Faithfulness Among Variants*

Shigeto Kawahara
International Christian University

Keywords: opacity, free variation, Correspondence Theory

1. Introduction

Opacity has been one of the most recalcitrant obstacles for Optimality Theory (Prince and Smolensky 1993), which does not recognize intermediate levels in derivation. In addition to an attempt to incorporate various intermediate levels within OT (see, e.g., Kiparsky 1998), a number of proposals have appeared for the problems surrounding opacity (see Kager (1999: 372-400) for overview).

This paper points out that there is one pattern of opacity which hitherto has not attracted systematic attention in the past literature; namely, opacity involved in the context of free variations. It is not uncommon in natural languages that one input receives more than one distinct surface forms. The crucial observation I make in this paper is that opacity is bountifully found in such context. Extending Benua's Transderivational Correspondence Theory (1997), I will argue that this opacity is a result of identity correspondence that regulates variant forms. The identity is articulated in the form of correspondence (McCarthy and Prince 1995), which is dubbed "OV-Correspondence." OV-Correspondence requires that the output forms that share the same input be phonologically identical.

The remainder of this paper is structured as follows. First, some assumptions and definitions are laid out in section 2. Section 3 presents various kinds of case studies of opacity found in variant forms. I will show how OV-Correspondence provides a systematic account of these opacity problems. The final section briefly concludes the paper.

2. Model

The main locus of the discussion in this paper is free variation. When there is more than one output form for one input, one form is more faithful to the underlying representation than other forms. The output that is most faithful to the input is referred to as "base" and the other forms are collectively referred to as "variants." I will point out that variants are often opaque.

Let us take one specific example. Japanese exhibits active vowel coalescence in colloquial speech. This optionally fuses two distinct vowels into one long vowel. Due to this phonological process, the lexical item [akai] 'red,' for instance, has two realizations: [akai] and [ake:]. Since [akai] is more faithful to the input form, this is the base. On the other hand, the form that undergoes coalescence [ake:] is the variant. This form is opaque because the lengthening of the output vowel cannot be motivated by the surface harmony. I will later claim that the lengthening takes place because [ake:] is required to be identical to its corresponding base form [akai] by ranked and violable constraints. More specifically, the lengthening is due to Max-OV-ì.

As exemplified by this opaque lengthening, variant forms and their corresponding base forms are required to be phonologically identical. The diagram below represents the model that will be employed in the rest of the paper.

(1) Input /akai/

Output [akai] ⟷ [ake:]

OV-Correspondence

To recapitulate, my central claim in this paper is that OV-Correspondence coexists with other kinds of correspondence in Universal Grammar. OV-Correspondence, which requires variants and their base forms be identical, gives rise to opacity in several contexts, as we will see below.

3. Case Studies

Based upon (1) above, this section presents various case studies of the realization of OV-correspondence. We will see that due to OV-Faith constraints, phonological process may misapply (i.e., underapply or overapply) so that forms that share the same input look more alike.

3.1. Underapplication of Postnasal Voicing

The first realization of OV-correspondence is observed in relation to nasal-obstruent clusters. In Japanese, or more specifically in the Yamato-stratum, the constraint that requires all nasal-obstruent clusters be voiced throughout (henceforth *NT; see, e.g., Itô and Mester 1999) is well attested. This constraint is responsible for the regular alternation in the verbal inflection for past tense "-ta" and the gerundive ending "-te."

(2)

	Stem	Gerundive	Past	Gloss
a.	tabe-	tabe-te	tabe-ta	'eat'
b.	sin-	sin-de	sin-da	'die'

When the stem ends with a non-nasal sound as in (2a), the suffixes realize as [-te] and [-ta], respectively, while when the stem ends with a nasal, these suffixes are voiced. In addition to this alternation, lexical items in the Yamato-stratum all obey *NT that disallows a sequence of a nasal followed by a voiceless obstruent, as in *tombo* 'dragonfly, *riŋgo* 'apple,' *kaŋgaeru* 'think,' and so forth.

However, it is of considerable interest that even in the vocabulary in the

Yamato-stratum, there is a case where postnasal voicing effect does not take effect: this is the case of a variant formation. NC clusters created by syncope systematically fail to satisfy *NT.

