A Harmonic Serialism-analysis of apcope and consonant cluster simplification in a Japanese dialect

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Abstract This paper presents an analysis of the first half of geminate consonants and the second half of lengthened vowels at the finals of non-past forms of the Takeo Saga dialect of Japanese in the framework of the Harmonic Serialism of Optimality Theory together with arguments for the analysis. Either 1) geminate consonants or the glottal constriction or 2) lengthened vowels occur in compensation for the absence of the underlying final /ru/ sequences. The paper also provides data in which even geminates of fricatives, voiced obstruents and semivowels occur, which Hayata's (1998) data description entails. Furthermore, a minority of the native speakers considers lengthened vowels and geminate consonants to be grammatical for the /i/-final stem verbs and the /r/-final stem verbs. Hayata's generative rule-based analysis and an extension of Sasaki's (2013) parallel-optimality theoretical analysis of geminate consonants are reviewed and shown to be unable to capture the phenomenon as compensatory geminate consonants. The paper discusses and clarifies the characteristics of the liquid as the cause of the chained phenomenon. McCarthy's (2008a, 2010, 2016, 2019) extension, in conjunction with the analysis of apocope, analyzes the phenomenon as a chain of 1) absence of the final vowel, 2) absence of the liquid and 3) the compensation. Six universal constraints, including one morphophonological constraint, are ranked highly and embedded among McCarthy's (2008a) constraints in his ranking. Some original arguments are presented for the constraints for a less-examined language.

Keywords Compensatory geminate consonants · Compensatorily Lengthened vowel · Harmonic Serialism of OT · Takeo Saga dialect of Japanese

1 Introduction

This paper assesses one main phenomenon. In the Takeo Saga dialect of Japanese, the underlying sequence /ru/s at the finals of the non-past forms are pronounced either as

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the first half of the geminate of the initial consonant of the next word or as the second half of the lengthened vowel immediately before the sequence /ru/ through the absence of the final vowel and the further absence of the final liquid, as schematized in underlying form (UF) /...V$_j$ru.C$_i$/ ↔ Intermediate Form (IF) ...V_jɾ:C_i ↔ Phonetic Form (PF) either [...V$_j$C$_i$.C$_i$] or [...V$_j$ː.C$_i$]. This is exemplified by the association of /nu.ru # go.ri.ra/ with the meaning ambiguous between 'a gorilla which sleeps' and 'a gorilla which paints (it)' and [nɯg$_i$.g$_i$o.ɾʲi.ra] in Figure 1 and by the association of the same UF /nu.ru # go.ri.ra/ with the unique meaning 'a gorilla which paints (it)' and [nɯː.g$_i$o.ɾʲi.ɾa] in Figure 2. The period in PF, IF and UF is a syllable boundary. If we employ Hayes' (1989) moraic theory, we can analyze each PF associated with the IF as compensation for the absence of the liquid with the first half of the geminate consonant or the second half of the lengthened vowel because the mora μ_2 is preserved, associated with the previous syllable σ_1, and filled with one of the two, as observed in the representations of the IFs and PFs in Figures 1 and 2.

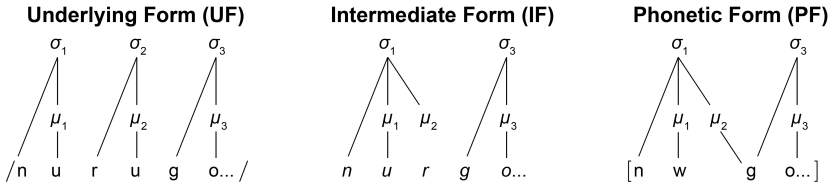


Fig. 1 The first half of a geminate consonant in compensation for /ru/ sequences in form with ambiguous meaning 'sleep-Non-past' or 'paint-Non-past'

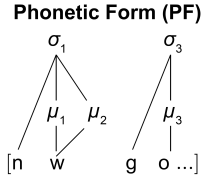


Fig. 2 The second half of the lengthened vowel in compensation for a /ru/ sequence in form with unique meaning 'paint-Non-past', UF and IF are the same as those in Figure 1

Saga dialects, originating from the language of the area from the 13th century to the 19th century, for example, governed by the Ryuzoji and Nabeshima clans, are now spoken in western Miyaki, Kanzaki City, Saga City, Ogi City, Taku City, Kashima City, Takeo City, Kishima City, Nishi-matsuura City, a part of Imari City, and Fujitsu City. The dialect that we investigate is spoken in Takeo City (population 51,000 in 2011). The verb morphology reflects an agglutinative structure of Japanese and exhibits a little morphophonology as this paper reveals.

This paper proposes Harmonic Serialism (HS) of Optimality Theory (OT; HS-OT) analysis of the phenomenon in the Japanese dialect by employing Hayes' (1989) theory and argues for the analysis for the less-examined language. McCarthy (2008a,

2010, 2016, 2019) developed HS-OT. Hayata's (1998) rule-based analysis, the framework of which may not allow prosodic notions, is unable to explain the absence of the final vowel only after the liquid. An extension of Sasaki's (2013) Parallel-OT (P-OT) analysis, the framework of which associates UFs and PFs directly, or with no intermediate form between them, cannot capture the chain between the absence of the final vowel and the compensation, for example, in the sequence of UF /ru.g_i/ and PF [g_i.g_i] through the intermediate form *r.*g_i.

In contrast with P-OT, the association between UF and PF in HS-OT is stepwise, with harmony incrementally achieved through intermediate forms (IFs) and with only one difference allowed between a form on the UF side and a form on the PF side in each step. HS-OT analysis analyzes the association between the liquid and either the first half of a geminate consonant or the second half of the lengthened vowel as a two-step one in the scheme of /Vr.C_i/ - *VH*.C_i - either [VC_i.C_i] or [*V*ː.C_i], as explained by McCarthy's (2008a) analysis of consonant cluster simplification. The symbol *H* is the Placeless counterpart of the consonant. The Placeless counterpart of the liquid contains, for example, [sonorant (liquid)].

In addition to McCarthy's (2008a) constraints, the proposed HS-OT analysis adopts 1) the markedness constraint that prohibits light syllables at the finals of the non-past forms, 2) the faithfulness constraint on contiguity, 3) two distinct faithfulness constraints on the marked values and the unmarked values of MoA based on de Lacy's (2006) markedness theory, 4) the faithfulness constraint on vowel length in the inflectional affix and 5) the constraint to make identical the values of consonantal. The affix-faithfulness constraint is morphophonological. Without Koga and Ono's (2010) morphological analysis of the non-past forms of the dialect employed in IDENT$_{affix}$[Long], no phonological constraint could have explained, for example, the contrast between [nɯʔ] and *[nɯː] 'sleep' and [nɯʔ] and [nɯː] 'paint' for the same UF /nuru/, among a minority of the Takeo Saga dialect native speakers.

If this study is correct, HS can analyze the sequence of apocope and compensation in a Japanese dialect. Furthermore, the faithfulness of the vowel length only within the inflectional affix will be required in addition to Torres-Tamarit's (2016) faithfulness constraint on the vowel quality of the affix. This indicates that the morpho(phono)logy is autonomous in the dialect of Japanese. De Lacy's (2006) markedness theory must extend to MoA.

This paper is presented sequentially. After assessing whether a geminate consonant occurs when the last consonant of the non-past form is each of /r/, (as Hayata's (1998) dataset provided), /w/, /t/, /n/, /m/, /b/, /k/, /g/ and /s/, as added in this paper, section 2 observes that the geminate consonant occurs even if the initial segment of the word following the non-past form is a voiced consonant, fricative, or sononant (a nasal, the liquid, or a semivowel). Furthermore, the section presents another phenomenon: A minority of the native speakers accepts the second half of the lengthened vowel and the first half of the geminate consonant at the finals of the /i/-final stem verbs and the /r/-final stem verbs. Section 3 reviews the literature (Hayata 1998 and Sasaki 2013) and discusses what allows the absence of the liquid. Section 4 proposes six ranked-high constraints, and these are added to McCarthy's (2008a) after introducing four basic concepts. Section 5 explains how the proposed constraints and rankings make correct predictions.

2 Non-past forms of verbs of Takeo Saga dialect of Japanese

2.1 Hayata (1998)

(1) First halves of geminate consonants at the finals in Takeo Saga dialect (with the upper part from Hayata 1998)

	S-final	relative clause#(noun)	conditional	negative imperative	causative	meaning
a. consonant-final stem verbs						
Takeo	toʔ	tog (g...)	toggʲiː	toNna	torasɯʔ	‘take’
Tokyo	toɾɯ	toɾɯ (g...)	toreba	toɾɯna	toraseɾɯ	
b. ‘vowel /e/-final’ stem verbs						
Takeo	tabɯʔ	tabɯg (g...)	tabɯggʲiː	tabɯNna	tabesasɯʔ	‘eat’
Tokyo	taberɯ	taberɯ (g...)	tabereba	taberɯna	tabesaseɾɯ	
c. vowel /i/-final stem verbs						
Takeo	okʲiʔ	okʲig (g...)	okʲiggʲiː	okʲiNna	okʲisasɯʔ	‘get up’
Tokyo	okʲiɾɯ	okʲiɾɯ (g...)	okʲireba	okʲiɾɯna	okʲisaseɾɯ	
d. strong ‘/k/-final’ stem verbs						
Takeo	kɯʔ	kɯg (g...)	kɯggʲiː	kɯNna	kosasɯʔ	‘come’
Tokyo	kɯɾɯ	kɯɾɯ (g...)	kɯreba	kɯɾɯna	kosaseɾɯ	
e. strong ‘/s/-final’ stem verbs						
Takeo	sɯʔ	sɯg (g...)	sugʲiː	sɯNna	sasɯʔ	‘do’
Tokyo	sɯɾɯ	sɯɾɯ (g...)	sɯreba	sɯɾɯna	saseɾɯ	
f. consonant-final stem verbs with the final consonant not /r/						
Takeo	aɰ	aɰ (g...)	aɰgʲiː	aɰna	awasɯʔ	‘meet’
Tokyo	aɯ	aɯ (g...)	aeba	aɯna	awaseɾɯ	
Takeo	ʃinɯ	ʃinɯ (g...)	ʃinɯgʲiː	ʃinɯna	ʃinasɯʔ	‘die’
Tokyo	ʃinɯ	ʃinɯ (g...)	ʃineba	ʃinɯna	ʃinaseɾɯ	
Takeo	amɯ	amɯ (g...)	amɯgʲiː	amɯna	amasɯʔ	‘knit’
Tokyo	amɯ	amɯ (g...)	ameba	amɯna	amaseɾɯ	
Takeo	tobɯ	tobɯ (g...)	tobɯgʲiː	tobɯna	toba(sa)sɯʔ	‘fly’
Tokyo	tobɯ	tobɯ (g...)	tobeba	tobɯna	toba(sa)seɾɯ	
Takeo	matsɯ	matsɯ (g...)	matsɯgʲiː	matsɯna	matasɯʔ	‘await’
Tokyo	matsɯ	matsɯ (g...)	mateba	matsɯna	mataseɾɯ	
Takeo	wakɯ	wakɯ (g...)	wakɯgʲiː	wakɯna	waka(sa)sɯʔ	‘boil’
Tokyo	wakɯ	wakɯ (g...)	wakeba	wakɯna	waka(sa)seɾɯ	
Takeo	kogɯ	kogɯ (g...)	kogɯgʲiː	kogɯna	kogasɯʔ	‘row’
Tokyo	kogɯ	kogɯ (g...)	kogeba	kogɯna	kogaseɾɯ	
Takeo	hanasɯ	hanasɯ (g...)	hanasɯgʲiː	hanasɯna	hanasasɯʔ	‘talk’
Tokyo	hanasɯ	hanasɯ (g...)	hanaseba	hanasɯna	hanasaseɾɯ	

Every non-past form ending with [ɾɯ] (/ru/) in the Tokyo dialect *either* 1) ends with the first half of the geminate consonant when followed by a consonant, regardless of the consonant *or* 2) ends with the glottal stop when followed by a vowel or at the

end of a sentence in Takeo Saga dialect (Hayata 1998), as in the upper part of (1).[1] Notably, the non-past forms of the 'vowel /e/-final' stem verbs have the 'stem-final /e/' replaced with /u/ in Takeo Saga dialect, and this is not the case in the non-past forms of the strong stem verbs, for example, [kɯʔ] 'come-Non-past' compared with *[kerɯ] (cf. [kɯɾɯ]).[2] That is, the dialect in the discussion retains the so-called bi-grade inflections without the sentence-final (or aorist) forms. See Hayata (2000) for relevant bi-grade inflections in Old Japanese. Native speakers say that they pronounce the glottal stop, called 'sokuon', in the same manner as the first half of the geminate consonant of [totta] 'took', in both situations (or followed by a consonant and, e.g., sentence-finally). Tension of the vocal folds is involved in producing the sokuon in the Tokyo dialect of Japanese, according to a physiological study (Fujimoto, 2014). An assumption is that at a bare minimum, the glottal constriction is involved where Hayata (1998) claims the glottal stop or the first half of each geminate consonant occurs. Ono (1954: 87-112) and Fujita and Kanbe (2003: 11, 24) also demonstrate that the underlying sequence /ru/s at the finals of the non-past forms are pronounced as the first half of a geminate consonant or the glottal stop. The 'non-past' form, not ending with /ru/ in the Tokyo dialect, or underlyingly ending with /tu/, /(w)u/, /nu/, /mu/, /bu/, /ku/, /gu/, or /su/, in contrast, never ends phonetically with the first half of a geminate consonant or the second half of the lengthened vowel in Takeo Saga dialect, as exemplified in the lower part of (1). Notably, the semivowel /w/ and the liquid /r/ are sonorants, but the non-past final /wu/ cannot be associated with the first half of a geminate consonant or the second half of the lengthened vowel. The final syllable of the PF [kaɯ̩] of /ka.wu/ is not a light syllable but a heavy syllable. The rhyme of the last syllable of the non-past form is a diphthong with the second the short high back vowel, [aɯ̩].

