Squibs and Discussion

Opaque Allomorph Selection in Japanese and Harmonic Serialism: A Reply to Kurisu 2012

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1 Introduction

Crosslinguistically, medial consonant clusters simplify by deleting or assimilating the first consonant /VpkV/ → [VkV] ~ [VkkV], never the second *[VpV] ~ *[VppV] (Steriade 2001, 2001/2008). Wilson (2000, 2001) demonstrates that this generalization holds in a number of different languages including Basque, Carib, Tunica, Diola-Fogny, and West Greenlandic. Parallel Optimality Theory (OT) fails to capture this asymmetry, as the output consonant appears in the onset regardless of its position in the input. McCarthy (2007, 2008) proposes a solution to this problem within Harmonic Serialism (HS), by postulating that deletion of the onset—that is, the second consonant—involves a step that is not harmonically improving. The prediction that onset consonants in clusters never delete has been recognized as one of the crucial arguments for HS compared to parallel OT.

Kurisu (2012) challenges this generalization by bringing forth data from Japanese where onsets, not codas, appear to be deleted, presenting a problem for a two-step analysis in HS (section 2). This squib takes a second look at the Japanese data by considering the full verbal paradigm (section 3). The evidence suggests that the Japanese verbal paradigm pattern involves allomorph selection, not pure phonological deletion. Next, we show that allomorph selection opaquely interacts with another process, *w*-deletion, which is phonological. HS can model this opaque interaction (section 4). In contrast, parallel OT cannot account for counterbleeding opacity at all (section 5). Thus, Japanese does not challenge the generalization that onsets never delete in consonant cluster simplification; instead, it in fact provides further support for HS.

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2 Japanese Verb Suffixation and Deletion

Japanese verb suffixes sometimes surface with an initial coronal consonant (1). The generalization is that vowel-final stems are followed by a coronal in the suffix, whereas consonant-final stems are followed by vowel-initial suffixes.

(1) *Japanese verbs* (Kurisu 2012:311)

	Suffix	/tob/ 'fly'	/ne/ 'sleep'
Infinitive	/-ru/	tob-u	ne-ru
Subjunctive	/-reba/	tob-eba	ne-reba
Causative	/-sase/	tob-ase	ne-sase
Volitional	/-joo/	tob-oo	ne-joo

Kurisu (2012) argues that underlying suffix-initial coronals are deleted when preceded by another consonant.[1] This deletion occurs because of a phonotactic restriction of Japanese: codas cannot have their own place specification. In OT, coronal deletion is driven by CodaCond(ition) (Ito 1988, 1989, Goldsmith 1990, Ito and Mester 1998, 2003). Furthermore, root segments are more faithful than suffix segments ($\text{Max}_{\text{Root}} \gg \text{Max}_{\text{Affix}}$; McCarthy and Prince 1995, Beckman 1998). In parallel OT, CodaCond can be satisfied by deletion of the second consonant, which would have been the onset in the output (2).

(2) *Kurisu's parallel OT analysis*

/tob-ru/	CodaCond	Max_{Root}	$\text{Max}_{\text{Affix}}$
a. ☞ to.bu			*
b. to.ru		*!	
c. tob.ru	*!		

As Kurisu (2012) points out, this analysis cannot be implemented in HS. HS is a variant of OT that combines constraint ranking with derivations (McCarthy 2010a,b, 2016). Gen in HS generates only candidates that differ from the input by a single operation. The winning candidate is then fed back to Gen as an input for another round of evaluation. This loop is repeated until the fully faithful parse of the latest input wins.

Deletion is considered to be a two-step process in HS: first place features are removed, then segments are deleted (McCarthy 2007, 2008). Thus, at step 1 a segment can only be debuccalized, not entirely deleted (3). The resulting segment is a consonant without a place feature, henceforth marked *H*. The problem for the HS analysis is that the placeless onset candidate (3a) should win at this step, but it does

[1] McCarthy (2007) recognizes the Japanese case as a potential example of onset deletion, suggesting that the suffix-initial consonant could be epenthetic. However, the epenthesis analysis does not explain why different types of coronal consonants can occur suffix-initially, as in (1).

not ("☹" marks an intended winner, which does not win given the constraint ranking). In fact, candidate (3a) is harmonically bounded by both the placeless coda candidate (3b), which wins in this case, and the faithful candidate (3c).