(3)	Base	Variant		Gloss
	[anata]	[anta]	*anda	'you'
	[nanika]	[naŋka]	*naŋga	'something'
	[nani+to]	[nanto]	*nando	'with what'

This failure of postnasal voicing could be regarded as derivational opacity. In terms of a rule-based approach, this apparent underapplication of the voicing effect can be accounted for by postulating that syncope is ordered after the postnasal voicing rule (i.e., syncope counterfeeds the postnasal voicing rule).

Within the OT framework, however, we cannot account for this opacity with recourse to rule ordering since the mapping of input to output is one-step. I propose that the failure of postnasal voicing is the consequence of the dominance of an OV-faithfulness constraint over the markedness constraint. It cannot be the case that an IO-faithfulness constraint (i.e., Ident-IO-[voi]) dominates *NT, since in other environments such as past-tense suffixation, voicing does take effect. Rather, it is Ident-OV-[voi] that outranks *NT, inhibiting [t] in [anta] from being voiced. Consider (4) which illustrates OV-correspondence between [anata] and [anta]. Observe that [t] in [anata] has [t] as its correspondence in the base [anata]. Hence Ident-OV-[voi] requires the postnasal [t] in [anta] to be [-voice]. The tableaux (5) and (6) summarize the point (the trigger is encapsulated as SYNCOPE):

(4) OV-Correspondence between [anata] and [anta]

```
Base       [a   n   a   t   a]
            |   |   |   |   |
Variant    [a   n       t   a]
```

(5)

/anata/ BASE [anata]	SYNCOPE	Ident-OV-[voi]	*NT	Ident-IO-[voi]
a. [anata]	*!			
b. [anta]			*	
c. [anda]		*!		*

(6)

/sin+te/	Ident-OV-[voi]	*NT	Ident-IO-[voi]
a. [sin+te]	N/A	*!	
b. [sin+de]	N/A		*

As seen in (5), with Ident-OV-[voi] dominating *NT, it is more important to have the same specification for voicing with its base form than to satisfy the markedness constraint *NT. Therefore, voicing the postnasal [t] is prohibited. Yet when OV-correspondence does not hold as in (6), the voicing does take place under the same ranking.

Some comments are in order. Notice that, in tableau (5), in order for Ident-OV-[voi] to correctly function, the base form [anata] must be taken into account. This entails that the surface form of [anata] must be determined before (5) takes place. Assuming Richness of the Base (Prince and Smolensky 1993), OV-correspondence cannot refer to the input of the base since the input can be "rich" (i.e., their exact property can be undetermined). Hence in order for (5) to be successful, the base form must be given in the form of output.

Another point that must be made clear is the *priority* of base forms. There does not seem to be cases where variant forms affect base forms. Consider the case above again. If the failure of postnasal voicing is caused by Faith-OV, why doesn't this constraint affect the base form? That is, why underapplication in the variant rather than overapplication in the base? This point is significant since the overapplication in the base seems to be more harmonic than the underapplication in the variant. As shown in the tableaux below, the overapplication pattern avoids the violation of Ident-OV while satisfying *NT.

(7)

/anata/	Ident-OV-[voi]	*NT	Ident-IO-[voi]
a. [anata]	*		
b. [anada]			*

(8)

/anata/	Ident-OV-[voi]	*NT	Ident-IO-[voi]
a. [anta]	*	*	
b. [anda]			*

Notice that in (5), *NT is violated by the actual output form of the variant. Thus the theory at the present state predicts that the overapplication in a base form is more harmonic than the underapplication forms. However, base forms affect variants forms, not vice versa.

To avert this problem, we can of course stipulate that OV-Correspondence is one-way: only variant forms are regulated to be identical to their base. However, this stipulation seriously deviates from the fundamental conception of Correspondence Theory. Correspondence regulates identity and thus a faithfulness constraint is violated whenever identity is not achieved (McCarthy and Prince 1995). Simply treating OV-correspondence as a mere exception is theoretically undesirable and unmotivated. Benua's *recursive evaluation* solves this problem (1997: 33-39) while simultaneously providing a solution to the first problem: in order for OV-Faith to function, the base form must be given in the form of output. To recapitulate Benua's model from our perspective, a base and its variant are evaluated in parallel against a recursive constraint hierarchy. The constraint ranking is duplicated, and the recursions are ordered from the evaluation of a base to the evaluation of a variant. The optimal form of each of the forms is selected by one of the recursions.