2.2 Even Geminates of Sonorants, Voiced and Voiceless Fricatives, and Voiced Obstruents

Even if the initial consonant of a word that follows the non-past form is a sonorant (or a semivowel or the liquid or a nasal, e.g., the coronal nasal in (1)) or a voiced or voiceless fricative, the geminate consonant is present in Takeo Saga dialect, as in (2a) and (2b) for geminate fricatives, (2c) for the fricative *h*, (2d) for the fricative ɕ, (2e)

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

[2] 'Vowel /e/-final' stem verbs are the verbs with one stem (say A) that end with the vowel /e/, and the other is the same as the other (A), except for the final vowel /e/ is eliminated, or schematized as the pattern of /X(e)/, for example, the verb stem /tab(e)/ 'eat', in Takeo Saga dialect. The strong '/s/-final' stem verb is the verb (meaning 'do') with stems /s(e)/ in the dialect. The strong '/k/-final' stem verb is the verb with the stem /k(o)/ 'come'. The morphological structures of the non-past forms in the dialect are clarified in section 4.1.5.

for the labio-velar semivowel, (2f) for the palatal semivowel, (2g) for the liquid, and (2h) for a coronal nasal.

(2) a. mottekɯs sɯʃi (Noun) cf. [strong '/k/-final']
bring [Non-past] sushi
'the sushi which (I) bring there'

b. kɯɾasɯʃ ʃeeto (Noun) cf. ['vowel /e/-final']
punch [Non-past] student
'the student who punches (them)'

c. kakɯh hajaka ɕito (Noun) cf. ['vowel /e/-final']
run [Non-past] fast man
'the fast man who runs'

d. kakɯɕ ɕito (Noun) cf. (the same as (2g))
run [Non-past] man
'the man who runs'

e. misoʃiɾɯ ni iɾɯw wakame (Noun) cf. ['vowel /e/-final']
miso soup in put [Non-past] sea weed
'the sea weed that (I) put in miso soup'

f. kʲezɯj jasɯɾi (Noun) cf. [consonant-final]
sharpen [Non-past] file
'the file with which (I) sharpen (it)'

g. tabɯɾ ɾamʲeN (Noun) cf. ['vowel /e/-final']
eat [Non-past] ramen noodle
'the ramen noodle that (I) eat'

h. ɾjo:ɾʲisɯn namako (Noun) cf. [strong '/s/-final']
cook [Non-past] sea cucumber
'the sea cucumber that (we) cook'

See Matsuura (2016) for geminates of voiced obstruents in Kyushu dialects, e.g., [...g.g...] in (1).[3] The morphologically closely corresponding Tokyo counterpart of (2b) would be [kɯɾa(wa)seɾɯ]. The morphologically closely corresponding Tokyo counterpart of (2c) is [iɾeɾɯ]. Hayata (1998: 2) provides one example of the liquid geminate in a future form of a verb, [tabɯrro:] (/taburu + rou/) 'will eat' for the Tokyo counterpart [taberɯdaro:]. Notably, the first half of the geminate of the nasal in (2h) is not syllabic one, which occurs when the morpheme that follows the non-past form is an affix, as in the negative forms, e.g., [tabɯNna] (UF /taburu+na/) in (1).

[3] The first halves of voiced geminate consonants are voiced, as in [tabɯg gohaN], but not *[tabɯk gohaN]. For the degrees of voicing, see Matsuura (2016).

2.3 Compensatorily Lengthened Vowels

A minority of the native speakers judges the vowel-lengthened counterparts of the vowel /i/-final and consonant /r/-final stem verbs acceptable as well, whereas they judge those of the 'vowel /e/-final' and strong stem verbs unacceptable, as exemplified in (3).

(3) A minority of native speakers with the second halves of lengthened vowels at the finals in Takeo Saga dialect

	S-final	RC#(Noun)	conditional	Neg. Imp.	causative	
consonant-final stem verbs						
(V)ː	toː	toː (g...)	toːgʲiː	toːna		'take'
$C_i(C_i)$	toʔ	tog (g...)	toggʲiː	toɳna	torasɯʔ	
(V)ː	kʲiː	kʲiː (g...)	kʲiːgʲi(V)ː	kʲiːna		'cut'
$C_i(C_i)$	kʲiʔ	kʲig (g...)	kʲiggʲiː	kʲiɳna	kʲirasɯʔ	
'vowel /e/-final' stem verbs						
(V)ː	*tabɯː	*tabɯː (g...)	*tabɯːgʲiː	*tabɯːna		'eat'
$C_i(C_i)$	tabɯʔ	tabɯg (g...)	tabɯggʲiː	tabɯɳna	tabesasɯʔ	
(V)ː	*nɯː	*nɯː (g...)	*nɯːgʲiː	*nɯːna		'sleep'
$C_i(C_i)$	nɯʔ	nɯg (g...)	nɯggʲiː	nɯɳna	neɯʔ	
vowel /i/-final stem verbs						
(V)ː	okʲiː	okʲiː (g...)	okʲiːgʲiː	okʲiːna		'get up'
$C_i(C_i)$	okʲiʔ	okʲig (g...)	okʲiggʲiː	okʲiɳna	okʲisasɯʔ	
(V)ː	kʲiː	kʲiː (g...)	kʲiːgʲiː	kʲiːna		'wear'
$C_i(C_i)$	kʲiʔ	kʲig (g...)	kʲiggʲiː	kʲiɳna	kʲisasɯʔ	
strong '/k/-final' stem verbs						
(V)ː	*kɯː	*kɯː (g...)	*kɯːgʲiː	*kɯːna		'come'
$C_i(C_i)$	kɯʔ	kɯg (g...)	kɯggʲiː	kɯɳna	kosasɯʔ	
strong '/s/-final' stem verbs						
(V)ː	*sɯː	*sɯː (g...)	*sɯːgʲiː	*sɯːna		'do'
$C_i(C_i)$	sɯʔ	sɯg (g...)	suggʲiː	sɯɳna	sasɯʔ	

For example, they judge *[nɯː] as ungrammatical as long as the verb is a 'vowel /e/-final' stem verb, meaning 'sleep'. When the verb is a consonant /r/-final stem verb, meaning 'paint', they also judge [nɯː] as grammatical. Uwano (1989: 74) notices that some final sequence /ru/s alternate with the second half of the lengthened vowel in various areas of western Japan; notably, that which is grammatical between geminate consonants and lengthened vowels or both is the same among the vowel /i/-final stem verbs and the consonant /r/-final stem verbs, and among the 'vowel /e/-final' stem verbs and the strong stem verbs. Which sound occurs is exactly the same before non-sonorants and before sonorants, as in [kʲezɯj/kʲezɯː jasɯɾi] 'a file that (I) sharpen it with', [tabɯɾ/*tabɯː ɾamʲeN] 'ramen noodle that (I) eat', [okʲiɕ/okʲiː ɕito]

'a man that wakes up', [mottekɯw/*mottekɯː wakame] 'sea weed that (I) bring,' and [ɾjoːrʲisɯs/*ryourʲisɯː suʃi] 'the sushi that (I) cook'.[4]

Summarizing the data of sections 2.1, 2.2 and this section, a heavy syllable occurs at the finals of some non-past forms, as schematized in (4).

(4) a. If the final syllable is underlyingly the semivowel /w/ for the onset and the high back vowel /u/ for the nucleus, the sequence */(C$_i$)V$_j$*.wu/ will be [(C$_i$)V$_j$ɯɥ] phonetically, which has the short high back vowel *ɯɥ* added to the previous syllable, as in [mɯɪ.kaɯɥ] for /mu.ka.wu/ 'confront-Non-past'.

b. With a non-past form plus a word, /...V$_p$.C$_f$V$_f$/+/S$_n$.../, where V$_p$ and V$_f$ are vowels, C$_f$ is a consonant, and S$_n$ is a segment, given that the PF will be [...V$_p$S$_n$.S$_n$...] if C$_f$ is the liquid and S$_n$ is a consonant and be [...V$_p$ʔ.S$_n$...] if C$_f$ is the liquid and S$_n$ is a vowel.

c. The final consonant of every underlying non-past form C$_f$ in the scheme is one of the consonants-/ɾ/, /w/, /t/, /n/, /m/, /b/, /k/, /g/ and /s/-in Takeo Saga dialect (and in Tokyo dialect).

d. Elsewhere, the PF is basically the same as the final syllable of UF, namely, [(...V$_p$.)C$_f$V$_f$.(S$_n$...)].

As observed, a minority of the speakers accepts the second half of the lengthened vowel as well if the verb is an /ɾ/ consonant-final verb or a vowel /i/-final verb, as summarized in (5).

(5) a. = (4a)

b. = (4b). In addition, for the sequence of a non-past form plus a word /...V$_p$.C$_f$V$_f$/ + /S$_n$.../, if C$_f$ is the liquid and the verb is either an /ɾ/ consonant-final verb or a vowel /i/-final verb, the PF can also be [...V$_p$ː.S$_n$...].

c. = (4c)

d. = (4d)

3 Review of the literature

3.1 Hayata's (1998) rule-based account

Hayata (1998) supports that the UFs of the first halves of geminate consonants and the glottal stop are **/ru/**, specifically 1) **/ɾ+ru/** like /toɾ+ru/ for [toʔ] and 2) **/ru/** like /oki+ru/ for [okʲiʔ] and /tabe+ru/ for [tabɯʔ]. The underlying stem-final /ɾ/ in the case of 1) is motivated because the stem-final consonant /ɾ/ occurs in other verb forms, for example, the negative, causative, passive, and volitional forms, such as [toɾ] in [toraN] 'do not take', [toɾasɯʔ] 'make (someone) take', [toɾaɾɯʔ] 'take [Passive],' and [toɾoj]

[4] The form /kezuru/ is a consonant /ɾ/-final verb, the form /mottekuru/ is a strong /k/-stem verb, and the form /ryourisuru/ is a strong /s/-stem verb.

'let's take'. That the word-final vowel /u/ is derived through the deletion of the second occurrence of /r/ in the C-C juncture /...r + ru/ in the case of 1) is reasonable because the deletion occurs there in case of the other stem-final consonants /t, k, b, g, s, n, and m, (w)/ such as [hanasɯ] for /hanas + ru/.[5] As the null hypothesis, Hayata (1998) claims that the UFs of the first halves of geminate consonants and the glottal stop in the other non-past forms, or those when the verb is a vowel-final stem or a strong stem verb, are also /ru/ even though no direct evidence supports that the underlying segment of both the first half of every geminate consonant and the glottal stop (constriction) is /ru/.[6]

Hayata's (1998) rules are 1) Vowel Change $e \rightarrow u$ / ___]$_{verb\ stem}$, 2) Verb Final /u/ Deletion $u \rightarrow \emptyset$ / r___]$_{verb}$, and 3) /r/-regressive Complete Assimilation $r \rightarrow C_i$ / ___]$_{verb}$#C_i. Using Verb Final /u/ Deletion, the final /u/ of the non-past form is eliminated after the liquid /r/, as in the second line of the table. Using the /r/-regressive Assimilation, the liquid /r/, either stem-final or affix-initial, completely assimilates to whichever consonant immediately follows that, as in the third line of the table. Using the Vowel Change, the stem-final /e/ changes to /u/, as in the first line in (6).