(3) *Step 1: Placeless onset is harmonically bounded*

/tob-ru/	CodaCond	Max_{Root}	$\text{Max}_{\text{Affix}}$	HavePlace	Max(place)
a. ☹ tob.Hu	*!			*	*
b. ☞ toH.ru				*	*
c. tob.ru	*!				

Kurisu (2012) thus concludes that the Japanese challenge can only be resolved if consonant deletion is a possible single-step operation, contra McCarthy (2007, 2008), who posits a principled restriction on onset deletion in consonant clusters. However, if deletion is a possible single-step operation, then HS cannot explain the coda/onset asymmetry, which holds across many languages (Steriade 2001, Wilson 2001). We will now reexamine this problem, and we will conclude that the data challenge neither the descriptive generalization nor HS.

3 Additional Data Support Allomorph Selection

Kurisu (2012) considers two alternative analyses, and eventually rejects both. One of these is an analysis based on allomorph selection, which we argue is the correct analysis. Unlike consonant deletion, allomorph selection can be done in a single step, as shown in (4).[2] If allomorphs are both listed as underlying, then choosing either one satisfies faithfulness constraints (Ito and Mester 2004, 2006, Yip 2004, Mascaró 2007, McCarthy 2007), and as a result, the allomorph is determined by top-ranked CodaCond.

(4) *Allomorph selection analysis* (Kurisu 2012:318)

/tob-{ru, u}/	CodaCond	Max_{Root}	$\text{Max}_{\text{Affix}}$
a. ☞ to.bu			
b. tob.ru	*!		

[2] For a two-step analysis of allomorph selection, see Wolf 2008. According to this alternative, Japanese roots are spelled out first, and their shape determines which suffix allomorph is selected. Our analysis is compatible with this view as well.

Note that in this analysis, MAX_{Root} plays no role, unlike in Kurisu's analysis in (2). However, this is not to say that root-specific faithfulness constraints in general have no effect in HS. Instead, the claim is that MAX_{Root} cannot prevent coda debuccalization and the coda's ultimate deletion, as in (3), which was previously pointed out by McCarthy (2007).[3] This generalization does not extend to other processes. For instance, a top-ranked $\text{IDENT}_{\text{Root}}$ would favor progressive root-to-affix assimilation over the reverse. Root-to-affix consonant assimilation is widely attested (Wilson 2001:174), including a case of total consonant assimilation in Ibibio (Beckman 1998:202–204, Akinlabi and Urua 2002). Our point here is simply that MAX_{Root} is not relevant in determining which consonant deletes in cluster resolution patterns in HS.

Kurisu's (2012) main argument against allomorph selection is that the allomorphs are phonetically similar, differing only in the presence or absence of the initial coronal. To capture the similarity between these two shapes of the suffixes, he posits that coronals must be underlying. This assumes that lexical representations are chosen to maximize phonological predictability, but this argument does not always hold, as in the well-known case of the Maori passive (Hale 1973).[4] One alternative reason why allomorphs are similar to each other now could be that they *were* the same morpheme historically. Another possible explanation is that there is synchronic pressure to require allomorphs to be phonologically similar, by way of violable constraints, as in fact proposed by Ito and Mester (2004) and Sano (2015) for Japanese verbal paradigms. In any case, the similarity of allomorphs need not be attributed to shared underlying representation.

We now provide two kinds of evidence from Japanese verbal paradigms to support the allomorph selection analysis over deletion; we will present a third kind in section 4. (See Vance 1987:chap. 12 for a comprehensive description of Japanese verb morphology.) First, not all suffix-initial coronals delete. For example, the past tense suffix /ta/ is never realized as [a] (5). Instead, consonant clusters with [t] of this suffix are resolved by different repairs: coda nasalization (5a), place assimilation (5b), gemination (5c), vowel epenthesis (5d–e)—but never onset deletion. Continuative /te/ behaves the same way.

[3] Further, McCarthy (2007) remains silent about vowel deletion patterns given V_1V_2 sequences, and we have nothing new to say about this issue other than acknowledging it as a key topic for future studies.

