Compensatory geminate consonants in a Japanese dialect

Keywords: compensatory geminate consonants, harmonic serialism (HS)

1 Phenomenon: The non-past forms of verbs in Takeo Saga dialect of Japanese

1.1 When Tokyo dialectal counterpart ends with /ru/

Every 'non-past' form ending with [ɽɯ] (/ru/) in the Tokyo dialect necessarily ends either 1) with the former part of the geminate consonant if immediately followed by a consonant whichever consonant it is (like [g] of [gg], where the latter /g/ is of /gohan/ 'rice') or 2) with the glottal stop otherwise, sentence-finally or followed by a vowel in the Takeo Saga dialect (Hayata 1998), as one example given for each stem type in Table 1.[1] Even if the consonant that follows the final sequence /ru/ of the non-past forms is a non-nasal sonorant, /r/, /w/ or /j/ or a voiced obstruent /b/, /d/, /g/ or /z/, the geminate consonant will be present in Takeo Saga dialect on the contrary to their absences in Tokyo Japanese.[2]

Table 1: The former parts of geminate consonants at the finals of the non-past forms in Takeo Saga dialect (Hayata 1998) in contrast with the non-past forms ending with /ru/ in Tokyo dialect

	S-final	Relative Clause#(Noun)	conditional	Neg. Imp.	causative	
consonant /r/-final stem verbs						
Takeo	toʔ	tog (g...)	toggʲiː	toɲna	toɾasɯʔ	‘take’
Tokyo	toɾɯ	toɾɯ (g...)	toɾeba	toɾɯna	toɾaseɾɯ	
vowel /e/-final stem verbs						
Takeo	tabɯʔ	tabɯg (g...)	tabɯggʲiː	tabɯɲna	tabesasɯʔ	‘eat’
Tokyo	tabeɾɯ	tabeɾɯ (g...)	tabeɾeba	tabeɾɯna	tabesaseɾɯ	
vowel /i/-final stem verbs						
Takeo	okʲiʔ	okʲig (g...)	okʲiggʲiː	okʲiɲna	ʔokʲisasɯʔ	‘get up’
Tokyo	okʲiɾɯ	okʲiɾɯ (g...)	okʲiɾeba	okʲiɾɯna	ʔokʲisaseɾɯ	
strong stem verbs						
Takeo	kɯʔ	kɯg (g...)	kɯggʲiː	kɯɲna	koɾasɯʔ	‘come’
Tokyo	kɯɾɯ	kɯɾɯ (g...)	kɯɾeba	kɯɾɯna	koɾaseɾɯ	
strong stem verbs						
Takeo	sɯʔ	sɯg (g...)	suggʲiː	sɯɲna	sasɯʔ	‘do’
Tokyo	sɯɾɯ	sɯɾɯ (g...)	sɯɾeba	sɯɾɯna	saseɾɯ	

See Matsuura (2016) for the observation of voiced obstruents at the coda in Kushu dialects, which are not found in other dialects, for example, Tokyo Japanese. The fact that even the phonetically unmotivated geminate consonants are found in the dialect indicates the phenomenon is morpho-phonological.[3] Note that the non-past forms of the ‘vowel e-final’ stem verbs have the so-called stem-final /e/ replaced with /u/ without exception in Takeo Saga dialect, and that this is not the case in the non-past forms of the strong stem verbs, for example, [kɯʔ] and [kɯɾɯ] and *[keɾɯ]. Native speakers say that they pronounce the glottal stop, which is called ‘sokuon’, the same as the former part of the geminate consonant of [totta] ‘took’, in both situations (or followed by a consonant and, for example, sentence-finally). Some kind of tension of the vocal folds is involved in producing the sokuon in Tokyo dialect of

Japanese according to Fujimoto's (2014) physiological study. It is assumed that the glottal constriction at least is involved where Hayata (1998) claims the glottal stop or the former part of each geminate consonant occurs. All the data on this paper, including those of Hayata (1998), are checked by a native speaker of the dialect XXX XXX, and are described in phonetic symbols in the current study.[4]

1.2 Otherwise

The 'non-past' form, not ending with /ru/ in Tokyo dialect, or ending with /tu/ ([tsɯ]), /wu/ ([ɯ]), /nu/, /mu/, /bu/, /ku/, /gu/ or /su/, never ends with the former part of a geminate consonant in Takeo Saga dialect, as exemplified by the paradigm of one example for each of the exhaustive kinds of consonant-final verbs in Table 2. Takeo dialect is spoken in Takeo City. This dialect is one of the Saga dialects, and shares many phenomena with the eastern Saga dialect.

2 Review of previous studies

2.1 Hayata's (1998) rules

Hayata (1998) argues in favor that the underlying forms of the glottal stop and the former parts of geminate consonants are **/ru/**, specifically case 1) **/r+ru/** like /tor+ru/ for [toʔ] and case 2) **/ru/** like /oki+ru/ for [okʲiʔ] and /tabe+ru/ for [tabɯʔ].[5] The stem final underlying /r/ in case 1 makes sense since the stem final consonant /r/ occurs in other verb forms, for example, the negative, causative, passive and volitional forms, like [toɽ] of [toɽan], [toɽasɯʔ] and [toɽaɽɯʔ] and [toɽoi]. That the word-

final vowel /u/ is derived through the deletion of the second occurrence of r in the C-C juncture from ...r + ru in case 1 is reasonable since it occurs in case of the other stem-final consonants /t, (w), n, m, b, k, g, s/ except for /r/, as was seen in Table 2. As the null hypothesis, Hayata (1998) claims that the

Table 2: The non-past forms in Takeo Saga dialect in contrast with those in Tokyo dialect

	S-final	RC#(N)	condi.	Neg. Imp.	caus.	meaning
consonant /t/-final stem verbs						
Takeo	matsɯ	matsɯ (g...)	matsɯgʲiː	matsɯna	matasɯʔ	‘wait’
Tokyo	matsɯ	matsɯ (g...)	mateba	matsɯna	matasɐɯ	
consonant /w/-final stem verbs						
Takeo	aɯ	aɯ (g...)	aɯgʲiː	aɯna	aɰasɯʔ	‘meet’
Tokyo	aɯ	aɯ (g...)	aeba	aɯna	aɰasɐɯ	
consonant /n/-final stem verbs						
Takeo	ʃinɯ	ʃinɯ (g...)	ʃinɯgʲiː	ʃinɯna	ʃinasɯʔ	‘die’
Tokyo	ʃinɯ	ʃinɯ (g...)	ʃineba	ʃinɯna	ʃinasɐɯ	
consonant /m/-final stem verbs						
Takeo	jomɯ	jomɯ (g...)	jomɯgʲiː	jomɯna	jomasɯʔ	‘read’
Tokyo	jomɯ	jomɯ (g...)	jomeba	jomɯna	jomasɐɯ	
consonant /b/-final stem verbs						
Takeo	jobɯ	jobɯ (g...)	jobɯgʲiː	jobɯna	jobasɯʔ	‘call’
Tokyo	jobɯ	jobɯ (g...)	jobeba	jobɯna	jobasɐɯ	
consonant /k/-final stem verbs						
Takeo	kakɯ	kakɯ (g...)	kakɯgʲiː	kakɯna	kakasɯʔ	‘write’
Tokyo	kakɯ	kakɯ (g...)	kakeba	kakɯna	kakasɐɯ	
consonant /g/-final stem verbs						
Takeo	kagɯ	kagɯ (g...)	kagɯgʲiː	kagɯna	kagasɯʔ	‘smell’
Tokyo	kagɯ	kagɯ (g...)	kageba	kagɯna	kagasɐɯ	
consonant /s/-final stem verbs						
Takeo	kasɯ	kasɯ (g...)	kasɯgʲiː	kasɯna	kasasɯʔ	‘rent out’
Tokyo	kasɯ	kasɯ (g...)	kaseba	kasɯna	kasasɐɯ	

glottal stop in the other non-past forms, or those when the verb is a vowel-final stem or a strong stem verb, is underlyingly /ru/. Hayata’s (1998) proposed rules are:

- Vowel Change: e $\rightarrow$ u / __]$_{verb\ stem}$
- Verb Final /u/ Deletion: $u \rightarrow \emptyset$ / r__]$_{verb}$
- /R/-regressive Complete Assimilation: r $\rightarrow$ C$_i$ / __]$_{verb}$#C$_i$

By the Vowel Change, the verb stem final /e/ changes to /u/, as in the first line in Table 3. By the