To illustrate the system, let us take the generation of [anata] and [anta]. In recursive evaluation mechanism, the selection of each output is achieved in the following way (for simplicity I ignore how syncope takes effect in [anta]):

(9) Recursion A

/anata/	Ident-OV-[voi]	*NT	Ident-IO-[voi]	>>
a. [anata]				
b. [anada]			*!	

Recursion B

>>		Ident-OV-[voi]	*NT	Ident-IO-[voi]
	a. [anta]		*	
	b. [anda]	*!		*

In the first recursion, [anata] is selected as the optima, and next, [anta] is selected in the next evaluation. In this way, at the time of evaluation of [anta], the base form, which is necessary for Ident-OV-[voi], is available. Also, this model accounts in a natural way for the priority of a base form. Since Ident-OV-[voi] does not take effect due to the lack of its correspondent in the first recursion, the base is not subject to Ident-OV-[voi] and hence it is not affected by a variant. In the rest of this paper, I assume this recursive evaluation mechanism to avoid the problems presented above, but do not explicitly provide recursive tableaux for clarity of presentation.

3.2. Overapplication of Nasal Place Assimilation

The next example is from Mwera, which instantiates an overapplication pattern. This language possesses nasal place assimilation and optional deletion of a postnasal voiced obstruent. When these operations interact with each other, nasal place assimilation overapplies. Some data are laid out below (Kenstowicz and Kisseberth 1977: 157):

(10) a. /N+juci/ => [ñ+juci] or [ñ+uci] but * [Nuci] or *[nuci] 'bee'
b. /N+gomo/ => [ŋgomo] or [ŋomo] but *[Nomo] or *[nuci] 'lip'

The prefixal nasal must assimilate to the following consonant, as [ñ+juci] and [ŋgomo] show. This language also has optional cluster simplification that deletes a voiced obstruent in a postnasal position. This operation gives rise to simplified variants such as [ñ+uci] and [ŋomo]. Observe that the prefixal nasal must assimilate to the underlyingly following obstruent even though the trigger consonant is not present at the surface. This overapplication of nasal place assimilation can be easily accounted for by the presence of Ident-OV-[place]. This constraint "transfers" the place specification of the base form to its corresponding variant form, thereby causing unmotivated nasal place assimilation. The fact that underlying pre-consonantal nasals cannot surface as a default form (presumably coronal [n]), despite being prevocalic at the surface level, indicates that Ident-OV-[place] dominates the Place Markedness Hierarchy (i.e., *Dor, *Lab >> *Cor (Prince and Smolensky 1993)).

(11)

/N+gomo / Base [ŋgomo]	Ident-OV-[place]	*Dor	*Lab	*Cor
a. [ŋomo]		*		
b. [nomo]	*!			*
c. [momo]	*!		*	

3.3. The Emergence of Marked Syllable Structures

The past phonological literature has revealed that there are strict conditions on a complex onset in English. Some of the conditions are as below:

(12) a. Two obstruents cannot constitute a complex onset except when the first member is /s/ (e.g., *stop, sky* but **ptight, *tky*)

b. only /s/ may appear with /m/ and /n/ (e.g., smite, snare, but **tmite*, **knight*)

c. Two sonorants cannot form a complex onset (*mrite, *lrik).

Given Richness of the Base, we do not and in fact must not impose these restrictions on input representations. The absence of such forms as *tky* or **tmite* must be derived from the constraint interaction. That is, the absence can be accounted for by the ranking of the relevant markedness constraint (such as Sonority Sequencing Principle (e.g., Selkirk 1984) over the faithfulness constraint. Of course, we do not know how these inputs actually surface since they are hypothetical forms, and thus let us assume that the first member of the complex onsets are deleted, violating Max. Assuming that the markedness constraint is Sonority Sequencing Principle (SSP) that requires enough rise in sonority from the first member to the second, the following tableau illustrates how input such as /tmite/ are prohibited to surface.

(13)

/tmite/	SSP	Max
a. [mite]		*
b. [tmite]	*!	

The generalizations on syllable structure shown in (12) might seem very robust, but they fail to hold once we take variants into account. Consider the data below, which represents some forms generated by syncope (see, particularly Spencer 1995: 225-230 among others):

(14)

	Regular form	Syncopated Form	Remarks
potato	[poteɪto]	[**pt**eɪto]	Violation of (12a)
connect	[konekt]	[**kn**ekt]	Violation of (12b)
Marina	[mərinə]	[**mr**inə]	Violation of (12c)

As seen, otherwise illicit complex onsets are amply attested in syncopated forms. This phenomenon can be naturally accounted for by Max-OV.