(6) Derivation of geminate consonants

ne ru toki	oki ru toki	Underlying Form
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 Form

Hayata (1998) provides no explanation for why vowel apocope occurs only after the liquid, (whereas Sasaki (2013) attempts to explain it, as discussed later). Hayata suggested further research to explain the /r/-regressive assimilation: "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 restricted to segmental phonology, an explanation of how the liquid /r/ can realize itself as any of the consonants /p/, /b/, /t/, /d/, /k/, /g/, /s/, /z/, /h/, /m/, /n/, /r/, /w/, and /j/ would even be more difficult.

Regarding the compensation by lengthened vowels, if restricted to segmental phonology, an explanation of how the liquid /r/ can realize itself as any of the vowels /i/, /u/, /e/, /o/, and /a/, which precedes that liquid, would be difficult.

Hayata's (1998) final /u/-deletion Similar to the 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).

(7) a. sĭkakíli ~ sĭkakíl 'put it in it'

[5] Hall, Jurgec and Kawahara (2018) reject the previously common practice in the generative study of Japanese in the text that the non-past affix is only the form /ru/.

[6] XX indicated Hayata's logic in my review of Hayata (1998).

b. kítaya ∼ kítay ‘he already sees it’

c. kikówa ∼ kików ‘he buys it’

d. támi ∼ tám ‘it ends’

Isthmus Nahuatl avoids light syllables at the end of verb forms if the final consonant is a voiced sonorant; the language invites one heavy syllable with the underlying final vowel absent and with the underlying final consonant added to the previous syllable as the coda, as in [... .kil] for /... .ki.li/.

The absence of the high back vowel at the post-liquid in Takeo Saga dialect is not observed in words of the other categories, as in [haruɯ] (/haru/) ‘spring’ compared with [haʔ] or [haːr] (/har+u/) ‘paste-Non-past’. The final vowel /i/ or /e/ of a present participle/gerundive form cannot be absent (even though they are verbs), as provided in sections 2.4 and 2.7 of Koga (2016). Takeo Saga dialect thus avoids light syllables at the end if the final consonant is the liquid, and the verb form is a non-past form; the language invites one heavy syllable with the underlying final vowel absent and with the underlying final liquid added to the previous syllable as the coda, as input forms and output forms schematized before and after the arrow in (8).

(8) $[_{\sigma}(C_i)V_j][_{\sigma}\mathrm{r}V_k]_{[Tense\ Non-past]}\# \leftrightarrow [_{\sigma}(C_i)V_j\mathrm{r}]_{[Tense\ Non-past]}\#$

Furthermore, either a geminate consonant or the lengthened vowel occurs in absence of the liquid here.

3.2 An extension of Sasaki’s (2013, 2015) P-OT account

3.2.1 His P-OT account

Sasaki (2013, 2015) investigates a complex phenomenon of the Hasaki Ibaraki dialect of Japanese, which includes the apocope of /u/ of the non-past forms and the /r/-complete assimilation, which is almost the same as that of Takeo Saga dialect. Sasaki (2013) is the first OT analysis of geminate consonants at the ends of non-past forms in another Japanese dialect. Sasaki’s (2013, 2015) constraints relevant to this study are

(9) 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 PoA feature value.

c. The markedness constraint CODA CONDITION, as defined in Ito and Mester (2001), bans the singleton non-nasal consonant at the coda position.

d. Ranking: MAX[Place] ≫ CODACOND ≫ *u#C

The constraint *u#C prohibits any underlying sequence of the pattern u#C whatever consonant C is, for example, /...mu # d.../, where C is the initial segment /d/ of

the copula. The interaction between the faithfulness constraint MAX[Place] and the markedness constraint *u#C explains the final vowel's absence only immediately after the liquid in Takeo Saga dialect. Sasaki (2013) explains that if the consonant /r/ deletes, the form without the liquid will not violate MAX[Place] because the PoA of the liquid is underspecified, as assumed in Ito (1986), and as observed in the upper part of (10).

(10) Sasaki's (2013) predictions of geminate consonants

		MAX[Place]	CODACOND	*u#C
	UR: /kuru#daigaku/ 'come [Non-past]-university'			
☞	a. [kud$_i$#d$_i$...]			
	b. [kur#d...]		*	
	c. [kuru#d...]			*
	UR: /kaku#daigaku/ 'write [Non-past]-university'			
☞	a. [kaku#d...]			*
	b. [kat$_i$#t$_i$...]	*		
	c. [kak#d...]		*	

If any other consonant such as /k/ deletes, it violates MAX[Place] because the other consonants have some value for PoA, as in the lower part of (10). The phenomenon that Sasaki (2013, 2015) is most concerned with is the avoidance of geminates of voiced consonants in the dialect.[7,8] OT's constraint-interaction to consider contextual conditions as constraints at higher ranks explains Hayata's (1998) rule: $u \rightarrow \emptyset$ / $r\_\_]_{verb}$. The PoA of the liquid is underspecified, and its absence does not violate the constraint at a higher rank MAX[Place]. The PoA of any consonant is some positive value, and its absence violates the constraint MAX[Place]. Because the liquid can be absent, the word-final vowel after the liquid can be absent.

Because P-OT theory, the basis of Sasaki's (2013, 2015) analysis, allows no intermediate form between UFs and PFs and no complex phenomenon analyzed as a chain of atomic phenomena. If a complex phenomenon is not analyzed as a chain of atomic phenomena, specifying the correct constraints for the complex phenomenon is difficult. Section 4.1.1 introduces HS-OT and clarifies what atomic phenomena the target phenomenon of Takeo Saga dialect is the chain of.[9]

[7] See footnote 3.

[8] The candidate *[kad.daigaku] violates a constraint VOICEDGEMINATE, which ranks higher. The candidate [kat.taigaku], which is a candidate in (10) and has the word-final /d/ devoiced, may be a reasonable candidate. Devoiced word finals are prevalent in languages.

[9] P-OT assumes that the absence of full segments occurs without IFs and cannot exclude, for example, the association between /patka/ and *[pata] (McCarthy 2019). See McCarthy (2008a, 2019) for the problem of P-OT.

3.2.2 Unmarked PoA and Unmarked MoA of the Liquid

If the scope of the study is expanded to include other types of consonant cluster simplification, or coda-onset assimilation 1) over root boundaries of Sino-Japanese compounds and 2) over verb stems and the /t/ initial-allomorph affixes in the Takeo Sags dialect (and the Tokyo Japanese), Sasaki's (2013) MAX[Place] is only inadequate for explaining different behaviors of consonants /k/ and /t/, and Kurisu's (2000) ranking of IDENT[Dorsal] ≫ IDENT[Coronal] is only also inadequate for explaining different behaviors of the liquid and the coronal stop.

First, Sasaki's (2013) MAX[Place] only, which does not adopt such an analysis as de Lacy's (2006:173-182) markedness theory in PoA, is inadequate for explaining different behaviors of /k/ and /t/ in (11) and (12), if extended to explain the dataset of coda-onset assimilation over root boundaries of Sino-Japanese compounds. A dorsal stop on the PF side is associated with a coronal stop on the UF side in the coda, as in (11).

(11) a. PF: [hakka] cf. *[hatsɯka] 'get fire'

b. UF: /hat+ka/ 'start+fire'

c. PF of Coda Consonant: PoA: [dor]; MoA: [obst]

d. UF of Coda Consonant: PoA: [cor]; MoA: [obst]

Conversely, a coronal stop on the PF side cannot be associated with a dorsal stop on the UF side in the coda, as in (12).

(12) a. PF: *[kottaj] cf. [kokutaj] 'national athletic meeting'

b. UF: /kok+tai/ 'nation+exercise'

c. PF of Coda Consonant: PoA: [cor]; MoA: [obst]

d. UF of Coda Consonant: PoA: [dor]; MoA: [obst]

We suppose that the constraint DEP, which gives one violation mark to the candidate with one epenthetic vowel or consonant, is relevant, and that the ranking is CODA-COND ≫ DEP ≫ MAX[Place], by following Sasaki (2013). This analysis makes the same predictions for the different PF-UF pairs, for example, between ([k]$_{PF}$, /t/$_{UF}$) and *([t]$_{PF}$, /k/$_{UF}$), as in (13), because the analysis is not sensitive to different PoA values. It correctly predicts that /hat+ka/ is associated with [hakka], as in the upper part of (13), whereas it incorrectly predicts that /kok+tai/ is associated with *[kottaj], as in the lower part of (13).

(13) Sasaki's (2013) predictions

		CODACOND	DEP	MAX[Place]
	UR: /hat+ka/			
☞	a. *hakka*			*
	b. *hatka*	*		
	c. *hatuka*		*	
	UR: /kok+tai/			
☞	a. *kottai*			*
	b. *koktai*	*		
	c. *kokutai*		*	

If DEP ranks lower than MAX[Place], the ranking is CODACOND ≫ MAX[Place] ≫ DEP; it cannot make correct predictions of both. The UF /kok+tai/ is correctly predicted to be associated with *kokutai*, whereas the UF /hat+ka/ is incorrectly predicted to be associated with **hatuka* (*[hatsɯka]). Sasaki's (2013) MAX[Place] is only thus inadequate if it is extended to explain the type of consonant cluster simplification over root boundaries of Sino-Japanese compounds.

Kurisu (2000), who investigates consonant cluster simplification over root boundaries of Sino-Japanese compounds and adopts the two constraints with a particular ranking, or IDENT[Dorsal] ≫ IDENT[Coronal], in place of MAX[Place], can predict the aforementioned dataset (11) and (12) correctly, as in (14).

(14) Kurisu's (2000) predictions

		CODACOND	IDENT[Dorsal]	DEP	IDENT[Coronal]
	UR: /hat+ka/				
☞	a. *hakka*				*
	c. *hatka*	*			
	c. *hatuka*			*	
	UR: /kok+tai/				
☞	a. *kokutai*			*	
	b. *koktai*	*			
	c. *kottai*		*		

The ranking of IDENT[Dorsal] ≫ IDENT[Coronal] indicates that the PoA dorsal is more faithful than the PoA coronal, which is similar to de Lacy's (2006:173-182) markedness theory in PoA. (The constraint IDENT[Dorsal] is similar to MAX[Place: M(arked)], and IDENT[Coronal] is similar to MAX[Place].)

Next, Kurisu's (2000) ranking of IDENT[Dorsal] ≫ IDENT[Coronal] is only inadequate to explain different behaviors of the liquid and the coronal stop in (15) and (16) if extended to include the type of consonant cluster simplification over the verb stem plus the /t/-inital affixes. The (coronal) liquid on the PF side cannot be associated with the coronal stop on the UF side, as in (15), whereas the coronal stop on the PF side is associated with the (coronal) liquid on the UF side, as in (16).

(15) a. PF: *[kerroN] cf. [ketsɯroN] 'conclusion'
b. UF: /ket+roN/ 'conclude+reason'

c. PF of Coda Consonant: MoA: [liquid]; PoA: [cor]

d. UF of Coda Consonant: MoA: [obst]; PoA: [cor]

(16) a. PF: [atta]

b. UF: /ar+ta/ ‘exist+Past’

c. PF of Coda Consonant: MoA: [obst]; PoA: [cor]

d. UF of Coda Consonant: MoA: [liquid]; PoA: [cor]

All the constraints related to MoA are only IDENT[Son(orant)] in Kurisu (2000). His analysis makes the incorrect same predictions of the different PF-UF pairs between ([t]$_{PF}$, /r/$_{UF}$) and *([r]$_{PF}$, /t/$_{UF}$), as in (17).

(17) Kurisu’s (2000) predictions

		CODACOND	IDENT[Dorsal]	DEP	IDENT[Coronal]
	UR: /ar+ta/				
☞	a. *atta*				*
	b. *arta*	*			
	c. *arita*			*	
	UR: /ket+roN/				
☞	a. *kerroN*				*
	b. *ketroN*	*			
	c. *keturoN*			*	

The segment /t/ has feature specifications [obstruent$_{MoA}$, coronal$_{PoA}$], whereas for segment /r/, [sonorant$_{MoA}$, coronal$_{PoA}$]. The analysis cannot explain the data that differs depending on the values of MoA. The UF /ar+ta/ is correctly predicted to be associated with the form *atta* on the PF side, as in the upper part, whereas the UF /ket+roN/ is incorrectly predicted to be associated with the PF form **kerroN* (*[kerroN]), as in the lower part. Such an analysis that the coronal obstruent is more faithful than the (coronal) liquid is necessary to explain the difference. What makes this inadequacy adequate is de Lacy’s (2006) markedness theory, as is clarified in section 4.1.4.