Table 3: Derivation of geminate consonants

ne ru toki	oki ru toki	Underlying Representation (hereafter UR)
nuru toki		by Vowel Change
nur toki	okir toki	by Verb Final /u/ Deletion
nut toki	okit toki	by /R/-regressive Complete Assimilation
nuttoki	okittoki	Phonetic Representation (hereafter PR)

Verb Final /u/ Deletion, the final /u/ of the non-past form gets eliminated after the liquid /r/, as in the second line of the table.[6] By the /R/-regressive Complete Assimilation, the liquid /r/, either the stem-final or the affix-initial, completely assimilates to whichever consonant immediately follows that, as in the third line of the table. Vowel Change is assumed to apply prior to Verb Final /u/ Deletion and /R/-regressive Complete Assimilation; if it is assumed otherwise, *[nettok^{j}i] as well as [nɯttok^{j}i], for example, would incorrectly derive from /neru toki/ 'when (he) goes to bed'. As for the /r/-regressive assimilation, or the former part of geminate consonants or the glottal stop, Hayata (1998) left further study of it for future research, giving the following suggestion: "It is as if some force were working that makes the number of the moras of each non-past form to be equivalent to that of the stem [plus one receiving the geminate consonant] (pages 2-3) (brackets are mine)." If we are restricted to segmental

phonology, it would be difficult to explain how the liquid /r/ can realize as any of the consonants /p/, /b/, /t/, /d/, /k/, /g/, /m/, /n/, /w/, /j/ of Japanese. Some kind of moraic theory is needed, as he noticed. It will be shown in section 3.5 that moraic theory can explain /R/-regressive Complete Assimilation.

2.2 Hayata's (1998) verb final /u/-deletion

The absence of the high back vowel at the post-liquid is morpho-phonological since it is not found in words of the other categories, as exemplified by [haɽɯ] (/haru/) 'spring' in contrast with [haʔ] (/har+u/) 'paste-Non-past' in Takeo Saga dialect.

Like the vowel apocope in Takeo Saga dialect, short unstressed vowels are present or absent synchronically in the environment of V(owel)[*voiced, sono(rant)*] _# in Isthmus Nahuatl, spoken in Veracruz, Mexico (Kenstowicz and Kisseberth 1979: 298).

(1) a. sĭkakíli ∼ sĭkakíl 'put it in it'
b. kítaya ∼ kítay 'he already sees it'
c. kikówa ∼ kików 'he buys it'
d. támi ∼ tám 'it ends'

Languages avoid subsets of the sequences of V[*sono(rant)*]V, or a vowel plus a sonorant and a vowel. Isthmus Nahuatl avoids the sequences of the most general pattern (2a) at the end of verb forms.

(2) a. *V[+ *sono(rant)*, + *voiced*]V# [Isthmus Nahuatl]

b. *V$\begin{bmatrix} liquid & MANNER \end{bmatrix} \begin{bmatrix} + & high \\ + & back \end{bmatrix}$# of the non-past forms [Takeo Saga]

Takeo Saga dialect avoids the sequences of another less general pattern (2b) in the non-past forms.

Avoiding the patterns (2a) and (2b), languages have the final vowel absent for each. Following Kenstowicz and Kisseberth's (1979) proposed rule (3a), since the final vowel /u/ of the non-past form is absent if the consonant /r/ precedes it in Takeo Saga dialect of Japanese, Hayata's (1998) rule is required to be revised to be as in (3b).

(3) a. V $\rightarrow \emptyset$ / V[+ *sono*, + *voiced*]__# (Kenstowicz and Kisseberth 1979: 299) [Isthmus Nahuatl]

b. V $\rightarrow \emptyset$ / V$\left[liquid \quad MANNER\right]$__$]_{[Tense\ Non-past]}$#

The final vowel of a present participle/gerundive form cannot be absent (in spite of the fact that they are of category, verb), as given in sections 2.4 and 2.7 of Koga (2016). Note that there is no explanation given in Hayata (1998) for why vowel apocope occurs (whereas Sasaki (2013) attempts to find an explanation to it, as will be discussed later), and that the application of Hayata's (1998) rule is limited to the particular phenomenon of the vowel apocope and the /r/-regressive assimilation in the Japanese dialect, not other phenomena beyond that.

2.3 An extension of Sasaki's (2013; 2015) P-OT account

Sasaki (2013; 2015) deals with a complex phenomenon of the Hasaki Ibaraki dialect of Japanese, and the phenomenon includes the apocope of /u/ of the non-past forms plus the /r/-complete assimilation, which is almost the same as that of Takeo Saga dialect.[7] Sasaki (2013) is the first OT analysis of compensatory geminate consonants at the ends of the whole non-past forms in one Japanese dialect. Sasaki's (2013; 2015) constraints relevant to this study are:

(4) a. 'The markedness constraint *u#C prohibits /u/ before the particle [head]-initial consonant', [/d/] [brackets are mine].

b. The faithfulness constraint MAX[Place] prohibits the elimination of any Place of Articulation (hereafter, POA) feature value.
c. The markedness constraint CODA CONDITION, as defined in Ito and Mester (1993), bans the singleton non-nasal consonant in the coda position.
d. Ranking: MAX[Place] ≫ CODACOND ≫ *u#C

The constraint *u#C prohibits the sequence in which whichever consonant follows the vowel /u/, not only /r/, for example, but also any other consonant, for example, /...mu/#/d.../ as long as the sound /d/, or the initial segment of the copula /da/, follows the sequence. The interaction between the constraint *u#C and the faithfulness constraint MAX[Place] explains the high back vowel's absence only immediately after the liquid in Takeo Saga dialect, which is an example of the insight of OT and will be explained later. Adopting Ito's (1986) assumption that the POA feature of the liquid of Japanese and the dialects is underspecified, Sasaki (2013) explains as follows: If the consonant /r/ deletes, it will not violate Max[Place] since the POA value of the liquid is underspecified, as seen in the upper part of Tableau 4. On the other hand, if any other consonant deletes like /k/, it will violate Max[Place] since the other consonants have some value for the POA feature, as in the lower part of Tableau 4.[8]

Tableau 4: Sasaki's (2013) predictions of geminate consonants

		MAX[Place]	CODACOND	*u#C
	UR: /kuru#daigaku/ 'come [Non-past]-university'			
	a. kuru#d...			*
	b. kur#d...		*	
☞	c. kut_i#t_i...			
	UR: /kaku#daigaku/ 'write [Non-past]-university'			
☞	a. kaku#d...			*
	b. kak#d...		*	
	c. kat_i#t_i...	*		

The method of OT which Sasaki (2013) follows, considering contextual conditions as condition-permitting constraints at higher ranks, explains Hayata's (1998) rule: $u \rightarrow \emptyset$ / $r\_]_{verb}$. Sasaki's (2013) adoption of OT is insightful also because OT may extend to other geminate consonants or other relevant phenomena in dialects of Japanese, for example, by different rankings of the same constraints as OT explains differences across dialects and languages.

The Problem for Parallel-OT: If Sasaki (2013) extends to the target phenomenon, it will face a problem. The difference between the target phenomenon and that of Sasaki's (2013) is that compensatory geminate consonants are present whichever consonant of a word underlyingly follows the final /ru/ of non-past forms in Takeo Saga dialect whereas only the dental voiced stop /d/ follows it in the phenomenon of Hasaki Ibaraki dialect. The extension incorrectly predicts that the final high back vowel will be absent if the stem final consonant of a non-past form and the initial consonant of the word following the non-past form are the same, as in Tableau 5.[9] The first candidate kag$_i$#g$_i$... for

Tableau 5: An incorrect prediction by Sasaki's (2013) extension

		MAX[Place]	CODACOND	*u#C
	UR: /kagu#gorira/ 'smell [Non-past]-gorilla'			
×☞	a. kag$_i$#g$_i$...			
	c. kagu#g...			*

/kagu gorira/ 'a gorilla which smells (it)' does not violate CODACOND since the coda consonant is not a singleton non-nasal consonant, but is a former part of a geminate. The candidate does not violate the constraint MAX[Place], either. The POAs of the former part and the latter part of the geminate consonant in kag$_i$#g$_i$... are the same as those of the underlying segments /g/ before and after the fi-

nal /u/ of /kagu#g.../. The first candidate [kag$_i$#g$_i$...] thus should be associated with the underlying form /kagu#gorira/. Actually, this is not the case, as was observed at the beginning of this paper. The final vowel cannot be absent unless the final consonant of the underlying non-past form is either the liquid in Takeo Saga dialect. Parallel-OT, which Sasaki (2103) adopts, does not restrict how much a candidate can differ from the underlying form. If McCarthy's (2008a; 2016) Harmonic Serialism-OT, which requires candidates to have only one difference, were adopted instead, then kag$_i$#g$_i$... could not be associated with /kagu g.../. The form kag#g..., which kag$_i$#g$_i$... requires to be the candidate in the previous step, is not associated with /kagu g.../ since it violates CODACOND. The coda consonant of the form kag#g... is a singleton non-nasal consonant. Compensatory geminate consonants are thus a problem for P-OT, similarly to Torres-Tamarit's (2016) claim that classic compensatory lengthening is a problem for P-OT. The discussion here implies that the adoption of Harmonic Serialism-OT, but not P-OT, is necessary.