[4] In Maori, the passive forms contain a consonant not present in the unaffixed forms. Since many consonants are possible in the passive, the most economical way to analyze these cases would be to posit consonants as part of the root. The challenge, however, is that no morpheme consistently ends with a consonant and that novel forms take the allomorph containing [t] (Hale 1973). Another case can be found in Babanki, where /ŋ/ appears to be deleted. Under closer examination, the alternation is better modeled as allomorph selection (Akumbu 2015).

(5) *No coronal deletion of the past tense suffix /ta/*

a.	tob + ta	→ tonda	'flew'	Coda nasalization
b.	kam + ta	→ kanda	'bit'	Nasal place assimilation
c.	kaw + ta	→ katta	'bought'	Gemination
d.	kar + ta	→ karita	'borrowed'	Vowel epenthesis
e.	kas + ta	→ kaʃita	'rented'	Vowel epenthesis

Second, verbal compounds preserve coronals and exhibit epenthesis (6). (See Poser 1984 and Nishiyama 2016 for arguments that this vowel is epenthetic.) Compare the minimal pair /tob + sase/ → [tob-ase] 'cause to fly' (1) and /tob + sonjiru/ → [tob-i-sonjiru] 'fail to fly'. Both examples involve a /bs/ cluster, and the purely phonological analysis predicts deletion in both cases.

(6) *No coronal deletion in Japanese compounds*

tob + dasu	→ tob-i-dasu	'rush out'
tob + deru	→ tob-i-deru	'stick out'
tob + sonjiru	→ tob-i-sonjiru	'fail to fly'

Thus, even though some of the coronal suffixes appear to exhibit phonological deletion, upon closer examination this generalization is based only on a subset of the Japanese verbal paradigm patterns. The combined data provide evidence that the different realizations of verbal suffixes are listed as allomorphs, instead of being governed by a regular coronal deletion process. The alternative would be to treat the cases that Kurisu (2012) discusses in (1) as phonological, and the other patterns we raise in (5)–(6) as allomorph selection. However, there is no independent evidence for making this distinction.

4 Allomorph Selection Is Opaque

We now move to a third type of evidence supporting allomorph selection over deletion. The Japanese coronal alternations interact with another process: *w*-deletion. The interaction is opaque; hence, it cannot be dealt with in parallel OT and instead supports an HS analysis. In Japanese, [w] deletes when followed by a nonlow vowel, shown as [w̸] in (7).[5]

[5] Note that this alternation is a case of deletion rather than epenthesis. For example, [w] in words like [maw-ase] 'cause to dance' or [maw-anai] 'not dance' cannot be epenthetic. We could postulate that in verbal paradigms, [w] is inserted between two vowels. However, this epenthesis alternative fails to explain how vowel-final stems behave when followed by vowel-initial suffixes. For instance, the negative form of the root /ne/ 'sleep' is [nenai], instead of *[ne**w**anai]. If [w] were epenthetic, rather than being a part of the stem as we posit, why would this form not arise? Another reason to assume that this /w/ is a part of the stem is that /w/ causes gemination in the past tense: /kaw + ta/ → [katta] 'bought' (5c). Vowel-final stems do not undergo this gemination: [neta] 'slept'. It is highly unlikely that [w] is inserted to be geminated.

(7) w-*deletion* (Vance 1987, Gibson 2008, Nevins 2011; Tomohiro Yokoyama, pers. comm.)

		/tob/ 'fly'	/ne/ 'sleep'	/iw/ 'say'
Infinitive	/-(r)u/	tob-u	ne-ru	iw̸-u
Subjunctive	/-(r)eba/	tob-eba	ne-reba	iw̸-eba
Volitional	/-(j)oo/	tob-oo	ne-joo	iw̸-oo
Causative	/-(s)ase/	tob-ase	ne-sase	iw-ase

		/karakaw/ 'mock'	/maw/ 'dance'	/ow/ 'chase'
Infinitive	/-(r)u/	karakaw̸-u	maw̸-u	ow̸-u
Subjunctive	/-(r)eba/	karakaw̸-eba	maw̸-eba	ow̸-eba
Volitional	/-(j)oo/	karakaw̸-oo	maw̸-oo	ow̸-oo
Causative	/-(s)ase/	karakaw-ase	maw-ase	ow-ase