4 Proposal

4.1 Basic Concepts

The following sections present the theoretical framework of HS (as McCarthy (2008a, 2010, 2016, 2019) develops) (section 4.1.1); a prosodic assumption, Hayes’ (1989) moraic theory (section 4.1.2), McCarthy’s (2008a) constraints for consonant cluster simplification (section 4.1.3), de Lacy’s (2006) markedness theory (section 4.1.4), a morphological assumption of verb stems and the non-past affix in the dialect (section 4.1.5).

4.1.1 HS-OT (Harmonic-Serialism-Optimality Theory)

This study adopts McCarthy's (2008a, 2010, 2016, 2019) HS-OT as the framework.[10] In HS-OT, the PF and the UF are associated only if a series of paths gradually improves harmony. If no series of paths gradually and harmonically improve between the UF and the PF, the UF and the PF cannot be associated. Only one difference is allowed between the form on the UF side and the form on the PF side in each path. The candidate UFs for morphophonology and phonology are assumed to be restricted to those that satisfy the constraints of morpho-syntax and syntax. The grammar of morpho-syntax and syntax appears to contradict the richness of the base in OT. This is not 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 richness of the base is satisfied for the UF form and the PF form, which grammar as a whole associates if it comprises the morphosyntactic and syntactic component and the morpho-phonological and phonological component.

The association between the final /ru/ of the non-past forms and the first half of a geminate consonant or the second half of the lengthened vowel, represented in Figures 1 and 2, is further analyzed in this framework. The underlying non-past form with /ru/ as its final (18a), on the one hand, and the same form except for either the first half of a geminate of the consonant or the second half of the lengthened vowel replacing the final sequence /ru/ (18d) or (18e), on the other hand, can be associated through an intermediate form with the apocope of the final vowel (18b) and another intermediate form with the final liquid debuccalised to be *H* (its Placeless counterpart) (18c).[11]

(18) a. UF: /...$V_j$ru # (C_i...)/ e.g., /toru (gorira)/ by apocope
b. IF: ...*V_jr (C_i...)* *tor (gorira)* by debuccalisation
c. IF: ...*V_jH (C_i...)* *toH (gorira)* by absence of liquid
d. PF_1: [...$V_j C_i$ (C_i...)] [tog$_i$(g$_i$or^{j}ira)] by a compensation
e. PF_2: [...V_jː (C_i...)] [toː(g$_i$or^{j}ira)] by a compensation

The associations from (18b) to either (18d) or (18e) are McCarthy's (2008a) analysis of consonant cluster simplification. See McCarthy (2008a) for a discussion of the debuccalized counterpart of whichever consonant is absent.

HS-OT can clarify what atomic phenomena in what order a complex phenomenon is a chain of because it allows IFs with minimum differences between the form on the UF side and the form on the PF side. If the atomic phenomena in the chain are attested independently in languages, it motivates the use of HS-OT analysis. This is not clear in P-OT. This study, which analyzes the compensation phenomenon as the

[10] Prince and Smolensky (2004) started OT and considered a serial architecture for OT, called HS. Gen and Eval iterate, sending the output of Eval back into Gen as a new input, and this loop continues until the derivation converges (McCarthy 2008b).

[11] McCarthy (2019) further claims absence of vowels also occurs step by step in the paths of *a* - {*u, i*} - *ə* - [∅], for example, /toru/ - *torə* - *tor*.

associations–1) between *ru* and *r*, 2) between *r* and *H*, or the liquid minus its PoA feature coronal here, and 3) between the liquid minus coronal and either the first half of a geminate consonant or the second half of the lengthened vowel–can receive motivation as follows. The word-final apocope of the vowel is observed in the non-past forms of the consonant /r/-final stem verbs in the Tarama dialect of Miyako Ryukyuan, as mentioned in Koga (2016: 24), and in the present forms in Isthmus Nahuatl, as discussed in section 3.1. The association between a consonant and either the first half of a geminate consonant or the second half of the lengthened vowel is observed in the dialects of Greek, as explained in section 4.1.2. Thus, the apocope and compensation in Takeo Saga dialect that comprise the given phenomena in a chain receive motivation because all the atomic phenomena are attested independently. That is, the phenomenon in Takeo Saga dialect is nothing special and is actually a chain of a vowel-then-consonant apocope and compensation which are prevalent in languages.

4.1.2 Hayes' (1989) moraic theory

In response to Hayata's (1998) suggestion, we follow Ito (1986), in which every word, comprising phonological segments, must be prosodically licensed. Specifically, the segments of a word must be structured into syllables, and each of which comprises a nucleus and optionally its onset and its coda. We assume that syllabification is available at every level, or at the levels of UFs, IFs, and PFs. Yamada (1990) provides the syllabification of words in the Tokyo dialect 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 UF /nuru/ is assigned a structure with two syllables and two moras, as in Figure *a* of Figure 3.

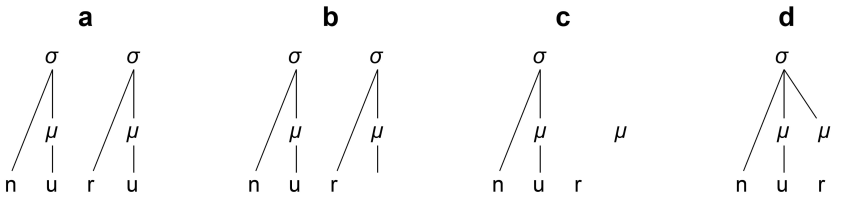


Fig. 3 Syllabic and moraic structure of /nuru/ (*a*), Final vowel absence (*b*), Syllable absent and mora preserved (*c*), and Linking stray mora to preceding syllable (*d*)

If the final vowel /u/ is absent, as in Figure *b*, the form syllabifies through Figures *c* and *d* of Figure 3. If the syllable contains no overt nucleus segment, no syllable structure forms (Hayes 1989). In contrast, moras are preserved, as in Figure *c*, by the faithfulness constraint MAX-μ, as provided in (20). A stranded mora acquires a novel association with an adjacent syllable, as represented in Figure *d* of Figure 3.

Hayes' (1989) moraic theory correctly predicts the two theoretically possible means to have the preserved mora at the coda filled by an adjacent segment for compensation, as provided in (19a) and (19b).

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

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

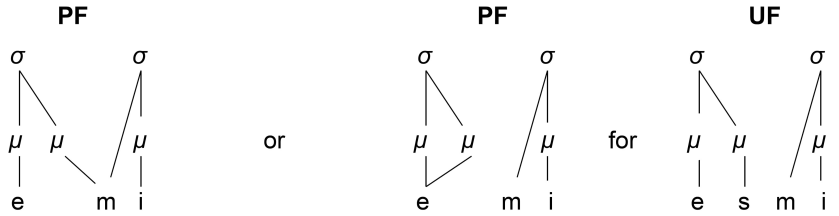


Fig. 4 Compensatory GC in Lesbian and Thessalian ([em$_i$m$_i$i] 'I am') (left) and CL vowel in Attic ([eːmi] 'I am']) (right) for the UF /esmi/

The segment *s* at the coda is absent in the PF forms. Particular languages actually use *either* 1) compensatory GCs (19a), as in the Lesbian and Thessalian dialects of Greek; 2) CL vowels (19b), as in the Attic dialect of Greek; *or* 3) both.

The liquid is further replaced with the first half of a geminate consonant or the second half of the lengthened vowel in the Takeo Saga dialect of Japanese. The native speakers of Takeo Saga dialect use compensatory GCs only, as represented in Figure 1. The minority of the native speakers uses both, as represented in Figure 2.

The compensation in two ways tacitly assumes that constraints (20) and (21) rank high in the dialect.

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

(21) $\mu \rightarrow$ S: Assign one violation mark for every mora not dominating a segment, or not filled by a segment.

The constraints force every mora in the form on the UF side to be present and associated with a segment in the form on the PF side.

4.1.3 McCarthy's (2008a) constraints for consonant cluster simplification

Constraints that McCarthy (2008a) proposes for consonant cluster simplification are CODACOND, HAVEPLACE, MAX[Place], and NOLINK[Place] (McCarthy 2008a: 285).

McCarthy's (2008a) Coda Condition McCarthy's (2008a) CODACOND (22) in conjunction with (21) requires the association between 1) 'non-past' forms with the syllabic and moraic structure such as Figure *d* of Figure 3 and 2) the same except for the liquid linked to the mora at the coda, as in the left figure of Figure 5.

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

Fig. 5 *r* at the coda (left) and its Placeless counterpart H at the coda (right)

The constraint CODACOND requires the PoA of the coda consonant to be token-identical to that of the onset of the next syllable. Only the same PoA values are not sufficient. To satisfy CODACOND, the liquid *r* is made to be its debuccalized (or Placeless) counterpart, as in the right figure of Figure 5. If the segment at the coda has no Place feature, the constraint CODACOND is satisfied vacuously. The Placeless counterpart of the liquid (H), which contains, for example, [sonorant (liquid)], is further replaced with the first half of the geminate consonant or the second half of the lengthened vowel to satisfy HAVEPLACE. It is because the PoA and MoA of the liquid are the least marked, and the constraints MAX[Manner] and MAX[PoA] are at lower ranks. The constraints are discussed in section 4.2.

McCarthy's (2008a) Ranking and Other Constraints McCarthy's (2008a) proposed ranking of the consonant cluster simplification constraints is

(23) CODACOND $\gg$ {HAVEPLACE, MAX[Place]} $\gg$ NOLINK[Place] (McCarthy 2008a: 285)

NOLINK[Place] states assign one violation mark to the pair of the input and output if the Place value is unlinked in the input and is linked in the output. HAVEPLACE states assign one violation mark for every segment with no Place specification. Notably, MAX[Place] ranks lower than CODACOND, in contrast with Sasaki's (2013), and ranks higher than NOLINK[Place]. No ranking is specified between HAVEPLACE and MAX[Place].[12] McCarthy's (2008a) ranking of the constraints in HS-OT, as in (23), for example, correctly predicts consonant cluster simplification in Diola Fogny, as in (24).

[12] No vertical line is used in place of dotted lines in the common OT practice in this paper, such as no line between HAVE[Place] and MAX[Place] in the tableau.

(24) Step 1 </pat.ka/, *paH.ka*> and Step 2 <*paH.ka*, [pa.ka]>

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

The UF /pat.ka/ is associated with the PF [paka] through the intermediate form *paH.ka*. Each step is harmonically improving. The first step </pat.ka/, *paH.ka*> is harmonically improving because *paH.ka* satisfies CODACOND (vacuously). A candidate *pat.Ha* in step 1 through which [pa.ta] is associated with /patka/ would not be optimal because it violates CODACOND. (McCarthy 2019). (P-OT can postulate no intermediate form, and thus could not make a correct prediction.) The second step <*paH.ka*, [pa.ka]> is also harmonically improving because [pa.ka] satisfies HAVEPLACE. Here, we assume that no mora dominates the segment *t* of the UF /patka/. The step <*paH.ka*, [pa.ka]> does not violate MAX-μ (20) on the basis of this assumption. The faithfulness constraint MAX-C, which I assume ranks lower than HAVEPLACE, and is not included in the table, cannot rank higher than HAVEPLACE; if it did, [pa.ka] would not have harmonically improved from *paH.ka* (McCarty 2008a: 287).

4.1.4 de Lacy's (2006) markedness theory

De Lacy's (2006: 173-182) markedness theory applied to MoA and PoA explains the different behaviors of the liquid and the coronal stop, provided in section 3.2.2. His key idea is that the marked values of PoA and of MoA are faithful, whereas the unmarked values of PoA and of MoA are not faithful. The relevant constraints are MAX[Manner:M(arked)] (25a) and MAX[Manner] (25b), with a ranking of (25c) between the two.

(25) a. MAX[Manner:M(arked)]: Assign one violation mark for every input marked Manner tier that has no correspondent output marked Manner tier.

b. MAX[Manner]: Assign one violation mark for every input Manner tier that has no correspondent output Manner tier.

c. Rankings: MAX[Manner:M] $\gg$ MAX[Manner]

The literature generally agrees that, for example, the PoA coronal is not marked, whereas the PoA dorsal is marked. The MoA obstruent is marked, whereas the MoA the liquid and the approximants are not marked. The marked and unmarked values of PoA and MoA are defined in (33). See Dinnsen and Barlow (1998) for constraints for faithfulness and unfaithfulness of MoA, for example, *Liquids (which states 'avoid liquids').