The Problem for Max[Place] $\gg$ CodaCond: Furthermore, the constraints with the ranking, including MAX[Place] $\gg$ CODACOND, which Sasaki (2013) offers, are not on the right track toward an explanation of compensatory geminate consonants. As an anonymous reviewer pointed out, the phenomenon of compensatory geminate consonants in Shino-Japanese compounds, especially of dialects of southern parts of Kyushu, Japan is relevant to the target phenomenon. The difference between these two lies in that the former is phonological and lexical relating to compounds of Sino-Japanese roots whereas the latter is morpho-syntactic and morpho-phonological. Following Tateishi (1990), two consonants /k/ and /ts/ can underlyingly be coda consonants in Shino-Japanese compounds as well (as the

original Japanese coda consonants like /n/ in Japanese and its dialects) on the assumption that Shino-Japanese roots consist of monosyllables according to their then-borrowed Chinese sounds. Then, the phenomenon in Shino-Japanese compounds is descriptively generalized as follows: If 1) the coda obstruent of the first member of a compound is underlyingly followed by an obstruent at the onset of the second member sharing an identical Manner specification and an identical POA specification, as in [kok$_i$k$_i$ai] for /kok+kai/ 'parliament', *or* 2) the coda obstruent of the first member of a compound with its POA being coronal anterior is followed by an obstruent at the onset of the second member sharing an identical Manner specification, as in [kekkon] for /kets+kon/ 'uniting+engagement', then the coda consonant and the onset consonant will be one geminate of the onset consonant on surface in Japanese and its dialects (Tateishi 1990; Ito and Mester 2015), as schematized in (5a) for (5b).

(5) a. PR: [...C_2.C_2V_2. ...]

b. UR: /... $\begin{bmatrix} C_1 & \\ - & sono \\ - & voiced \\ \beta \text{ or } cor, ante & POA \\ \alpha & MANNER \end{bmatrix} . \begin{bmatrix} C_2 & \\ - & sono \\ - & voiced \\ \beta & POA \\ \alpha & MANNER \end{bmatrix} V_2$. .../

In some Sino-Japanese compounds, for example, in Kobayashi Miyazaki dialect of Japanese, even if the onset obstruent is voiced, the coda consonant and the onset obstruent will be one geminate of the onset consonant on surface, as attested in [koggo] for /kok+go/ 'the language of the country' and [teddoː] for /tets+dou/ 'railroad' (九州方言学会 1969: 228) and *[koggai] cf. [kokugai] for /kok+gai/ 'outside of country' or *[keddan] cf. [ketsudan] for /kets+dan/ 'determination' (Matsuura 2017).

The phenomenon in the last paragraph and the target phenomenon clarify the kind of the consonants that can underlyingly be at the coda for the compensatory geminate consonants. The underlying

coda consonants are not the consonants whose POA is underspecified as Sasaki (2013) claims, but those which are POSSIBLY OR ACTUALLY ASSIMILATED partially in POA or completely to next onset consonant, i.e., are 1) the liquid, as represented in the pair between a PR pattern (6a) and a UR pattern (6b), 2) the non-voiced obstruent if the next onset consonant is also a non-voiced obstruent, sharing a Manner value and a POA specification and 3) the coronal anterior non-voiced obstruent if the next onset consonant is also a non-voiced obstruent, sharing a Manner value, as the two last cases represented in the pair between a PR pattern (5a) and a UR pattern (5b).

(6) a. PR: [...C_2.C_2V_2. ...]

b. UR: /... $\begin{bmatrix} C_1 & \\ liquid & MANNER \end{bmatrix} \begin{bmatrix} V_1 & \\ + & high \\ + & back \end{bmatrix} .C_2V_2$. .../

What was pointed out here nullifies Sasaki's (2013) ranking of the constraints MAX[Place] ≫ CODACOND. Since HS is necessitated, if MAX[Place] were ranked at a higher rank than CODACOND, as in Sasaki (2013), why [kok$_i$k$_i$ai] is associated with /kok+kai/ through the intermediate form koH.kai in Shino-Japanese compounds could not be explained, that violates MAX[Place], as will be clarified in a given suggestion at the end of section 3.7.3. Sasaki (2013) is not adequate, giving no explanation to geminate consonants, whereas Hayata (1998) has suggested an idea.

3 Proposal

The grammar of morpho-syntax and syntax appears to contradict the richness of the base in OT. Actually it will not be the case if the grammar of morpho-syntax and syntax is constraint-based and the constraints in those components are assumed to be ranked higher than those of phonology. The underlying forms for the phonological component can thus be considered the forms satisfying the constraints of the morpho-syntax and syntax.

3.1 Allomorphs of verb stems and allomorphs of the non-past affix

With a syntactic feature with two possible values and a morpheme expressing the marked value given, there is no morpheme expressing the other unmarked (or default) value in many languages. For example, Vietnamese has three values for tense: past, future and present. The language contains morphemes realizing the past tense, as in (7b), and the future tense, as in (7c), and yet there is no morpheme realizing the present tense, or the default value of tense, as in (7a).

(7) a. dua-tre nghich-ngom [Vietnamese]
child naughty
'The child is naughty.'

b. dua-tre da-tung nghich-ngom [Vietnamese]
child Past naughty
'The child was naughty.'

c. dua-tre se nghich-ngom [Vietnamese]
child Future naughty
'The child will be naughty.'

The present tense is implied from the fact that the sentence contains neither the morpheme of the past tense *da-tung* nor that of the future tense *se*. The content of the tense is either the past tense or the future tense or the present tense, and so, the tense of the sentence (7a) is interpreted as the present tense since it has no morpheme of the past tense or the future tense.

It is plausible that the weakest consonant or vowel or a sequence of them or something like them realizes the unmarked value in some languages, for example, in order to satisfy a formal requirement like prosodic minimality. It is assumed that the 'non-past' morpheme, either /u/ or /ru/ or the combination of them, is actually the tense expletive in Japanese and its dialects, following Koga and Ono (2010). They claim that the tense expletive may be doubled if the verb stem is a 'vowel /e/'-final base verb or a strong base verb in western Saga dialect. Furthermore, it, either /u/ or /ru/, selects itself as well as verb stems. The tense expletive /ru/ selects the tense expletive /u/, the whole /u+ru/ is another tense expletive, being a complex as [$_{tense}$ [$_{tense}$ *u*] [$_{tense}$ *ru*]]. The exponents of the tense expletive are thus allomorphs /u/, /ru/ and /u+ru/. For example, the complex [$_{tense}$ [$_{tense}$ *u*] [$_{tense}$ *ru*]] selects the verb stem /n/ 'sleep' in the left figure of Figure 1, and the simple morphemes [$_{tense}$ *u*] and [$_{tense}$ *ru*] select verb stems, as the former does in the right figure.[10]

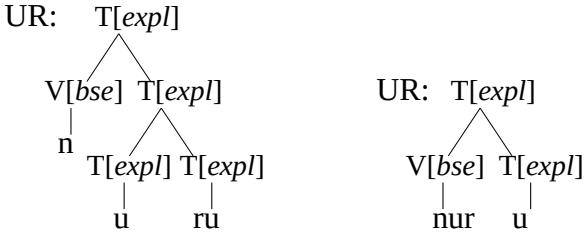

Figure 1: The 'non-past' form /n+u+ru/ 'sleep-Non-past' and that of /nur+u/ 'paint-Non-past'

Koga and Ono's (2010) morphological analysis is crucial in the analysis I will propose, as will be seen in proposing the constraint $\text{IDENT}_{\text{affix}}$[Long]. It will here be argued for this morphological assumption. The non-past form of every so-called 'vowel e'-stem final verbs of which a vowel precedes the vowel 'e' contains a semi-vowel /j/ before the vowel /u/ in Takeo Saga dialect, resulting in the pattern of [...Vjuʔ], of which the UR is the pattern of the segmental sequences, /...Vjuru/, as in the upper part of Table 6. Without the semi-vowel [j], the surface forms would be ungrammatical,

Table 6: Semi-vowel [j] (non-)occurrences in non-past forms of Takeo Saga dialect

Non-past		Past		Non-past		Past	
kajɯʔ	*kaɯʔ	kaeta	'change (it)'	kʲijɯʔ	*kʲiɯʔ	kʲieta	'disappear'
ɸɯjɯʔ	*ɸɯɯʔ	ɸɯeta	'increase'	obojɯʔ	*oboɯʔ	oboeta	'memorize'
cf. tabɯʔ	*tabjɯʔ	tabeta	'eat'	cf. nɯʔ	*njɯʔ	neta	'sleep'

having hiatus as given in the table. The non-past form of every so-called 'vowel e'-stem final verbs if a consonant precedes the vowel 'e' never contains [j] before the vowel [ɯ] in Takeo Saga dialect, as in the lower part of the table.