Let us suppose that both *w*-deletion and coronal deletion satisfy CODA-COND. For instance, the input /ow-ru/ 'chase' could surface as *[o.wu] or *[o.ru]. The former is not well-formed because *w*-deletion failed to apply before a nonlow vowel, while the latter would be the expected output. However, the attested output is [o.u], instead of *[o.ru] with an onset consonant. Why should both [w] and [r] be deleted, leaving an onsetless syllable? An explanation of this puzzle is that *w*-deletion applies only after allomorph selection. If so, the suffix should be selected first, yielding the intermediate form [ow-u], at which point *w*-deletion applies, resulting in the correct surface form [o-u].

This interaction can be characterized as allomorph selection applying at the intermediate stages of the derivation, which is attested crosslinguistically (Gibson 2008, Wolf 2008:chaps. 2 and 3, Nevins 2011:2373–2374). One key advantage of HS over parallel OT is that it can capture phonological generalizations at intermediate steps.[6]

To model the Japanese phonotactic restrictions on $w+$vowel sequences, we propose a markedness constraint *w[−low] (≡ *w* must not be followed by a [−low] vowel). This constraint applies to Japanese phonology in general, only having exceptions in some loanwords (e.g., [witto] 'wit'). The remaining constraints have been used earlier in the squib.

[6] For instance, footing sometimes ignores subsequent syncope, which can only be captured by grammars that can assign footing before applying syncope, such as HS (McCarthy 2010b). Other advantages of HS include predictions about variation (Kimper 2011), positional faithfulness (Jesney 2011), and stress typology (Pruitt 2010, 2012, Torres-Tamarit and Jurgec 2015). One remaining question is whether other multilevel versions of OT can account for the data in question. Since Kurisu (2012) focuses on the HS vs. parallel OT debate, we do not go into detail about other multilevel models. We note, however, that only HS, not Stratal OT, can account for the onset/coda asymmetry discussed at the outset of the squib.

As we have shown, the allomorph is selected at a step before *w*-deletion. The selection of the allomorph depends on whether the root ends with a licit coda, which is captured by high-ranked CODACOND. When the root ends with a [w], the allomorph without a coronal is selected at the first step (8). Note that when the root ends with an underlying vowel, *-ru* will be selected because of low-ranked ONSET, as in [ki-ru] 'cut'.

(8) *Step 1: Allomorph selection*

/iw-{ru, u}/	CODACOND	*w[−low]	HAVEPLACE	MAX(PLACE)	MAX	ONSET
a. ☞ i.wu		*				
b. iw.ru	*!					

At step 2, the phonotactic constraint *w[−low] drives *w*-debuccalization (9).[7]

(9) *Step 2: Debuccalization*

i.wu	CODACOND	*w[−low]	HAVEPLACE	MAX(PLACE)	MAX	ONSET
a. ☞ i.Hu			*	*		
b. i.wu		*!				

At step 3, the placeless onset segment is deleted (10). The derivation converges at step 4.

(10) *Step 3:* w*-deletion*

i.Hu	CODACOND	*w[−low]	HAVEPLACE	MAX(PLACE)	MAX	ONSET
a. ☞ i.u					*	*
b. i.Hu			*!			

Opaque allomorph selection is also found in languages other than Japanese, including Ukrainian (Darden 1979, Gibson 2008), Polish (Rubach 2003, Sanders 2003, Łubowicz 2012), German (Aronoff 1976, Kiparsky 1994), Spanish (Aranovich et al. 2005, Aranovich and Orgun 2006), Sanskrit (Kiparsky 1997), Turkish (Lewis 1967, Aranovich et al. 2005, Paster 2006), and Babanki (Akumbu 2015).

[7] Since the HS literature posits that consonants delete in two steps (debuccalization and deletion), we follow that convention here. The debuccalized segment does not contain any place features and thus cannot violate *w[−low]. An alternative is that [w] in Japanese is already phonologically placeless (while the other glide [j] is specified as coronal), in which case [w] can be deleted in one step.

Thus, we submit that the Japanese case that we have discussed here is not a crosslinguistically isolated pattern.

