not in *k*-stems. In cophonology, these examples are explained with reranking. As illustrated in (10) and (11), (9a) and (9b) are explained if *[i] is ranked below *[u], exactly the same ranking as regular *k*-stems. Vowel harmony is nevertheless blocked in (11) due to the feature incompatibility of dorsal V_1 and coronal C_2. By contrast, exceptional *k*-stems in (9c) take the same ranking as regular *t*-stems, as shown in (12). In effect, the overall ranking looks as encapsulated in (13).

The empirical advantage of this analysis lies in its explicability of the absence of $[(C)V_bki]$, where V_b indicates a back vowel. Given the ranking in (13d), high ranked *[i] rules out this form. This indicates that V_1 and V_2 agree in backness in *k*-stems whenever a back vowel occupies V_1.

Prespecification maintains that exceptional information is encoded in the underlying representation, and high ranked Faith protects it. In order to explain the exceptional examples in (9), we must assume that exceptional V_2 is specified in the underlying representation. In addition, Faith-V should outrank Agree. Such an analysis succeeds in selecting correct outputs for (9). However, it cannot eliminate $[(C)V_bki]$ from $/(C)V_bki/$. As illustrated in (14), this is because the ranking that ensures faithful parsing of a prespecified vowel protects final /i/ in $/(C)V_bki/$. Thus, the prespecification approach cannot elucidate the systematic gap of $[(C)V_bki]$. It must be arbitrarily stipulated by appealing to the accidental absence of $/(C)V_bki/$.

Lexical indexation is an idea that assigns lexical marking L to exceptional items. Moreover, a particular constraint is lexically indexed, and the indexed constraint evaluates the well-formedness of L-indexed items. This alternative account is not successful either. In exceptional *t*-stems, the fact that vowel harmony occurs indicates that $*[i]_L$ must be ranked below *[u], yielding the ranking *[i] » Agree » *[u] » $*[i]_L$. This analysis fails, as presented in (15). *[i] » $*[i]_L$ is an anti-Paninian constraint ranking, so specific $*[i]_L$ plays no selective role. This analysis erroneously predicts that vowel harmony is persistently inhibited in *t*-stems. Unlike in the proposed cophonology account, this lexical indexation analysis does not remove high ranked *[i]. A general ranking for non-exceptional data remains intact, and it exercises influence on the selection of optimal forms in exceptional cases too. As a result, high ranked general *[i] is always selective.

In summary, cophonology explains Sino-Japanese stem vowel harmony facts most efficiently, including both regular and exceptional examples. The approaches resting on prespecification and lexical indexation encounter empirical problems either in regular or in exceptional examples.

(1)

	V_1=i	V_1=e	V_1=u	V_1=o	V_1=a
C_2=/t/	V_2=u	V_2=u	V_2=u	V_2=u	V_2=u
C_2=/k/	V_2=i	V_2=i	V_2=u	V_2=u	V_2=u

(2) *t-stems* [situ] 'quality' [metu] 'destruction' [butu] 'thing' [botu] 'death' [hatu] 'departure'
k-stems [siki] 'formula' [teki] 'whistle' [ʃuku] 'celebration' [koku] 'country' [saku] 'make'

(3) *Ranking for regular k-stems*: Agree » *[u] » *[i]

(4)

/kok{i,u}/	Agree	*[u]	*[i]
a. koki	*!		*
b. ☞ k*oku*		*	

(5)

/sik{i,u}/	Agree	*[u]	*[i]
a. ☞ siki	*		*
b. siku	*	*!	

(6) *Ranking for regular t-stems*: *[i] » Agree » *[u]

(7)

/bot{i,u}/	*[i]	Agree	*[u]
a. boti	*!	*	
b. ☞ botu		*	*

(8)

/sit{i,u}/	*[i]	Agree	*[u]
a. s*iti*	*!		
b. ☞ situ		*	*

(9)

a. *t-stems (V_1=front)*		b. *t-stems (V_1=back)*		c. *k-stems*	
kiti	'luck'	hati	'eight'	tiku	'bamboo'
niti	'day'	rati	'bound'	niku	'meat'

(10)

/kit{i,u}/	Agree	*[u]	*[i]
a. ☞ k*iti*			*
b. kitu	*!	*	

(11)

/hat{i,u}/	Agree	*[u]	*[i]
a. ☞ hati	*		*
b. hatu	*	*!	

(12)

/tik{i,u}/	*[i]	Agree	*[u]
a. tiki	*!	*	
b. ☞ tiku		*	*

(13)

	Regular ranking	*Exceptional Ranking*
t-stems	(a) *[i] » Agree » *[u]	(b) Agree » *[u] » *[i]
k-stems	(c) Agree » *[u] » *[i]	(d) *[i] » Agree » *[u]

(14)

/CV_bki/	Faith-V	Agree	*[u]	*[i]
a. ☞ CV_bki		*		*
b. ☹ C*V$_b$ku*	*!		*	

(15)

/kit{i,u}/$_L$	*[i]	Agree	*[u]	*[i]$_L$
a. ☹ k*iti*	*!			*
b. ☞ kitu		*	*	