The hiatus avoidance by the semi-vowel /j/ occurs in the potential forms of all kinds of verbs, which consist of the present participle form + j + uʔ (or +/j+u+ru/), in Takeo Saga dialect, as in Table 7.

Table 7: Semi-vowel /j/ occurrences in the potential forms of Takeo Saga dialect

Non-past		Past		Non-past		Past	
jomʲijɯʔ	*jomʲiɯʔ	jomʲieta	'can read'	tabejɯʔ	*tabeɯʔ	tabeeta	'can eat'
neːjɯʔ	*neːɯʔ	neːeta	'can sleep'	okʲijɯʔ	*okʲiɯʔ	okʲieta	'can wake up'
kʲiːjɯʔ	*kʲiːɯʔ	kʲiːeta	'can come'	ʃiːjɯʔ	*ʃiːɯʔ	ʃiːeta	'do'

If a verb is a vowel-final stem verb, its present participle form is the same as the stem; if the verb is a consonant-final stem verb, its potential form is its stem + the vowel /i/. Without the semi-vowel /j/, the

surface forms would be ungrammatical, having hiatus as in given in the table.

Table 8: The *3*-tuples of UR, IF and PR of word forms with semi-vowel /j/ in Takeo Saga dialect

PR	IF	UR		PR	IF	UR	
[kajɯʔ]	kajuru	/ka̲+u̲ru/	‘change (it)’	[kʲijɯʔ]	kijuru	/ki̲+u̲ru/	‘disappear’
[ɸɯjɯʔ]	fujuru	/fu̲+u̲ru/	‘increase’	[obojɯʔ]	obojuru	/obo̲+u̲ru/	‘memorize’
cf. [tabɯʔ]	taburu	/tab̲+u̲ru/	‘eat’	[nɯʔ]	nuru	/n̲+u̲ru/	‘sleep’
[jomʲijɯʔ]	jomijuru	/jomi̲+u̲ru/	‘can read’	[tabejɯʔ]	tabejuru	/tabe̲+u̲ru/	‘can eat’
[neːjɯʔ]	nejuru	/ne̲+u̲ru/	‘can sleep’	[okʲijɯʔ]	okijuru	/oki̲+u̲ru/	‘get up’
[kʲiːjɯʔ]	kijuru	/ki̲+u̲ru/	‘can come’	[ʃiːjɯʔ]	sijuru	/si̲+u̲ru/	‘do’

The hiatus avoidance by the semi-vowel /j/ in the non-past forms of the ‘vowel e’-stem final verbs of which a vowel precedes the vowel ‘e’ and that in the potential forms of all kinds of the verbs in Takeo Saga dialect is actually not a coincidence, but follows from one assumption. Inflectional and derivational affixes of Japanese and its dialects have such allomorphs that can combine with its morphological head at the junctures in either of the patterns, CV and VC, like the negative forms /yom+an/, /tabe+n/, /ko+n/, /se+n/ and desiderative forms /yomi+tai/, /tabe+tai/, /oki+tai/, /ki+tai/, /si+tai/. Here it is assumed that the potential allomorphs are only vowel-initial ones /-u/ ‘be able to [e.g., for the non-past tense]’ and /e/ ‘be able to [e.g., for the past tense]’ and the non-past allomorphs of the ‘vowel e’-stem final verbs are the final sequence /u+ru/ instead of /ru/ (or /u/).[11] On the assumption that the semi-vowel /j/ occurs if the junctures between stems and affixes are of the pattern, the Vowel-Vowel sequence, the facts of the semi-vowel [j] presences in both the non-past forms of some so-called ‘vowel e’-stem final verbs and the potential forms of all the verbs in Takeo Saga dialect can be explained.

3.2 McCarthy's (2008a; 2016) Harmonic Serialism-OT

McCarthy's (2008a; 2016) framework Harmonic-Serialism (HS)-Optimality Theory is adopted for the current study. In HS-OT, the surface form and the underlying form are associated only if there is a series of paths that gradually improve harmony. If there is no gradual harmonically improving path between the underlying form and the surface form, then they cannot be associated.

Following McCarthy's (2008a) paths for vowel apocope and consonant deletions, 1) the underlying non-past form if its final /ru/, as schematically represented as (8a) and 2) the same except for the former part of a geminate of the consonant replacing the final sequence /ru/ (8d) can be associated through an intermediate form with the apocope of the final vowel (8b) and another intermediate form with /r/ debuccalized to be H (its placeless counterpart) (8c).

(8) a. UF: /...ru # (C_i...)/ e.g., /toru (gorira)/ by apocope
b. IF: ...r (C_i...) tor (gorira) by debuccalization, or H
c. IF: ...H (C_i...) toH (gorira) by a complete assimilation
d. SF: [...C_i (C_i...)] [tog (goɽʲiɽa)]

The phenomenon of the association between the underlying verb final /ru/ and the former part of an assimilation is thus a combination of three phenomena: 1) the apocope of verb-final /u/, 2) the debuccalization of verb-final /r/ and 3) a complete assimilation. The first part of the complex phenomenon, the apocope of /u/, is the same as that in the Tarama Okinawa dialect of Japanese, as mentioned in Koga (2016: 24).[12] The apocope of the verb-final /r/ is the same as that in the language of Catalan. Furthermore, the apocope of a consonant at the coda and a complete assimilation are the same as that in a dialect of Greek, as will be given in section 3.5.

3.3 Hayes' (1989) moraic theory

In response to what Hayata (1998) suggests (at the end of the section 2.1), I follow Ito (1986), in which every word, consisting of phonological segments (or consonants and vowels), must be prosodically licensed. Specifically, the segments of a word must be structured into syllables each of which consists of a nucleus and its coda and onset. Syllabification is available at every level, or at the levels of underlying intermediary and surface forms in phonology. See Yamada (1990) for syllabification of words in Japanese on the basis of the sonority hierarchy of the phonemes of Japanese. Only the nucleus and the coda are associated with moras (Hayes 1989). For example, the underlying form /nuru/, which will will mean either 'sleep-Non-past' if segmented as in the left figure of Figure 1 or 'paint-Non-past' if segmented as in the right figure of Figure 1 (on page 14), is given one syllabic moraic structure of the leftmost figure of Figure 2 below.

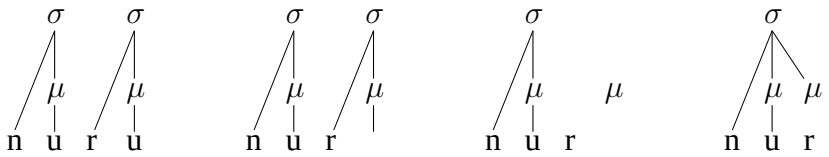

Figure 2: Syllabic and moraic structure of /nuru/ (leftmost), Final vowel absence (2nd leftmost), Syllable absent and mora preserved (2nd rightmost) and Linking stray mora to preceding syllable (rightmost)

If the final vowel /u/ is absent, as exemplified in the second leftmost figure, the non-past form will syllabify through the second rightmost and rightmost figures of Figure 2 as Hayes (1989) details. If the syllable contains no overt nucleus segment, then no syllable structure will be formed (Hayes 1989). In contrast, moras will be preserved, as exemplified in the second rightmost figure, by the faithfulness constraint MAX-μ even if there is no vowel present, as defined in (9).