Next, I continue the discussions from section 3.2.2 and examine de Lacy's (2006: 173-182) markedness theory regarding the dataset (15) and (16). I suppose that the constraint MAX[Manner:M] and MAX[Place:M] have the same rank, and that the constraint MAX[Manner] and MAX[Place] have the same rank. The constraints MAX [Manner:M] and MAX[Place:M] rank higher than HAVEPLACE, and HAVEPLACE

ranks higher than the constraints MAX[Manner] and MAX[Place]. The constraint DEP-σ, which prohibits an epenthetic syllable, has different ranks for the two types of consonant clusters. The constraint DEP-$\sigma_{affix(ation)}$ (on boundaries between stems and affixes) has the same rank as MAX[Manner:M] and MAX[Place:M]. The constraint DEP-$\sigma_{R(oot)C(ompound)}$ (on boundaries between roots for a compound) has the same rank as HAVEPLACE.[13] This analysis sensitive to the differences in MoA values and correctly predicts the difference between the grammatical association /r/ - [t] and the ungrammatical association */t/ - [r], as in (26), which Kurisu (2000) incorrectly predicts.

(26) de Lacy's (2006) predictions

		CODACOND	MAX[Manner:M]	MAX[Place:M]	DEP-σ_{affix}	DEP-σ_{RC}	HAVEPLACE	MAX[Manner]	MAX[Place]
	Step 1 UR: /ar+ta/								
☞	a. *aHta*						*		*
	b. *arita*				*				
	c. *arta*	*							
	Step 2 *aHta*								
☞	a. *atta*							*	
	b. *aHta*						*		
	Step 1 UR: /ket+roN/								
☞	a. *keturoN*					*			
	b. *keHroN*						*		*
	c. *ketroN*	*							

The candidate *aHta* is optimal in step 1 for /ar+ta/. It only violates HAVEPLACE. The candidate *arita* violates DEP-σ_{affix}.[14] The constraint DEP-σ_{affix} is ranked higher than the constraint HAVEPLACE. In step 2, the candidate *aHta* is further associated with [atta], which only violates MAX[Manner]. The candidate *aHta* violates HAVEPLACE. The candidate [atta] is optimal in step 2. The form /ar+ta/ is thus associated with [atta]. By contrast, the candidate *keturoN* is optimal in step 1.[15] It violates DEP-σ_{RC}, and the candidate *keHroN* violates HAVEPLACE and MAX[Place]. The two constraints DEP-σ_{RC} and HAVEPLACE rank the same. The candidate *keturoN* converges in step 2, violating no constraints. If the candidate *keHroN* were optimal in step 1,

[13] The difference is the association of /kak+ta/ 'write-Past' with [kai.ta] (cf *[ka.ki.ta])) and that of /kok+tai/ with [ko.ku.tai], which, for example, supports the analysis in the text that the constraint DEP-$\sigma_{affixation}$ ranks higher than DEP-σ_{RC}.

[14] The epenthetic V is /i/, but not /u/, for this type of consonant cluster simplification.

[15] The epenthetic V is /u/, but not /i/, for this type of the consonant cluster simplification.

the candidate *keHroN*, which violates HAVE[Place], could not be further associated with **kerroN* because it violates MAX[Manner:M]. The difference for /ar+ta/ and /ket+roN/ is thus explained by the analysis that the MoA of the liquid is unmarked, whereas the MoA of the obstruent /t/ is marked.[16]

1) The constraints and their ranking for root boundaries of Sino-Japanese compounds (e.g. /hat+ka/ for [hakka] (11)), 2) those for verb stems and the /t/ initial-allomorph affixes (like /ar+ta/ 'exist [Verb Stem]+Past' for [atta]), and 3) those for the consonant cluster simplification at the finals of the non-past forms (e.g. /toru g.../ for [togg...] 'take-Non-past gorilla') may not be the same, for example, a difference between 1) and 2) was revealed in the discussion. This occurs because the same constraints do not work at morphologically different junctures (McCarthy 2008a: 295-298).[17] I do not further examine the consonant cluster simplification in root boundaries of Sino-Japanese compounds and of verb stems and the /t/ initial-allomorph affixes in this paper; however, we have seen enough arguments to adopt de Lacy's (2006) markedness theory for MoA. Section 4.2 describes how de Lacy's (2006) markedness theory applies to MoA and works for the consonant cluster simplification at the finals of the non-past forms.

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

I present Koga and Ono's (2010) analysis in this section, which is required for one of the constraints of the HS-OT analysis I propose, and then argue in favor of the analysis through further observation.

[16] The labio-dorsal approximant [w] cannot be associated with the coronal stop /t/, as in (i), whereas the vowel [o] is associated with the labio-dorsal approximant /w/, as in (ii).

(i) a. PF: *[tewwaN] cf. [tetsɯwaN] 'iron arm'
b. UF: /tet+waN/ 'iron+arm'
c. PF of Coda Consonant: MoA: [approximant]; PoA: [labial/dorsal]
d. UF of Coda Consonant: MoA: [obst]; PoA: [cor]

(ii) a. PF: [omo:ta]
b. UF: /omow+ta/ 'think+Past'
c. PF of Coda Consonant: MoA: (Vowel); PoA: (Vowel [Mid, Back)
d. UF of Coda Consonant: MoA: [approximant]; PoA: [labial/dorsal]

De Lacy's (2006) markedness theory makes correct predictions. The association between /ow/ and [o:] does not violate MAX[Place:M] because the PoA of the semivowel /w/ is close to the heights of vowels /u/ and /o/. It only violates MAX[Manner]. By contrast, the association of /tet+waN/ with **tewwaN* does not violate MAX[Place:M] but violates MAX[Manner:M]. The association with *tetuwaN* ([tetsɯwaN]) is only optimal.

[17] See footnote 30.

The zero morpheme expresses the unmarked (or default) value in contrast with a morpheme expressing the marked value of a feature in many languages. For example, Vietnamese has morphemes for Past and Future and no morpheme for Present. Thus, plausibly, the weakest consonant or vowel or a phonological feature realizes itself as the unmarked value in some languages. Following Koga and Ono (2010), I assume that /u/, /ru/, and the combination of them [$_{tense}$ [$_{tense}$ *u*] [$_{tense}$ *ru*]], or /uru/, are the allomorphs of the 'non-past' affix, or the tense expletive in Japanese and its dialects. The doubled tense expletive (or /uru/) selects the stems of strong stem verbs and 'vowel /e/-final' stem verbs, for example, /n/ 'sleep', as in the left figure of Figure 6.

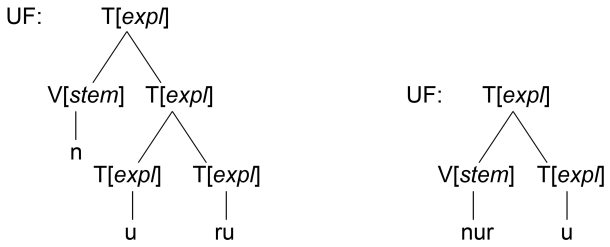


Fig. 6 'Non-past' form /n+uru/ 'sleep-Non-past' and that of /nur+u/ 'paint-Non-past'

The simple allomorph [$_{tense}$ *u*] selects, for example, verb stem /nur/ 'paint', as in the right figure.[18]

An argument for the final /uru/ of the 'vowel /e/-final' stem verbs and the strong stem verbs as (an allomorph of) the non-past affix [19] That the palatal semivowel occurs in two distinct distributions in Takeo Saga dialect cannot be adequately explained without adopting Koga and Ono's (2010) analysis. One distribution is in the non-past forms of Takeo Saga dialect: Only if a vowel, but NOT a consonant, immediately precedes the final sequence /eta/ in the past form as in the scheme of [$V_i$eta], will its non-past form necessarily end with [V_ijɯʔ], or have the palatal semivowel between V_i and [ɯʔ], as contrasted between [kajɯʔ], [k^{j}ijɯʔ], [ɸɯjɯʔ], and [obojɯʔ], on the one hand, and *[tabjɯʔ] and *[njɯʔ], on the other hand, as in (27).

[18] Koga (2012) explains why the non-past affix selects shorter stems such as /n/ 'sleep' instead of /ne/ 'sleep' if there is more than one allomorph. See footnote 2 for analysis of the stems of the verbs of the dialect.

[19] Hall, Jurgec and Kawahara (2018) propose allomorph selection in the Japanese verbal paradigm similar to Koga and Ono's (2010) and Koga's (2012) morphologlical analysis. They argue in favor of this to support McCarthy's (2008a, 2019: 7) medial consonant cluster simplification through the absence of the second, but not the first. See section 4.1.1 for his argumentation for [paka], but not *[pata], for /patka/.

(27) Semivowel [j] occurrences in some 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	‘memorise’
cf. tabɯʔ	*tabjɯʔ	tabeta	‘eat’	cf. nɯʔ	*njɯʔ	neta	‘sleep’

For example, the vowel /a/ immediately precedes the final sequence /eta/ in the past form [kaeta] ‘changed’, and the non-past form [kajɯʔ] has the palatal semivowel between the vowel and [ɯʔ]. The other distribution is that the hiatus avoidance by the palatal semivowel /j/ occurs in the non-past *potential* forms of all the verbs, which consist of the present participle form + juʔ (+/juru/) ‘can’ in Takeo Saga dialect, as in (28).

(28) Semivowel /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’

The present participle form is the same as the stem when the verb is a vowel /i/ or ‘/e/-final’ stem verb; the form is the stem plus the vowel /i/ when the verb is a consonant-final stem verb; it is /ki/ for the strong stem verb /k(o)/ ‘come’; it is /si/ for the strong stem verb /s(e)/ ‘do’. The vowel /i/ or /e/ immediately precedes the final sequence /eta/ in every past potential form such as [tabeeta] ‘could eat’, and its non-past form, such as [tabejɯʔ], has the palatal semivowel between the vowel and [ɯʔ].[20]

If we analyze the final sequence /uru/ of the non-past forms of the ‘vowel /e/-final’ stem verbs and strong stem verbs as a morpheme as we analyze /uru/ ‘can’ as a morpheme for the potential forms, as performed in (29), we can explain the two independent distributions easily and only by one assumption: The semivowel /j/ morphophonologically occurs if the juncture between the stem and the affix is of the V-V pattern such as [kajɯʔ] for /ka+uru/ ‘change+Non-past’ and [jomʲijɯʔ] for /yom+i+uru/ ‘read+Present Participle+can’.[21]

[20] The UF syllable /ju/, for example, is associated with PF [jɯ] whereas the UF syllable /je/, for example, is associated with PF [e] in the dialect and the Tokyo Japanese. The PoA of j is close to the highest tongue positions of e.

[21] Many words contain hiatus such as /aoi/ ‘blue’, /iou/ ‘ sulfur’, and /oi/ ‘nephew’ in the dialect, Tokyo Japanese, and other Japanese dialects.

(29) The *3*-tuples of UF, IF, and PF of word forms with semivowel /j/ in Takeo Saga dialect

PF	IF	UF		PF	IF	UF	
[kajɯʔ]	kajuru	/ka̲+u̲ru/	‘change (it)’	[kʲijɯʔ]	kijuru	/ki̲+u̲ru/	‘disappear’
[ɸɯjɯʔ]	fujuru	/fu̲+u̲ru/	‘increase’	[obojɯʔ]	obojuru	/obo̲+u̲ru/	‘memorise’
cf. [tabɯʔ]	taburu	/tab̲+u̲ru/	‘eat’	[nɯʔ]	nuru	/n̲+u̲ru/	‘sleep’
[jomʲijɯʔ]	jomijuru	/jomi̲+u̲ru/	‘can read’	[tabejɯʔ]	tabejuru	/tabe̲+u̲ru/	‘can eat’
[ne:jɯʔ]	nejuru	/ne̲+u̲ru/	‘can sleep’	[okʲijɯʔ]	okijuru	/oki̲+u̲ru/	‘get up’
[kʲi:jɯʔ]	kijuru	/ki̲+u̲ru/	‘can come’	[ʃi:jɯʔ]	sijuru	/si̲+u̲ru/	‘do’

If no morphological boundary was postulated immediately before the final sequence /uru/ of the non-past forms of the ‘vowel /e/-final’ stem verbs and strong stem verbs (and immediately before the same final sequence of the non-past potential forms), it would be difficult to explain the occurrences of the palatal semivowel immediately before the final sequence /uru/ of only the certain type of the non-past forms of the ‘vowel /e/-final’ stem verbs.

4.2 Proposal of Additional Constraints

I now propose additional constraints based on the foundations provided in the previous section. For consonant cluster simplification, I rank six constraints higher and then add them to McCarthy’s (2008a) constraints. Some constraints are relevant to the explanation of the absence of the final vowel in the non-past forms, occurring only immediately after the liquid; some constraints are relevant for the absence of the liquid; others are relevant to determine which occurs in place of the liquid at the coda between the second half of the lengthened vowel and the first half of the geminate consonant.