We have demonstrated that once the Japanese data are considered in full detail, the phonological deletion analysis must be rejected, but the allomorph selection alternative remains viable and can be successfully captured in HS. Kurisu (2012:311–312) mentions three other similar cases—Korean, Turkish, and Tigrinya—which all involve alternations of individual suffixes rather than a general pattern. It is thus likely that these languages also exhibit allomorph selection rather than deletion; we leave a detailed examination of these cases for future research.

5 Alternatives

The Japanese opaque pattern can be modeled in HS as allomorph selection. The alternative analyses in HS and any analyses in parallel OT fail.

First, the deletion analysis in HS fails, as seen in (3). At step 1, the candidate with a debuccalized coda consonant [iH.ru] would win, ultimately leading to the incorrect winner *[i.ru]. Second, a parallel OT analysis is also unsuccessful, either as deletion (11a) or as allomorphy (11b), because the transparent candidate *[i.ru] (ii) harmonically bounds the attested opaque output [i.u] (i). Note also that (11a) and (11b) use two additional constraints (*w[−low] and ONSET), but otherwise retain the same set of constraints that Kurisu (2012) employs.

(11) *Parallel OT analysis fails*

a. *Coronal deletion*

/iw-ru/	CODACOND	*w[−low]	MAX_{Root}	$\text{MAX}_{\text{Affix}}$	ONSET
i. ☹ i.u			*	*!	*!
ii. ☞ i.ru			*		
iii. i.wu		*!		*	
iv. iw.ru	*!				

b. *Allomorph selection*

/iw-{ru, u}/	CODACOND	*w[−low]	MAX_{Root}	$\text{MAX}_{\text{Affix}}$	ONSET
i. ☹ i.u			*		*!
ii. ☞ i.ru			*		
iii. i.wu		*!			
iv. iw.ru	*!				

Finally, the parallel OT analysis fails even if we consider other types of faithfulness-based approaches. One such example is a constraint like MAX-$C_{Presonorant}$. This constraint refers to a presonorant position, but any remaining consonant (C_1 and C_2) is in presonorant position in the output. Thus, the constraint must refer to an *input* position, which is inconsistent with the positional faithfulness template (Beckman 1997). Apart from that, the challenges of this alternative are in fact discussed in detail by Wilson (2001:180–184). One of these problems is that MAX-$C_{Presonorant}$ cannot deal with a case in which a consonant cluster is preceded by vowel syncope (i.e., $C_1VC_2 \rightarrow C_1C_2 \rightarrow C_2$). Even in such cases, C_1 invariantly deletes, as in Carib and Tunica. MAX-$C_{Presonorant}$ cannot account for this observation.

6 Conclusions

Kurisu (2012) argues that Japanese has onset deletion that cannot be analyzed as a two-step process in Harmonic Serialism. This challenges an otherwise robust crosslinguistic generalization that the second consonant never deletes in cluster simplification. In this squib, we have shown that Japanese does not involve onset deletion; rather, it involves allomorph selection. This conclusion is corroborated by reexamination of the data and opaque interactions with a phonological pattern.

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Accidental Gaps and Surface-Based Phonotactic Learning: A Case Study of South Bolivian Quechua

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The lexicon of a natural language does not contain all of the phonological structures that are grammatical. This presents a fundamental challenge to the learner, who must distinguish linguistically significant restrictions from *accidental gaps* (Fischer-Jørgensen 1952, Halle 1962, Chomsky and Halle 1965, Pierrehumbert 1994, Frisch and Zawaydeh 2001, Iverson and Salmons 2005, Gorman 2013, Hayes and White 2013). The severity of the challenge depends on the size of the lexicon (Pierrehumbert 2001), the number of sounds and their frequency distribution (Sigurd 1968, Tambovtsev and Martindale 2007), and the complexity of the generalizations that learners must entertain (Pierrehumbert 1994, Hayes and Wilson 2008, Kager and Pater 2012, Jardine and Heinz 2016).

In this squib, we consider the problem that accidental gaps pose for learning phonotactic grammars stated on a single, surface level of representation. While the monostratal approach to phonology has considerable theoretical and computational appeal (Ellison 1993, Bird

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