(9) Prosodic faithfulness constraint, Max-μ: Assign one violation for each mora in the input that is not present in the output.

That in the second leftmost figure of Figure 2 is thus associated with that in the second rightmost figure. Any stranded mora optionally acquires a new association with an adjacent syllable, as exemplified between the second rightmost figure and the rightmost figure.

3.4 McCarthy's (2008a) Coda Condition

McCarthy's (2008a) CODACOND, as given in (10), will allow, for example, the association between 1) the 'non-past' forms with the syllabic and moraic structure of the rightmost figure of Figure 2 and 2) the same except for the liquid linked to the mora at the coda of the left figure of Figure 3 below, if the POA of the liquid /r/ is token-identical to the POA of the onset of the next syllable.

(10) CODACOND: Assign one violation mark for every token of Place that is not associated with a segment in the syllable onset (McCarthy 2008a: 279).

Figure 3: r at the coda (left) and a mora associated with no segment at the coda (right)

The condition will be met if the POA of the coda consonant regressively assimilates to that of the consonant that follows it. Since the POA at the coda must be token-identical to that of the onset at next syllable, only the same values will not be sufficient if they are of the same POA, as seen in the review of Sasaki (2013) toward the end of section 2.3. If the consonant at the coda has no Place feature, then

the constraint CODACOND will be satisfied vacuously. In order to satisfy CODACOND, there will be no other way to let the liquid absent with the syllable-associated mora left alone, as in the right figure of Figure 3. Of course, the absence of the liquid is dependent on whether or not the faithfulness constraint on the manner feature liquid IDENT[Liquid] is ranked at a lower rank in the language.

3.5 Compensatory geminate consonants or lengthening in Hayes (1989) and Kiparsky (2011)

Hayes' (1989) moraic theory correctly predicts there are two theoretically possible ways to have the mora at the coda filled by a segment for compensation: one, the lengthened vowel, what is called 'compensatory lengthening', and two, the geminate consonant.

(11) a. **Compensatory Geminate Consonants (CG)**: The consonant at the onset of the next syllable is prepared and already audible, or having a geminate consonant, at the coda, as in the left figure of Figure 4.

b. **Compensatorily Lengthened Vowels (CL)**: The vowel at the nucleus is lengthened and continues to be audible at the coda, as in right figure of Figure 4.

Particular languages actually use either compensatory geminate consonants, as in the Lesbian and Thessalian dialects of Greek, compensatory lengthening, as in the Attic dialect of Greek or both. This is called a 'realization problem' by Kiparsky (2011). The Takeo Saga dialect of Japanese uses only geminate consonants, as represented in Figure 5, as Lesbian and Thessalian Greek do. The geminate consonant can be, for example, k if a noun /kodomo/ 'child' is the head noun to which a relative clause /nur+u/ 'Non-past paint' or /n+u+ru/ 'Non-past sleep' adjoins. See Figure 7 (page 27) for the syntactic and morphological structure of them. Thus, Hayes' (1989) moraic theory explains why the

consonant geminate occurs in conjunction with McCarthy's (2008a) CODACOND, pointing out the geminate consonants in Takeo Saga dialect of Japanese as compensatory geminates.

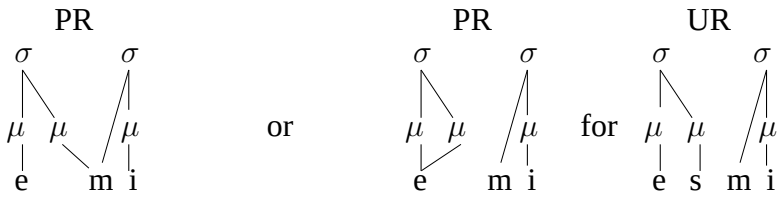

Figure 4: CG in Lesbian and Thessalian ([em$_i$m$_i$i] 'I am') (left) and CL in Attic ([eːmi] 'I am']) (right)

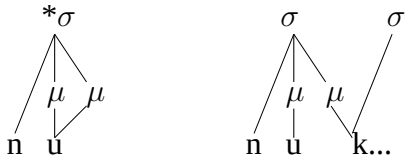

Figure 5: No lengthened vowel for the compensation in Takeo Saga dialect (left) and a gaminate consonant for the compensation in Takeo Saga dialect (right)

The vowel apocope and the /r/-regressive assimilation in Takeo Saga dialect are a realization of Kubozono's (1985: 203-258) tendency for associations from two light syllables $C_1V_1.C_2V_2$ to one heavy syllable $C_2.C_2V_2$, which he notices compensatory lengthening as one case of the tendency like the historical change of [ka.ɽʲi.bʲi.to] and [ka.ɽuː.do] 'hunter' and [ka.kʲi.ta] and [kai.ta] 'wrote').

3.6 Additional Constraints

In order for the paths as a whole of /...r # C$_i$.../ → ...H C$_i$... → ...C$_i$ C$_i$...: The constraints and the ranking that McCarthy (2008a: 285) proposes for the consonant cluster simplification over a coda consonant and the onset consonant of next syllable are:

(12) CODACOND ≫ {HAVEPLACE, MAX[Place]} ≫ NOLINK[Place]

See the definition of CODACOND in (10). NOLINK[Place] says that assign one violation mark to the pair of the input and output if the Place value is unlinked in the input and becomes linked in the output. HAVEPLACE says that 'Assign one violation mark for every segment that has no Place specification'. Note that MAX[Place] is ranked lower than CODACOND and ranked higher than NOLINK[Place]. There is no ranking between HAVEPLACE and MAX[Place].[13]

McCarthy's (2008a) ranking of the constraints in HS-OT, as given in (12), for example, makes a correct prediction of consonant cluster simplification in Diola Fogny, as given in Tableau 9.
The underlying representation /pat.ka/ is associated with the phonetic realization [paka] through the intermediate form paH.ka. Each step is harmonically improving. The first step </pat.ka/, paH.ka> is harmonically improving since paH.ka satisfies CODACOND (vacuously). The second step <paH.ka, pa.ka> is also harmonically improving since paka satisfies HAVEPLACE.

Tableau 9: Harmonic improvements in <pat.ka, paH.ka, pa.ka>

/patka/	CODACOND	HAVEPLACE	MAX[Place]	NOLINK[Place]
step 0. pat.ka	*!			
step 1. paH.ka		*!	*	
step 2. pa.ka			*	*

As predicted, /pat.ka/ cannot associate with the form pat.Ha since this form does not harmonically improve the underlying representation, violating CODACOND since the POA of /t/ is not token-identical to that of the debuccalized H, which has no POA value. Here the would-have-been phonetic realization *[pa.ta], which can be associated with pat.Ha, cannot be associated with the underlying representation /pat.ka/. (Thus, I do not have to resort to the faithfulness of onset than coda as it has been done in HS-OT. See Ito and Mester (2015: 300) for an analysis in P-OT.) Note that MAX-C, which I assume

is ranked at a lower rank than HAVEPLACE and have not included in the table, cannot be ranked at a higher rank than HAVEPLACE since if it were so, pa.ka would not have harmonically improved from paH.ka (McCarty 2008a: 287).

In order for the first path, /...ru # C_i.../ → ...r C_i...: The vowel final absence *V# is a well-motivated constraint in many languages, for example, Yawelmani. Sasaki's (2013) constraint *u# is modified to be *$V_{[Tns\ \ expl]}$#, which states "assign one violation mark if a word ends with any vowel associated with the non-past tense." This is ranked higher than CODACOND to explain, for example, the intermediate form nur (a form with apocope) harmonically improving from the underlying form /n+u+ru/: *$V_{[Tns\ \ expl]}$# ≫ CODACOND.

CODA CONSONANTS: To explain the fact that the non-past morpheme-related final vowel /u/ is absent only if the liquid immediately precedes it, one of the phonotactics (e.g., restrictions on permissible segments at particular positions of syllables) is adopted for Takeo Saga dialect and Japanese as follows:

(13) Markedness Constraint: CODACONSONANTS of Japanese and its dialects: Assign one violation mark to any consonant at the coda which is not 1) the coronal anterior nasal /n/, 2) the liquid /r/, 3) the Placeless consonants H, N, 4) the glottal stop ʔ or 5) the former part of a geminate consonant.

These consonants in the coda are possibly or actually assimilated partially or completely to the onset of the next syllable. The liquid r is one of the coda consonants, and the dorsal stop g is not one of them in Takeo Saga dialect. Since the association between /nuru/ and nur is allowed but the association between /kagu g.../ and kag g... is not allowed, this constraint must dominate the constraint *$V_{[Tns\ \ expl]}$# (i.e., CODACONSONANTS ≫ *$V_{[Tns\ \ expl]}$#).