For the path /...ru # C_i.../ ↔...r:C_i... To explain the apocope in Takeo Saga dialect, I propose constraint (30).

(30) *...[$_\sigma$ (C)V]$_{[Tns\ non-past]}$# ‘Assign one violation mark if a non-past form ends with a light syllable.’

This is an instantiation of the tendency in Japanese and old Japanese pointed observed by Kubozono (1995: 230-257). The constraint is ranked higher than CODACOND to explain, for example, the intermediate form *nur* (a form with apocope) harmonically improving from the UF /nu.ru/ (whichever it is between /n+uru/ and /nur+u/): *...[$_\sigma$ (C)V]$_{[Tns\ non-past]}$# ≫ CODACOND. Apocope is prevalent in languages. If the final syllable of a non-past form is heavy one such as [kaɯɻ] ‘buy-Non-past’ and [ta.bɯg.(g...)] ‘eat-Non-past ...’, the form does not violate the constraint (30).

As observed in section 2, if the last consonant of a non-past from is underlyingly, for example, the semivowel /w/ as opposed to the liquid, the non-past final /wu/ cannot be associated with either the first half of a geminate consonant or the second half of the lengthened vowel. The difference between the non-past final /ru/

and /wu/ is that the association between the final /...V.*wu*/ and ...*Vu* does not violate CONTIG(UITY), which blocks word/morpheme-internal epenthesis, as formulated in (31a), whereas that between /...V.*ru*/ and ...*Vu* violates CONTIG.[22]

(31) a. CONTIG(UITY): Assign one violation mark if segmental material contiguous in the input is not contiguous in the output.

b. Rankings: $\{$*...[$_\sigma$ (C)V]$_{[Tns\ non-past]}$#, CONTIG$\}$ $\gg$ CODACOND

What follows explains why the path /...V$_i$.wu..../ - *V$_i$.u* - [...V$_i$ɯ....] does not violate CONTIG. The underlying contiguity /wu/ remains within one segment of the short high back vowel ɯ (/u/) of [...V$_i$ɯ....]. The production of the short high back vowel absorbs the production of the semivowel because the semivowel is produced similar to a vowel, and the labio-velar semivowel normally has a narrower constriction than the high back vowel (Vance 2008: 19). By contrast, if the last consonant is, for example, /r/, the last syllable /Vru/ can never be associated with [Vɯ] through *V.u*. The underlying contiguity /ru/ can never be within one segment of the short high back vowel ɯ (/u/) of [...V$_i$ɯ...]. The production of the high back vowel never absorbs the production of the liquid and never includes the production of /r/ whose PoA is coronal.[23] Path /...V$_i$.ru..../ - *V$_i$.u* (- [...V$_i$ɯ....]) violates CONTIG.

The constraint CONTIG with the proposed ranking correctly predicts that the path [kaɯ] - /ka.wu/ is harmonically improving and that the path *[toɯ] - /toru/ is not harmonically improving, as in the first step of both in (32).

(32) Harmonic improvements of Step 1 </ka.wu/, *kau* ([kaɯ])> and Step 1 </to.ru/, *tor*>

	/kaw+u/	CONTIG *...[$_\sigma$ (C)V]$_{[Tns\ non-past]}$#	CODACOND	MAX[Place]
☞	kau			
	ka.wu	*		
	kaw		*	
	/tor+u/			
☞	tor		*	
	to.ru	*		
	tou	*		*

The form [kaɯ] (*kau*) does not violate *...[$_\sigma$ (C)V]$_{[Tns\ non-past]}$#. The last syllable of the PF of the non-past form [kaɯ] (*kau*) is a heavy syllable with a diphthong. The form [kaɯ] (*kau*) does not violate CODACOND either. The short vowel is in the nucleus; thus, it vacuously satisfies CODACOND. By contrast, the IF *Vr* for /V.ru/, which violates CODACOND, wins against [Vu]. The sequence [Vu] violates CONTIG and MAX[Place]. The liquid /r/ at the onset can never be absent. Because CONTIG outranks CODACOND and MAX[Place], *Vr* is optimal, sacrificing the violation of CODACOND. Thus, /toru/ is associated with the intermediate form *tor*.

For the path...Vr.C$_i$... ↔...VH.C$_i$... See sections 4.1.1-4.1.3.

[22] See McCarthy and Prince (1995: 123) for contiguity.

[23] Production of the liquid is rather close to that of the high front vowel.

For the path...VH.C_i... ↔...VC_i.C_i... or...V:.C_i... At the beginning of this section, that the association of /kawu/ with *kau* [kaɯ] is more optimal than that with *kaw* whereas the association of /toru/ with *tor* is more optimal than that with *tou* [toɯ] is predicted by the ranking of {*...[$_\sigma$ (C)V]$_{[Tns\ non-past]}$#, CONTIG} ≫ CODACOND. The key is that the onset labio-velar approximant is assimilated to the high back vowel at the nucleus. What remains to explain is why the path *r* - *H* is optimal whereas the paths {*n, m, b, t, k, g, s*}-*H* are all not optimal.[24] What distinguishes the relevant consonant for the former and the relevant consonants for the latter (except for /w/) is that the MoA of the former (*r*) is unmarked, whereas the MoA of the latter (*n, m, b, t, k, g, s*) are all marked, as defined in (33) for Takeo Saga dialect (and Tokyo dialect).

(33) The values of MoA of Takeo Saga dialect are obstruent, nasal, approximant, liquid, and glottal. The obstruent (or [-sononant] and [+/- continuant]) and nasal values are marked. The approximant and the liquid are unmarked.

De Lacy's (2006) markedness theory carries on to the MoA and works in Takeo Saga dialect. The relevant constraints are in section 4.1.4, MAX[Manner:M(arked)] and repeated here as (34a), and MAX[Manner], repeated here as (34b), together with the ranking (34c) among the other already proposed constraints.

(34) a. (= (25a)) MAX[Manner:M(arked)]: Assign one violation mark for every input marked Manner tier that has no correspondent output marked Manner tier.

b. (= (25b)) MAX[Manner]: Assign one violation mark for every input Manner tier that has no correspondent output Manner tier.

c. Rankings: MAX[Manner:M] ≫ HAVEPLACE ≫ MAX[Manner] ≫ NO-LINK[PLACE]

The rankings of MAX[Manner:M] and of MAX[Manner] are discussed next.

Discussion of MAX*[Manner:M]* ≫ HAVEPLACE We suppose that the MoA of the word-final consonant is marked, for example, obstruent (or [- sonorant] and [+/- continuant]). Neither the first half of the geminate consonant (or candidate IIIa) nor the second half of the lengthened vowel (or candidate IIIb) harmonically improves from the Placeless counterpart of the obstruent (or candidate II) because the marked manner of candidate II is absent, violating the higher-ranked constraint MAX[Manner:M]. There are violations of the candidate of each step given before the slash and independently in Tableau (35) in this supposition. Therefore, no compensation occurs. This prediction is correct. If the ranking were vice versa, namely, was HAVEPLACE ≫ MAX[Manner:M], the association between *VH* (here, H is the Placeless counterpart of *t*) and [V:] or [VC_i](C_j), for example, would have been optimal. Notably, (as the higher ranking of MAX[Place] than CODACOND forces only the Placeless consonant to sacrifice itself to violate CODACOND in Sasaki (2013)), the higher ranking

[24] The last consonants of the underlying non-past forms are *r, w, n, m, b, t, k, g* and *s* of the dialect and Tokyo dialect, as given in (4c).

of MAX[Manner:M] than HAVEPLACE forces only the consonant with the manner unmarked to sacrifice itself to violate HAVEPLACE.

(35) (Non-)harmonic improvements of [...C$_j$.C$_j$...] for ...C_i.C_j...

		MAX[Manner:M] / CODACOND	HAVEPLACE	MAX[Manner]
	I....VC$_i$ # C$_j$... is less harmonic than candidate II	*		
☞ /	II....VH # C$_j$... is more/less harmonic than candidates IIIa and IIIb		*	
/ ☞	IIIa....VC$_j$ # C$_j$...	*/		*
/ ☞	IIIb...V: # C$_j$...	*/		*

Discussion of HAVEPLACE ≫ MAX*[Manner]* By contrast, we suppose that the MoA of the word-final consonant is unmarked, for example, the liquid. The first half of the geminate consonant (or candidate IIIa) and the second half of the lengthened vowel (or candidate IIIb) harmonically improve from the Placeless counterpart of the liquid (or candidate II), not violating the higher-ranked constraint MAX[Manner:M], but violating MAX[Manner]. There are violations of the candidate of each step given after the slash and independently in the tableau in this supposition. Because HAVEPLACE outranks Max[Manner], the association of the Placeless counterpart of the liquid with its absence is optimal. If the ranking were vice versa, namely, were MAX[Manner] ≫ HAVEPLACE, the association between the final *VH* and *VH* would have been optimal. Whether the MoA and PoA of the last consonant of non-past forms is marked or unmarked is a reasonable explanation for Sasaki's (2013) question, Why does the vowel 'apocope' occur only immediately after the liquid?

For the path...VH.C_i... ↔ either...VC$_i$.C_i... or...V:.C_i... The last two constraints are presented to explain which compensation occurs for the absence of the Placeless counterpart of the liquid. If the first half of a geminate consonant, but NOT the second half of the lengthened vowel, occurs, the dialect allows no association between the Placeless counterpart of the liquid and a vowel. This captures what the majority of the native speakers of the dialect roughly say, that is, the dialect does not allow a consonant to be pronounced as a vowel sounding softer in any situation. The constraint IDENT[Cons(onantal)] (36) in Ito and Mester (2001) suffices for this purpose.

(36) 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).

This constraint (or IDENT[Cons]) should be ranked higher than NOLINK[Place] to explain the harmonically improving path *...VH.(C_i...) ↔ ...VC$_i$.(C_i...)*, but NOT a

non-harmonically improving path *...VH.(C$_i$...)* ↔ *...V:.(C$_i$...)* for /nur+u/ ‘paint+Non-past’ for the majority of native speakers. See section 4.1.3 for the definition of the constraint NoLink[Place]. As aforementioned, the constraint, for example, disallows the association between a vowel, one of [- consonantal], and a consonant, or one of [+ consonantal]. I assume that the onset semivowels of the dialect are [+ consonantal].[25] The majority of the native speakers of Takeo Saga dialect ranks Ident[Cons] higher than NoLink[Place]. Otherwise, [nɯk$_i$(k$_i$...)] ‘paint-Non-past’, which violates NoLink[Place], cannot be an optimal candidate against *[nɯ:(k)].

The last constraint Ident$_{affix}$[Long] is proposed. There is no difference in segmental phonology between the form /nur+u/, which is a verb form of a consonant /r/-final stem verb and means ‘paint-Non-past’, and the form /n+uru/, which is a verb form of a ‘vowel /e/-final’ stem verb and means ‘sleep-Non-past’. The difference is only in their morphosyntactic structures.[26] In line with Torres-Tamarit’s (2016: 694) idea that the vowels of inflectional affixes are more faithful to their underlying ones than those of stems, I claim that such a positional version of the faithfulness constraint on length is required to be ranked at a higher rank as defined in (37).

(37) Faithfulness Constraint: Ident$_{affix}$[Long]: Assign one violation mark for every pair for which a vowel in the input and its corresponding vowel in the output in the inflectional affix have different values for the feature [length].

The constraint (37), for example, prohibits a vowel of the inflectional affix, but NOT any vowel of the stem, from associating additionally with a floating mora, as schematized in left of Figure 7.

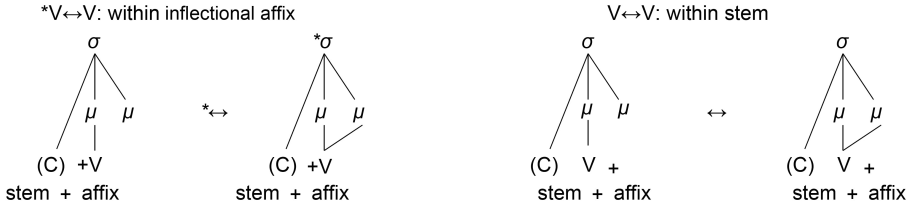


Fig. 7 Ident$_{affix}$[Long]

The constraint Max-μ is not violated by the adjacent segment additionally associating with the floating mora. (Takeo Saga dialect and Tokyo dialect have a vowel length distinction involving differences in the number of moras, e.g. [ho:.ko] (/houko/) ‘a place with a big number of something’, which is trimoraic, and [ho.ko] (/hoko/) ‘sword’, which is bimoraic.) The vowels in the stem, by contrast, allow the association with a length difference through the floating mora, as schematized in the right

[25] Otherwise, Ident[Cons] might be replaced by Ident[Syllabic].