(15)

/konekt/ BASE [konekt]	Syncope	Max-OV	SSP	Max-IO
a. [konekt]	*!		*	
b. [k̥nekt]		*	*	*
c. [nekt]		**!		**

With Max-OV dominating SSP, the desired candidate (b) wins. Note that ranking motivated in (13) alone predicts that candidate (c) would win. It should be evident that Max-OV is indispensable to achieve the correct result.

3.4. Opaque Vowel Lengthening

The final example is from vowel coalescence and glide formation in Japanese. Some relevant data is shown in (16). As a result of these phenomena, the output vowels must be invariably long. Within the framework of OT, given that no language-specific constraint holds in input (i.e., Richness of the Base), the lengthening of output vowels cannot be accounted for by referring to facts about the number of morae in the input forms.

(16)

Vowel Coalescence		Compensatory Lengthening	
[takai] => [tak**e:**]	'high'	[iu] => [y**u:**]	'say'
[samui] => [sam**i:**]	'cold'	[bar**iu**m] => [bary**uu**mu]	'aluminum'

I propose that such variants are opaque because of OV-correspondence. More specifically, due to Max-OV-ì, variants are required to have a correspondent mora for each mora in their base forms. Taking the generation of [take:] as an example, the tableau (17) shows the competition between a candidate with a short vowel and a candidate with a long vowel, given input with moraless vowels.

(17)

Input /takai/ Base [taìkaìiì]	Max-OV- ì	Dep-IO-ì
a. [taìkeì]	*!	**
b. ☞ [taìkeìì]		***

Observe that without Max-OV-ì, the desired candidate (b) would be harmonically bounded by the other candidate due to the additional violation of Dep-IO-ì. Hence the existence of Max-OV-ì is indispensable.

4. Conclusion

I have shown that opacity is often found in the context of variant formations. Some phonological operations may underapply or overapply. Otherwise prohibited structures may arise in order to achieve identity between the base and the variant. Lengthening takes effect in order to preserve mora count through vowel coalescence or glide formation. These phenomena strongly motivate the existence of OV-correspondence.

References

Benua, Laura (1997b) Transderivational identity: phonological relations between words. Doctoral dissertation, Univ. of Massachusetts, Amherst.

Itô, Junko and R. Armin Mester (1999) "Japanese Phonological Lexicon," The handbook of Japanese linguistics, ed. By Tsujimura Natsuko, 62-100. Oxford: Blackwell Publishers.

Kager, René (1999) Optimality Theory. Cambridge: Cambridge University Press.

Kawahara, Shigeto (2001) Similarity among Variants: Output-Variant Correspondence. Senior Thesis, International Christian Univ.

Kenstowicz, Michael and Charles Kisseberth (1977) Topics in Phonological Theory. New York: Academic Press.

Kiparsky, Paul. (1998) Paradigm effects and opacity. MS, Stanford University.

McCarthy, John and Alan Prince (1995) "Faithfulness and reduplicative identity," Papers in Optimality Theory. Univ. of Massachusetts Occasional Papers in Linguistics 18, ed. By Jill Beckman, Laura Walsh Dickey, and Suzanne Urbanczyk 249-384. Amherst, Massachusetts: Graduate Linguistic Student Association.

Prince, Alan and Paul Smolensky (1993) Optimality Theory: constraint interaction in generative grammar. MS, Rutgers Univ. and Univ. of Colorado.

Selkirk, Elizabeth (1984) Phonology and Syntax: the relation between sound and structure. Cambridge, Massachusetts: MIT press.

Spencer, Andrew (1995) Phonology. Oxford: Blackwell Publishers.

****

* This paper is a short excerpt from Kawahara (2001). The full version contains more case studies, a comparison with alternative approaches such as multi-stratal OT and local conjunction, discussions on how variant forms can come about, and an attempt to reduce OV-Correspondence to one specific kind of OO-Correspondence.

While working on the issues presented here, I am particularly grateful to Jaye Padgett and Jennifer Smith for extensive discussions and comments on this issue. Thanks are also due to Markus Hillar, Takeru Honma, Kurisu Kazutaka, John McCarthy, Joe Pater and Elizabeth Selkirk. None of them should be assumed to agree with anything I claim in this paper.