In order for the second path, ...H C_i... → ...C_i C_i...: IDENT[CONSONANTAL]: Takeo Saga dialect of Japanese allows the former of a geminate consonant to occur in place of the final liquid of the non-past forms, but NOT the preceding vowel to lengthen to keep the stranding mora. That is, Takeo Saga dialect does not allow any change of a value of the consonantal feature. The constraint IDENT[Cons] (14) in Ito and Mester (2001) works well for this purpose.[14]

(14) Faithfulness Constraint: IDENT[Cons(onantal)]: Assign one violation mark for every segment that changes its value for the feature consonantal between the input and output (Ito and Mester 2001).

To explain the harmonically improving path ...H C_i... → ...C_i C_i..., but NOT a non-harmonically improving path ...VH → ...V:, this constraint should be ranked between HAVEPLACE and MAX[Place]: i.e., HAVEPlace ≫ IDENT[Cons] ≫ MAX[Place]. The constraint, for example, disallows the association between a vowel, one of [- consonantal], and a consonant except for semi vowels, or one of [+ consonantal]. Takeo Saga dialect of Japanese is one of the languages that rank IDENT[Cons] higher.

$\text{IDENT}_{\text{affix}}$[Long]: Suppose that there is a difference, for example, one between ?[nɯː] and [nɯʔ] for /nur+u/ 'paint[Non-past]' and *[nɯː] and [nɯʔ] for /n+u+ru/ 'sleep[Non-past]' in Takeo Saga dialect. Actually one of the two native speakers that helped with the current study said this; for example, the form ?[nɯː] sounds softer than the form [nɯʔ] for /nur+u/ 'paint[Non-past]'. There is no difference between the form /nur+u/ and the form /n+u+ru/ in terms of segmental phonology, and the difference lies in the morpho-syntactic structures. Following the idea in the OT literature, for example, Torres-Tamarit (2016: 694), that affixal morphemes are more faithful to their underlying forms than stems are, such a positional version of the faithfulness constraint on length is proposed as follows.

(15) Faithfulness Constraint: $\text{IDENT}_{\text{affix}}$[Long]: Assign one violation mark for every pair of which a vowel and its corresponding vowel in the inflectional affix have different values for the feature [length].

Note that this constraint is concerned with differences in length of vowels, involving no change of the numbers of moras, between an input and an output. (The Japanese language as well as its dialects has a vowel length distinction involving differences in the number of moras, for example, [hoː.ko] (/houko/) ‘a place with a big number of something’, which is trimoraic, and [ho.ko] (/hoko/) ‘sword’, which is bimoraic.) The case of a mora floating, or a mora being not associated with an actual segment, instantiates such differences without change in the number of moras. The constraint (15), for example, prohibits a vowel of the affix, but NOT any vowel of the stem, from associating with a floating mora, as schematized on the left of Figure 6.

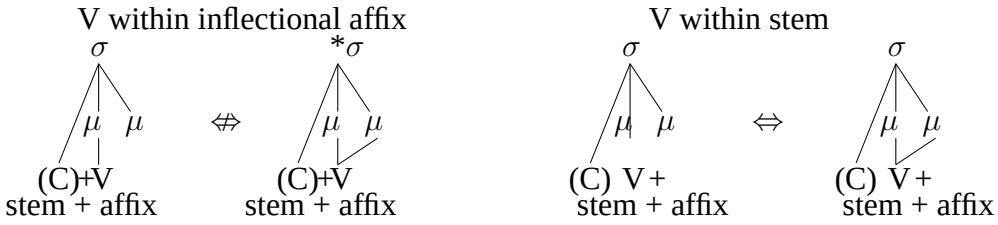

Figure 6: $\text{IDENT}_{\text{affix}}$[Long]

The vowels in the stem, on the other hand, permit the association in a length distinction even if there is no difference in the numbers of moras, as schematized on the right of the figure. If the ‘non-past’ morpheme (whose allomorphs are /u/, /ru/ and /u+ru/) is the tense expletive, as was proposed, then it will follow that the vowel of the phoneme /u/, which is the tense expletive or a part of the tense expletive, cannot be associated with its lengthened counterpart like between *[tabɯː] and /taburu/

through the intermediate forms tabur and tabu$^{\mu}$, where $^{\mu}$ represents a floating mora. The ranking of all the constraints is summarized here:

(16) CODACONSONANTS ≫ *V$_{[Tns\ \ expl]}$# ≫ CODACOND ≫ HAVEPLACE ≫ {IDENT$_{\text{affix}}$[Long], IDENT[Cons]} ≫ MAX[Place] ≫ NOLINK[Place]

Note that there is no ranking between HAVEPLACE and MAX[Place] in McCarthy (2008a), and yet HAVEPLACE ≫ MAX[Place] because of the transitivity since two constraints, IDENT$_{\text{affix}}$[Long] and IDENT[Cons], are ranked lower than HAVEPLACE and higher than MAX[Place].

3.7 Predictions

The core components of morphology and syntax 'generate', for example, /n+u+ru/ '(He) will sleep', /tab+u+ru/ '(He) will eat (it)', /oki+ru/ '(He) will get up' and /nur+u/ '(He) will paint (it)' as tensed phrases (TP), and /n+u+ru/ # /gorira/ 'the gorilla that sleeps' as a noun with a relative (finite) clause adjoined ([$_N$ [$_T$ $_N$]], Figure 7). Harmonic Serialism in OT with the markedness and faithfulness constraints and the proposed rankings makes such correct predictions that:

- 1) the underlying form /n+u+ru # kodomo/ 'sleep [Non-past] child' as its UR was given in the left figure of Figure 1, repeated here in the upper part of Tableau 11, is also associated with [nuk] (k...) through the same steps, and that
- 2) the underlying form /nur+u/ 'paint [Non-past]' (kodomo), as its UR was given in the right figure of Figure 1, repeated here in the upper part of Tableau 10, is associated with the surface form [nuk] (k...) through nur (k...) and nuH (k...).

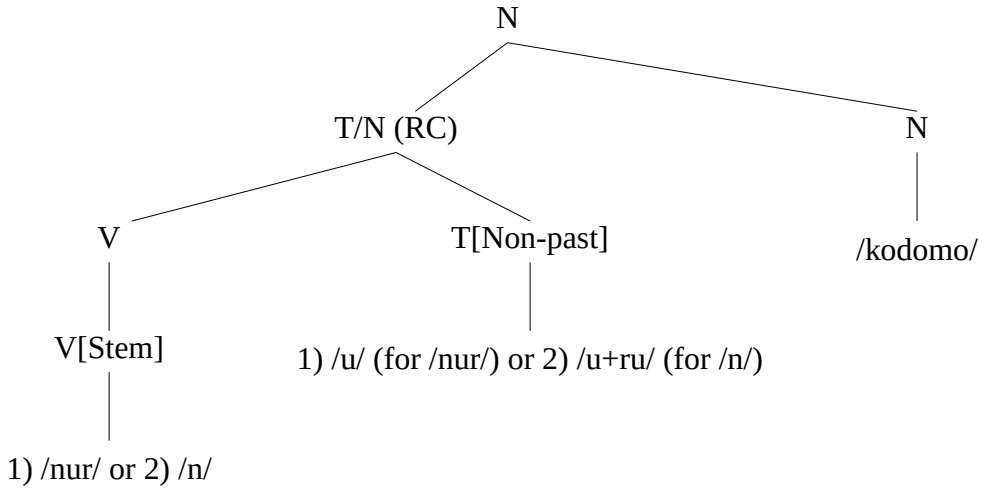

Figure 7: Morpho-syntactic Structure of /nuru kodomo/

3.7.1 Regarding /nur+u/ 'paint [Non-past]'

The candidate set of the first step associating with the underlying form /nuru/ may contain no other than nur in addition to the underlying form /nuru/. (For example, nuu, which results from /r/ absence, is not included in the candidate set since it violates a faithfulness constraint INPUT-CONTIGUITY, which is ranked at a much higher rank.) The form nur is harmonically improving with the underlying form /nuru/under the ranking of the markedness constraint *$V_{[Tns\ expl]}$# over the markedness constraint CODACOND, as given in the upper most part of Tableau 10.