[26] The pitch falls of the verbs in the text are as given in /nu.ru¬/ (/n+uru/) ‘sleep-Non-past’ and /nu.ru¬/ (/nur+u/) ‘paint-Non-past’. See footnote 27.

figure. If the allomorphs of the tense expletive are /u/, /ru/, and /uru/, as was proposed, the penultimate phoneme /u/ of the underlying non-past forms of the 'vowel /e/-final' stem and strong stem verbs cannot be associated with its lengthened counterpart because it is a part of the inflectional affix. For example, the penultimate phoneme /u/ of /nuru/ 'sleep-Non-past', whose morphological structure is /n+uru/, cannot be associated with its lengthened counterpart (through the IFs *nur* and *nuH*). The association between [nɯː] and /n+uru/ violates the constraint IDENT$_{affix}$[Long]. By contrast, the penultimate phoneme /u/ of /nuru/ 'paint-Non-past', whose morphological structure is /nur+u/, can be associated with its lengthened counterpart through the IFs *nur* and *nuH*. The association between [nɯː] and /nur+u/ does not violate the constraint. There are other minimal pairs with their morphological structures only different, for example, /sur+u/ 'rub-Non-past' and /s+uru/ 'do-Non-past' and /kur+u/ 'turn-Non-past' and /k+uru/ 'come-Non-past'.[27]

Rankings The rankings of the proposed constraints so far for the majority of the native speakers of Takeo Saga dialect are summarized as follows. When explaining *nuH* 'sleep-Non-past' ↔ [nɯk$_i$(k$_i$...)], either IDENT$_{affix}$[Long] or IDENT [Cons] must rank higher than NOLINK[Place]; otherwise, [nɯk$_i$(k$_i$...)] cannot win against *[nɯː(k)] for *nuH* 'sleep-Non-past'. Because IDENT[Cons] must rank higher than NOLINK[Place] for *nuH* 'paint-Non-past' ↔ [nɯk$_i$(k$_i$...)], where the vowel before the debuccalized counterpart of the liquid is a part of the stem, IDENT$_{affix}$ [Long] does not have to rank higher than NOLINK[Place], and can rank at any rank.

(38) a. MAX[Manner:M] ≫ HAVEPLACE

b. {CONTIG, *...[$_\sigma$ (C)V]$_{[Tns\ \ expl]}$#} ≫ CODACOND ≫ {HAVEPLACE, MAX [Place]} ≫ NOLINK[Place] ≫ MAX[Manner]

c. IDENT[Cons] ≫ NOLINK[Place]

The rankings are represented in the Hasse Diagram in Figure 8. The discussion regarding the ranking between NOLINK[Place] and MAX[Manner] is presented in footnote 28. Notably, no ranking is specified, for example, between MAX [Manner:M], and CODACOND or CONTIG or *...[$_\sigma$ (C)V]$_{[Tns\ \ expl]}$#. A total ordering of constraints cannot usually be established in languages (McCarthy 2008b: 48).

Ranking for the minority of the native speakers, called 'soft sound lovers' I assume that the constraint rankings for the majority of the native speakers of Takeo Saga dialect and those for the minority, or 'soft sound lovers', differ and that ranking difference explains phenomenal differences, following the concept of OT. The rankings for the 'soft sound lovers' are (39).

[27] 'Accents' (or the own position of the pitch fall if any) cannot determine the morphological properties, and are not relevant to the morphophonological constraint. The pitch fall each occurs in the ways of /su¬.ru/ 'rub-Non-past', /su.ru¬/ 'do-Non-past', /(me)ku¬.ru/ 'turn-Non-past' and /ku¬.ru/ 'come-Non-past'.

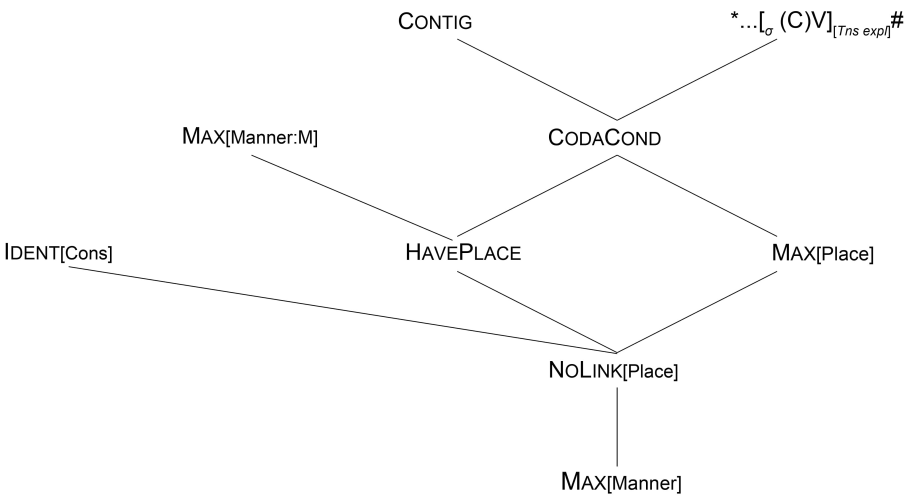


Fig. 8 Hasse Diagram for Majority

(39) a. Same as (38a)
b. Same as (38b)
c. IDENT[Cons] is ranked at the same rank as NOLINK[Place].
d. IDENT$_{affix}$[Long] $\gg$ NOLINK[Place]

The constraint IDENT[Cons] must rank the same as NOLINK[Place] to explain the association between *nuH* 'paint-Non-past' and either [nɯː(k)] or [nɯk$_i$(k$_i$...)] for the 'soft sound lovers'; otherwise, either [nɯk$_i$(k$_i$...)] or [nɯː(k...)] would only be an optimal candidate against the other. The constraint IDENT$_{affix}$ [Long] must rank higher than NOLINK[Place] to explain the association between *nuH* 'sleep-Non-past' and [nɯk$_i$(k$_i$...)]; otherwise, [nɯk$_i$(k$_i$...)] could not win against [nɯː(k...)]. The rankings are represented in the Hasse Diagram in Figure 9. Notably, the ranking MAX[Manner:M] $\gg$ HAVEPLACE, or (38a) and (39a), and the ranking {CONTIG, *...[$_\sigma$ (C)V]$_{[Tns\ \ expl]}$#} $\gg$ CODACOND $\gg$ {HAVEPLACE, MAX[Place]} $\gg$ NOLINK[Place] $\gg$ MAX[Manner], or (38b) and (39b), are common to the two rankings for the two groups of the native speakers of the dialect. IDENT[Cons] ranks lower, specifically at the same rank as NOLINK[Place] and IDENT $_{affix}$[Long] ranks higher, specifically higher than NOLINK[Place] for the soft sound lovers.

5 Predictions

This section clearly explains how the proposed analysis, in sections 4.1 and 4.2, as a whole works for each example of non-past forms. Five predictions are made based on the constraints in the two rankings. The first three predictions are grammaticality-concerned judgments by the majority of the native speakers of Takeo Saga dialect and

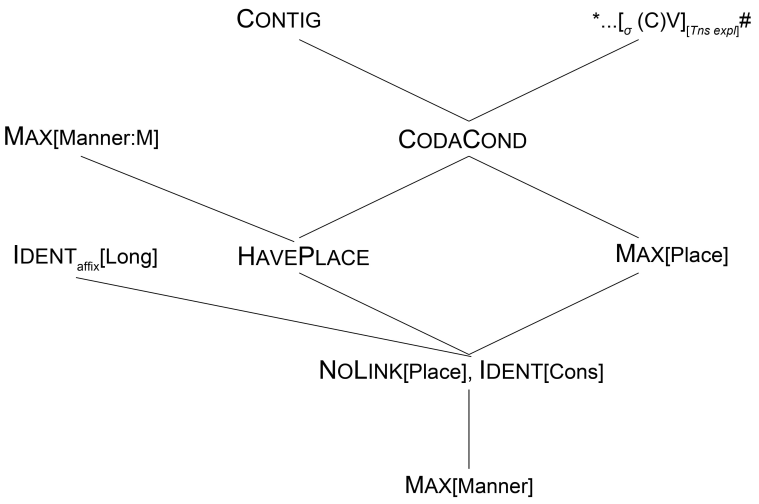


Fig. 9 Hasse Diagram for Minority

are predicted by the ranking (38) in sections 5.1.1, 5.1.2, and 5.1.3. The fourth and fifth predictions are grammaticality-concerned judgments made by the 'soft sound lovers' (or the minority) and are predicted by the ranking (39) in section 5.2.

The core components of morphology and syntax allow, for example, /nur+u/ '(He) will paint (it)', /n+uru/ '(He) will sleep', and /mat+u/ '(He) will wait (for it)', to be tensed phrases, and each of the non-past forms and /gorira/ as a noun with a (finite) relative clause to be adjoined, as in Figure 10.

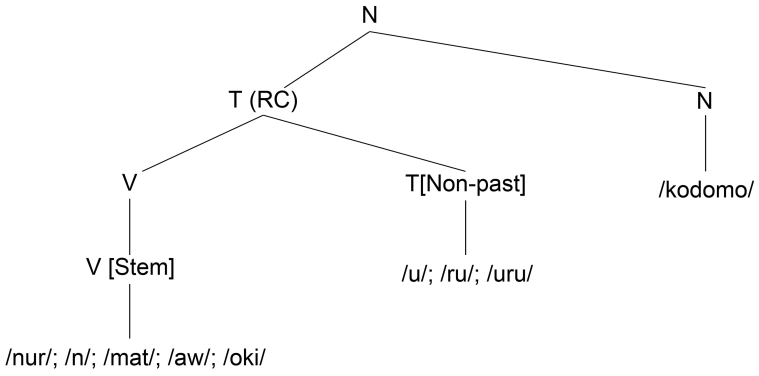


Fig. 10 Morphosyntactic Structures of Some Non-Past Forms

The proposed morphophonological analysis works at the final of each non-past form.

5.1 Majority of native speakers

5.1.1 For /nur+u/ (C_i...) 'paint-Non-past...'

The candidate set of the first step associated with the UF /nuru/ may contain *nur* and *nuu* in addition to the UF /nuru/, as summarized in (40).

(40) Harmonic improvements of /nur+u/ 'paint-Non-past'

		MAX[Manner:M]	HAVEPLACE	*...[σ (C)V]$_{[Tns\ expl]}$#	CONTIG	CODACOND	HAVEPLACE	MAX[Place]	NOLINK[Place]	MAX[Manner]	IDENT[Cons]	NOLINK[Place]	IDENTa$_{fix}$[Long]
	Step 1: /nu.ru # ko.do.mo/ M-SS of UF: T[*expl*] → V[*bse*] /nur, T[*expl*] u/ PS of UF: σ σ / μ μ / /n u r u/												
☞	a. nur # k...					*							
	b. nu.ru # k...			*						*			
	c. nuu # k...				*			*		*	*		
	Step 2: *nur # ko.do.mo*												
☞	a. nuH # k...		*			*	*	*					
	b. nur # k...					*							
	Step 3: *nuH # ko.doN*												
☞	a. nuk$_i$ # k$_i$... σ σ / μ μ / n u k								*	*		*	
	b. nuH # k$_i$...		*				*						
	c. nu: # k... σ σ / μ μ / n u k									*	*		

The four rankings of the constraints coexisting in the tableau are separated by the three vertical double lines. See McCarthy (2008b: 50) for how one tableau represents two separate rankings such as {A, B} ≫ C and D ≫ C.

Now, I explain how candidates are evaluated when more than one separate constraint ranking is in one tableau. Different ranking groups may have a common constraint, and which candidate wins against the others is decided through the common constraint. We suppose that four constraints are high in two separate ranking groups, for example, {A, B} ≫ C and D ≫ C. The common constraint is C. No ranking is specified among A, B, and D. Furthermore, we suppose that candidates P and Q violate the constraints in the same manner as the violations marked in (41).