In the second step, the form nuH, which has the final consonant debuccalized, is harmonically improving with nur under the ranking of the markedness constraint CODACOND over the markedness constraint HAVEPLACE since the consonant at the coda of the former is placeless and it vacuously satisfies CODACOND. The candidate set of the third step may contain nuk and nuː in addition to the winning candidate at the second step nuH.[15] The form nuː violates IDENT[Cons] since the con-

Tableau 10: Harmonic improvements of /nur+u/ ‘paint-Non-past’

		CODACONSONANTS	*V$_{[Tns\ expl]}$#	CODACOND	HAVEPLACE	IDENT$_{\text{affix}}$[Long]	IDENT[Cons]	MAX[Place]	NOLINK[Place]
	Step 1: /nuru # kodomo/ M-SS of UF: T[*expl*] V[*bse*] T[*expl*] nur u PS of UF: σ σ μ μ n u r u								
☞	a. nur # k...			*					
	b. nuru # k...		*						
	Step 2: nur # kodomo								
☞	a. nuH # k...				*			*	
	b. nur # k...			*					
	Step 3: nuH # kodomo								
☞	a. nuk$_i$ # k$_i$... σ σ μ μ n u k								*
	b. nuH # k...				*				
	c. nuː # k... σ σ μ μ n u # k						*		

sonantal feature at the end of the input nur is not at the end of the output nuː. (It does not violate IDENT$_{\text{affix}}$[Long] since the vowel at the nucleus is a part of the verb stem, and is not associated with the tense expletive.) The form nuk$_i$ (k$_i$odomo), on the other hand, does not violate IDENT[Cons] since the final /k/ is consonantal as the liquid /r/ is. Note that this form satisfies CODACOND since the POA of the coda consonant k is token-identical to that of the consonant of the onset of next syllable. The form nuk (kodomo) thus incurs the least serious violations in the third step, and so optimal for /nur+u/ 'paint [Non-past]' (kodomo). The phonetic realization [nɯk$_i$ (k$_i$odomo)] 'children who paint (it)' is thus predicted to be interpreted as meaning that the child who will paint (it).

3.7.2 Regarding /n+u+ru/ 'sleep [Non-past]'

The prediction regarding the underlying form nuru (n+u+ru) 'sleep [Non-past]' is the same except for one difference from that of /nur+u/ 'paint [Non-past]', as in Tableau 11. The form nuː in the third step here violates not only IDENT[Cons] but also IDENT$_{\text{affix}}$[Long] since the vowel /u/ at the nucleus is not a part of the verb stem but is a part of the affix /u+ru/, which is associated with the tense expletive.

3.7.3 Other predictions

Regarding [kagu (goɽʲiɽa)] (*[kaggoɽʲiɽa]) for /kag+u # gorira/ 'smell [Non-past] gorilla': The data set that falsifies the extension of Sasaki (2013) is explained in Harmonic Serialism-OT. The form with the apocope of the final vowel /u/ kag is not harmonically improving from /kagu/, violating the constraint CODACONSONANTS. This is because the consonant before the vowel /g/ is not either of the coda consonants. Thus, no debuccalized counterpart can be associated with the form without apoc-

Tableau 11: Harmonic improvements of /n+u+ru/ ‘sleep-Non-past’

		CODACONSONANTS	*V$_{[Tns\ expl]}$#	CODACOND	HAVEPLACE	IDENT$_{\text{affix}}$[Long]	IDENT[Cons]	MAX[Place]	NOLINK[Place]
	Step 1: /nuru # kodomo/ M-SS of UF: T[*expl*] V[*bse*] T[*expl*] n T[*expl*] T[*expl*] u ru PS of UF: σ σ μ μ n u r u								
☞	a. nur # k...			*					
	b. nuru # k...		*						
	Step 2: nur # kodomo								
☞	a. nuH # k...				*			*	
	b. nur # k...			*					
	Step 3: nuH # kodomo								
☞	a. nuk$_i$ # k$_i$... σ σ μ μ n u k								*
	b. nuH # k...				*				
	c. nu: # k... σ σ μ μ n u # k					*	*		

ope. So, no form with complete assimilation is associated with it. **Regarding [nɯː] (cf. ?[nug$_i$]) ([g$_i$orira]) for /nur+u # gorira/ 'paint [Non-past] gorilla' in western Saga dialect:** If I have the same constraints with the same ranking except for IDENT[Cons] ranked at a lower rank than NO-LINK[Place] for western Saga dialect, [nɯː] (nuː) is correctly predicted to associate with /nur+u # gorira/ 'paint [Non-past] gorilla' rather than *[nɯg] since both of the candidates violate MAX[Place] and the former only violates IDENT[Cons] and the latter only violates NOLINK[Place]. The form [nɯː] (nuː) does not violate IDENT$_{\text{affix}}$[Long] since the vowel at the nucleus is a part of the verb stem. **Regarding compensatory geminate consonants in SJ compounds like [hakkan] (cf. *[hatsukan]) for /hats+kan/ 'giving off+sweat', *[kottai] (cf. [kokutai]) for /kok+tai/ for 'national athletic meeting':** The given compensatory geminate consonants in Shino-Japanese compounds will be explained if I have the morpho-phonological and morpho-syntactic constraints proposed for the target phenomenon in Takeo-Saga dialect ranked at the same higher ranks and have the following four constraints ranked at higher ranks in the Shino-Japanese lexico-morpho-phonological component, on the assumption that the coronal anterior is the default value of POA: 1) the markedness constraint against voiced obstruents in coda position, NOVCDCODA, 2) the faithfulness constraint MAX[Voice], 3) the faithfulness constraint DEP-V and 4) a context-bound version of the faithfulness constraint DEP-V/C$_i$[- voiced]_C$_i$[- voiced] (which prohibits epenthesizing a vowel between the same non-voiced consonants). The rankings are CODACONSONANTS$_{\text{SJCompounds}}$ $\gg$ {NOVCDCODA, MAX[Voice], DEP-V/C$_i$[- vcd]_C$_i$[- vcd]} $\gg$ HAVEPLACE and MAX[Voice] $\gg$ DEP-V $\gg$ MAX[Place], as the ranking in Tableau 12 instantiates one possible ranking. The underlying form /kok + kai/ 'national diet' associates with koH.kai, but not with ko.ku.kai since the vowel u occurs between the non-voiced same consonants at the coda and at the

next onset. Then, the form koH.kai associates with kok$_i$.k$_i$ai. (If MAX[Place] were ranked at a higher rank than CODACONSONANTS$_{\text{SJCompounds}}$, the underlying form /kok + kai/ 'national diet' could not associate with koH.kai, violating MAX[Place], as discussed at the end of the section 2.3.) The underlying form /kok + tai/, on the other hand, associates with ko.ku.tai, but not with the form koH.tai. The dorsal of Place for /k/ is not the default value. The epenthetic vowel occurs between different consonants k and t, which do not violate DEP-V/C$_i$[-vcd] _C$_i$[-vcd]. For the underlying form /hats+kan/ 'give off + sweat', there are two candidates with least serious violations haH.kan and ha.tsu.kan, as shown in the first step on the assumption that the coronal anterior is the default value for POA. The former further associates with hak$_i$.$_i$kan, as shown in the second step. Here the proposal cannot explain the difference between hak$_i$.k$_i$an and ha.tsu.kan. The underlying form /tets+dou/ may associate with either te.tsu.dou or teH.dou, as shown in the first step. If the latter candidate were chosen, it would not be harmonically improving in the second step. This intermediate form teH.dou is ungrammatical since it contains a consonant without its Place specified, which is not pronounceable. Then, there is only one candidate grammatical, te.tsu.dou.[16] I have no particular idea to explain the compensatory VOICED geminate consonants in Kobayashi Miyazaki dialect, implying a possibility that native speakers of Kobayashi-Miyazaki dialect do not recognize those as compounds, i.e., know those as single morphemes underlyingly containing VOICED geminate consonants like [kog$_i$g$_i$o] for /koggo/ (in contrast with [kokugaj] for /kok+gai/ and [kok$_i$k$_i$aj] for /kok+kai/). I leave testing of the suggestion to the compensatory geminate consonants in Shino-Japanese compounds for future study.

Tableau 12: (Non-) harmonic improvements for </hats+kan/ ‘drying sweat’, /kok+tai/ ‘national athletic meeting’ and /tets+dou/ ‘railroad’>

		CODACONSONANTS$_{\text{SJCmpnd}}$	CODACOND	NOVCDCODA	MAX[Voice]	DEP-V/C_i[-vcd] _ C_i[-vcd]	HAVEPLACE	DEP-V	MAX[Place]	NOLINK[Place]
	Step 1: /kok + kai/									
☞	a. koH.kai						*		*	
	b. kok.kai		*							
	c. ko.ku.kai					*		*		
	Step 2: koH.kai									
☞	a. kok$_i$.k$_i$ai									*
	b. koH.kai						*			
	/kok + tai/									
☞	a. ko.ku.tai							*		
	b. kok.tai		*							
	c. koH.tai						*		*	
	Step 1: /hats + kan/									
☞	a. haH.kan						*		(*)	
☞	b. ha.tsu.kan							*		
	c. hats.kan		*							
	Step 2: haH.kan									
☞	a. hak$_i$.k$_i$an									*
	b. haH.kan						*			
	Step 1: /tets + dou/									
☞	a. te.tsu.dou							*		
☞	b. teH.dou						*		(*)	
	c. tets.dou		*							
	Step 2: teH.dou									
☞	a. teH.dou						*			
	b. ted$_i$.d$_i$ou			*	*					(*)

4 Summary and implications

First, Hayata's (1998) data set of the former parts of geminates at the end of some non-past forms of Takeo Saga dialect was repeated, and the sequence /ru/ correspondingly occurs in Tokyo dialect. Then, the final segments of the other non-past forms exhaustively were observed, and it was found that the end of a non-past form differs from its Tokyo counterpart in that the final vowel is absent. In section 2, Hayata's (1998) rules were reviewed. His /u/-deletion rule needs to be slightly revised, not explaining why the vowel is eliminated only after the liquid /r/. No explanation but a suggestion for a need for prosody is given to the /r/-regressive complete assimilation. Next, a plausible extension of Sasaki's (2013; 2015) P-OT analysis was reviewed. Recognizing the importance to adopt OT, it was shown that the constraints in the given ranking, or MAX[Place] $\gg$ CODACOND $\gg$ *u#, incorrectly predict the final vowel /u/ will be absent if the final consonant of the non-past form and the initial consonant of the next word are the same consonants. This is because of the framework P-OT, which Sasaki (2013) adopts. Observing another compensatory geminate consonants between obstruents in Shino-Japanese compounds, it was pointed out that MAX[Place] $\gg$ CODACOND is not on the right track. In section 3, based on 1) Koga and Ono's 2010 morpho-phonological analysis of the non-past morphemes, 2) McCarthy's (2008a; 2016) Harmonic Serialism of Optimality Theory, 3) Hayes' (1989) moraic theory, 4) McCarthy's (2008a) CODACOND and 5) compensatory lengthening and geminates by Hayes (1989) and Kiparsky (2011), it was proposed to employ four constraints to McCarthy's (2008a) constraints: 1) CODACONSONANTS, 2) *$V_{[Tns\ expl]}$#, 3) $\text{IDENT}_{\text{affix}}$[Long] and 4) IDENT[Cons]. The apocope of the final vowel and the liquid's complete assimilation of Takeo Saga dialect of Japanese are analyzed

along the lines of the phenomena in other languages. It was suggested to analyze the compensatory geminate consonants in Shino-Japanese compounds with the extension of the proposed analysis.

Notes

[1] Lengthened vowels are described as V: and hiatuses are described as VV on this paper.

[2] See footnote 14.

[3] The former part of voiced geminate consonants are actually voiced, as in [tabɯg gohan], but not [tabɯk gohan]. The duration of voiced geminate consonants are about two times longer than that of single counterparts although the degrees of voicing differ depending on dialects.

[4] The former part of geminate nasals of the negative imperative forms with the affix /na/ are actually syllabic according to native speakers of the dialect, which Hayata (1998) does not specify in the data. Whether the nasal-initial word or affix that immediately follows a /ru/-final non-past form is an affix or a word makes a difference, as contrasted between [to$_{i}$.n$_{i}$a] for /toru +na/ in the table and [ton$_{i}$.n$_{i}$a.ma.zu] for /toru#namazu/ 'catfish which (we) will catch'.

[5] Hayata (1998) assumes the conventional rule for the phonology of Japanese $C_i \rightarrow \emptyset$ / C_i#__, which associates, for example, [toɽɯ] (toru) with /tor+ru/. It is assumed that the non-past morpheme has three allomorphs, /ru/ and /u/, and a complex consisting of the atomic allomorphs. McCarthy's (2008a: 308) CodaCond and ONSET, as proposed for the allomorphy of the nominative affix in Korean {/i/, /ka/}, suffice to explain the phonologically conditioned allomorphy of Japanese. ONSET explains, for example, [tabeɽɯ] and *[tabeɯ] for /tabe+{ru,u}/ and [tabɯɽɯ] and *[tabɽɯ] for /tab+{ru,u, uru}. CODACOND explains, for example, *[yomɽɯ] and [yomɯ] for /yom+{ru,u}/. Koga and Ono (2010) explain, for example, *[tabɯ] and [tabɯɽɯ] for /{tab, tabe}+{u,ru,uru}. Koga (2012) explains, for example, [tabɯɽɯ] vs. *[tabeɽɯ].

[6] The phonetic realization of the liquid /r/ is the retroflex flap [ɽ] in Japanese and its dialects.

[7] The core phenomenon of Sasaki (2013; 2015) is the avoidance of geminates of voiced consonants in the dialect. See the footnote16. This is not relevant to this study although compensatory geminate consonants in Shino-Japanese compounds

are related to his study, and it will not be discussed.

[8] Sasaki (2013) predicts, for example, that /katsu da/ 'It is that I will defeat (it)' associates with [kat$_i$t$_i$a] in Hasaki Ibaraki dialect since the surface form *[kat$_i$t$_i$a] violates neither of MAX[Place], CodaCond and *u=C. This will be a problem for Sasaki (2013) if *[kat$_i$t$_i$a] is not attested but [katsuda] is attested for /katsu da/. The form nun is also a candidate constrained by DEP[Nasal] or IDENT[Nasal], which is assumed to rank higher but is not included in the tableau.

[9] Another example is [*kak$_i$ k$_i$...] (cf. [kaku kuwa]) for /kaku kuwa/ 'draw [Non-past]-mulberry'.

[10] The former is also the case for the strong base verbs /k/ 'come' and /s/ 'do'. The latter is also the case for the vowel /i/-final verbs like /oki/ 'get up'.

[11] Other exceptional affixes are the /t(a/e)/-initial allomorphs, for example, the past affix, which is /ta/ only.

[12] The word-final dental liquid /r/ seems to phonetically realize as /l/ in the dialect in Korean.

[13] No vertical line is used in place of dotted lines in the common OT practice on this paper like no line between HAVE[Place] and MAX[Place] in the tableau.

[14] The constraint IDENT [Syllabic] may be better than the constraint IDENT[Cons]. Even if the initial consonant of a word that follows a /ru/-final non-past form is a glide, /j/ or /w/, the former part of the compensatory geminate or the glottal stop occurs, as in [tabuj jo:kan] or [tabuʔ jokan] for /taburu jokan/ 'bean past that (we) eat'. The glides are [- consonantal].

[15] The form nu may be another candidate. The faithfulness constraint MAX-μ, which is assumed to be ranked higher and is not written in as a constraint in the tableau for space limit, rejects this candidate.

[16] See McCarthy (2008b: 275-278) for a discussion of the constraint against voiced obstruents at coda position. See references cited there.

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Abstract

The current study reviews Hayata's (1998) generative rule-based analysis and an extension of Sasaki's (2013) Parallel-Optimality Theoretical (P-OT) analysis (which deals with a complex phenomenon of Hasaki Ibaraki dialect) with regard to explaining the former part of geminate consonants at the finals of the non-past forms in Takeo Saga dialect of Japanese. Hayata (1998) as well

as the extension of Sasaki (2013) cannot explain why geminate consonants occur, not capturing the phenomenon as compensatory geminate consonants. P-OT is shown to bear an incorrect prediction of compensatory geminate consonants. The extension of Sasaki (2013), specifically MAX[Place] ≫ CODACOND, makes an incorrect prediction. The phenomenon fits Harmonic Serialism-OT, as in McCarthy (2008a; 2016), in conjunction with Hayes' (1989) moraic theory. Constraints are proposed and added to McCarthy (2008a). The adoption of Hayes (1989) makes it possible to explain the Japanese phenomenon along compensatorily lengthened vowels and compensatory geminate consonants in other languages like Lesbian and Thessalian dialects of Greek.