(41) Separate Ranking Groups of Constraints

		Constraint A / Constraint B	Constraint C	Constraint D	Constraint C
☞	Candidate P	*	*		*
	Candidate Q	*		*	

In this case, candidate P wins against candidate Q. The difference between P's violations of the constraints and Q's is that P violates C, whereas Q violates D. Candidates P and Q both violate A. Whether they violate A is irrelevant to decide which is optimal. What is relevant is which violates more constraints ranked at a higher rank than the common constraint. Candidate P violates no constraint except for A ranked at a higher rank than the common constraint C. Candidate Q violates the constraint D, which is ranked at a higher rank except for A compared with the common constraint C. The number of the constraints higher than constraint C which Candidate Q violates is two. That of the constraints higher than constraint C which candidate P violate is one. Thus, candidate P incurs the least serious violations of the constraints. (Notably, which candidate has more violation marks of the lefter constraints as a whole in the tableau is irrelevant.)

The constraints with the ranking {CONTIG, *...[$_\sigma$(C)V]$_{[Tns\ non-past]}$} ≫ CODACOND explain why *nur* wins against /nu.ru/ and *nuu* in the first step. See the explanation on p. 25 for how the constraint CONTIG lets /nur/ win against *nuu*. The markedness constraint *...[$_\sigma$(C)V]$_{[Tns\ non-past]}$ allows no light syllable at the end of a non-past form, and disallows, for example, /nu.ru/ or /[$_\sigma$ n$_{o(nset)}$ u$_{n(ucleus)}$][$_\sigma$ r$_o$ u$_n$]$_{[Tns\ non-past]}$/.

The violation of CODACOND, which is ranked lower than *...[$_\sigma$(C)V]$_{[Tns\ non-past]}$, is sacrificed to let the candidate *nur* win against /nu.ru/. The constraints with the ranking CODACOND ≫ {HAVEPLACE, MAX[Place]} explain why *nuH* wins against *nur* in the second step. The form *nur* violates CODACOND (because the PoA of the liquid is coronal in this study, contrary to Sasaki (2013)). The form *nuH* does not violate CODACOND, violating MAX[Place] and HAVEPLACE, which rank lower than CODACOND. The Placeless counterpart of the liquid vacuously satisfies CODACOND.

The candidate set may include *nuk$_i$ (k$_i$...)*, *nuH* and *nu:* in the third step for *nuH*. Because the constraint $\mu \rightarrow$ S is assumed to rank higher, a form *nu*$^{\mu}$, which has a

mora μ dominating no segment and violates the constraint, is not included as a candidate. The superscript $^{\mu}$ indicates a mora associated with no segment. The candidate *nuH* violates the constraint HAVEPLACE. Neither *nuk$_i$ (k$_i$...)* nor *nu:* violates HAVEPLACE, and they violate constraints only ranked lower than HAVEPLACE. The constraints with the ranking IDENT[Cons] $\gg$ NOLINK[Place] explain why *nuk$_i$ (k$_i$...)* performs better than *nu:*. The candidate *nuk$_i$ (k$_i$...)* violates NOLINK[Place], while *nu:* violates IDENT[Cons]. The former constraint ranks lower than the latter.[28] (Because the MoA of the liquid is unmarked, they both violate MAX[Manner].) The form *nuk$_i$ (k$_i$odoN)* incurs the least serious violations and is thus optimal for /nur+u/ 'paint [Non-past]' (kodomo). (The form *nu:* does not violate IDENT$_{affix}$[Long] because the vowel at the nucleus is a part of the stem and is not located within the inflectional affix of the tense expletive.) The meaning of the interpretation of the PF [nɯk$_i$ (k$_i$odoN)] is thus correctly predicted to be the child who will paint (it).

5.1.2 For /n+uru/ (C$_i$...) 'sleep-Non-past...'

The prediction regarding the UF /nuru (n+uru)/ 'sleep [Non-past]' is the same as that of /nur+u/ 'paint-[Non-past]' except for one difference. The form *nu:* in the third step with the morphosyntactic structure in the left of Figure 6 violates not only IDENT[Cons] but also IDENT$_{affix}$[Long] because the vowel /u/ at the nucleus is not part of the verb stem but part of the inflectional affix /uru/, which is an allomorph of the tense expletive. Wherever IDENT$_{affix}$[Long] is ranked, the violation makes no difference because *nu:* violates IDENT[Cons], which dominates NOLINK[Place], and *nuk$_i$ (k$_i$odomo)* violates NOLINK[Place]. The PF [nɯk$_i$ (k$_i$...)] is thus optimal for /n+uru (#k...)/ 'sleep [Non-past]' (k...). The PF [nɯk$_i$ (k$_i$odoN)] is thus predicted to be interpreted as meaning the child who will sleep, too.

5.1.3 For /mat+u/ (C$_i$...) 'wait-Non-past...'

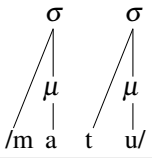
The candidate set of the first step may contain *mat*, /ma.tu/, and *mau*, as summarized in Tableau (42). The constraints with the ranking {CONTIG, *...[$_\sigma$(C)V]$_{[Tns\ non-past]}$} $\gg$ CODACOND explain why *mat* wins against /ma.tu/ and *mau* in the first step. The candidate *mau* violates CONTIG. The final short high back vowel *u* can never be an amalgamation of the coronal voiceless stop and the high back vowel. The sequence *tu*, which is contiguous in the form /matu/, is not contiguous in the form *mau*. The candidate /mat/ violates CODACOND. The candidate /ma.tu/ violates *...[$_\sigma$(C)V]$_{[Tns\ non-past]}$#. Because both CONTIG and *...[$_\sigma$(C)V]$_{[Tns\ non-past]}$# outrank CODACOND, *mat* wins against *mau* and /ma.tu/.

[28] If MAX[Manner] ranked higher than NOLINK[Place], the highest constraints that *nuk$_i$ (k$_i$...)* and *nu:* violate would be the same constraint MAX[Manner]; they would both be optimal. This is an incorrect prediction. Therefore, the proposed ranking NOLINK[Place] $\gg$ MAX[Manner] is correct.

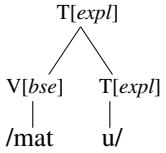
(42) Harmonic improvements of /mat+u/ 'wait-Non-past'

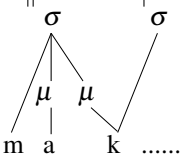
		MAX[Manner:M]	HAVEPLACE	*...[σ (C)V][Tns expl]#	CONTIG	CODACOND	HAVEPLACE	MAX[Place]	NOLINK[Place]	MAX[Manner]	IDENT[Cons]	NOLINK[Place]	IDENTa*fix*[Long]
	/ma.tu # ko.do.mo/												
	Step 1: /ma.tu # ko.do.mo/												
☞	a. mat # k...					*							
	b. ma.tu # k...			*									
	c. mau # k...	*			*			*		*	*		
	Step 2: *mat # ko.do.mo*												
☞	a. maH # k...		*				*	*					
	b. mat # k...					*							
	Step 3: *maH # ko.doN*												
☞	a. maH # k*i*...		*				*	*					
	b. mak*i* # k*i*...	*							*	*		*	
	c. ma: # k...	*								*	*		

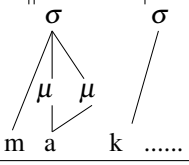
PS of UF:



M-SS of UF:







Similarly, for the path from *nur* to *nuH* in the previous prediction, *maH* is optimal in the second step. The candidate set may include *mak*$_i$ *(k*$_i$*...)*, *maH*, and *ma:* in the third step. The candidate *maH* violates the constraint HAVEPLACE. However, both *mak*$_i$ *(k*$_i$*...)* and *ma:* violate MAX[Manner:M], which is ranked higher than HAVEPLACE. This occurs because the MoA of /t/ is obstruent and is marked. Thus, *maH* wins against both *mak*$_i$ *(k*$_i$*...)* and *ma:*, but cannot be pronounced. In the immediately

previous step, or step 2, another candidate is *mat*, or the same form as the form on the PF side *mat*. It is impossible to pronounce it. Going back to the further immediately previous step, or step 1, there is another candidate /matu/ for the second best. The second best form /ma.tu/ is optimal in the first step but violates *...$[_{\sigma}$(C)V$]_{[Tns\ non-past]}$#. No other choice is available.[29]

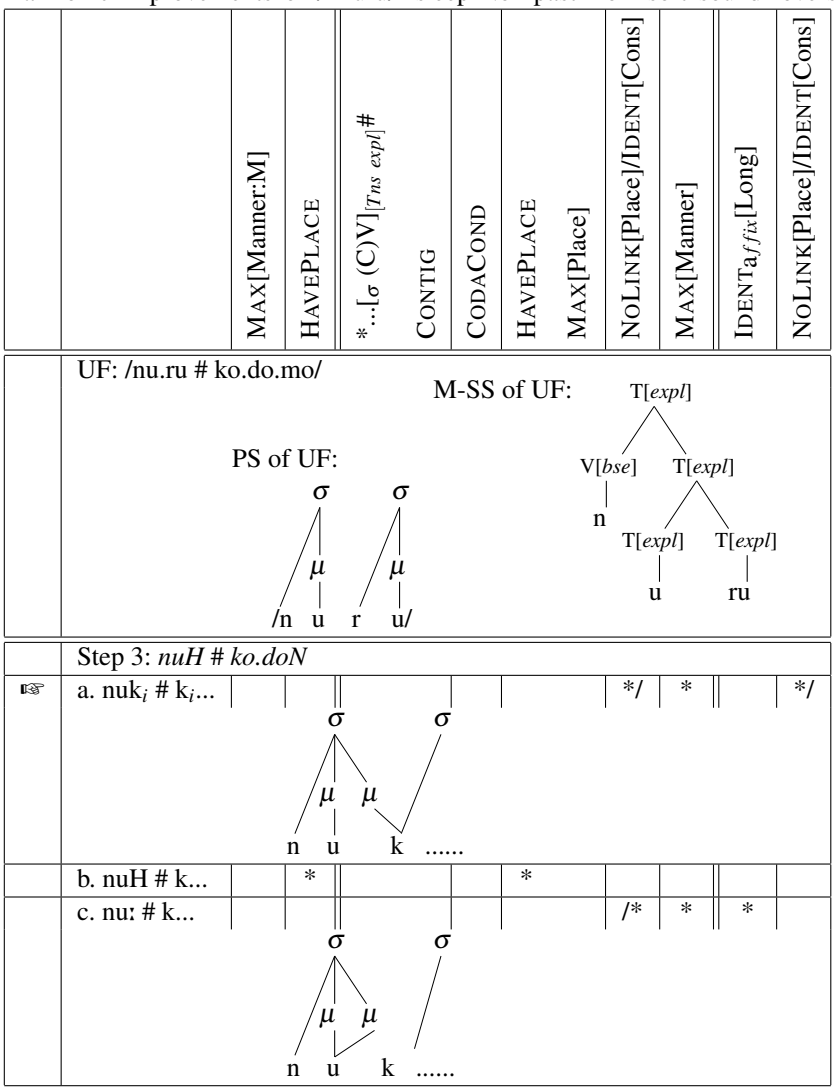
5.2 Minority of Native Speakers

The constraint ranking (39) correctly predicts that the 'soft sound lovers' judge both non-past forms with CL vowels and those with compensatory GCs of vowel /i/-final and consonant /r/-final stem verbs as grammatical, and that they judge only the non-past forms with compensatory GCs of 'vowel /e/-final' and strong stem verbs as grammatical. Because the constraints in the ranking relevant in the first and second steps between /nuru/ and *nuH* are common between the two constraints with the rankings (38) and (39), the first and second steps are the same as those of (40).

Prediction for /n+uru/ (C_i...) 'sleep-Non-past...': Tableau (43) summarizes the third step of the prediction. The constraints NoLink[Place] and Ident[Cons] are ranked the same in the constraint ranking (39). Any constraint ranked higher than the two constraints and disallowing only one of the two candidates, [nɯk$_i$] ([kodomo]) and *[nɯː], determines which wins against the other. One constraint satisfies it. The constraint Identa_{ffix}[Long] disallows *[nɯː] and allows [nɯk$_i$] ([kodomo]). (The constraint Max[Manner] disallows both.) Therefore, the candidate [nɯk$_i$] ([kodomo]) wins against *[nɯː] and incurs the least serious violations of the constraints. Only the form [nɯk$_i$] ([kodomo]) is optimal for /n+uru/ (kodomo) 'sleep-Non-past (child)', even for the soft sound lovers.

[29] At the last moment, I noticed the following. To avoid the awkward interpretation of the prediction in the text regarding the type of examples with the last consonant not the liquid or the labio-velar semivowel such as /matu/, it may be necessary to rank two constraints *...$[_{\sigma}$(C)V$]_{[Tns\ non-past]}$# and CodaCond the same. If ranked the same, it would be predicted that one form on the UF side can be associated with multiple optimal forms on the PF side as UF /matu/ is associated with IFs *mat* and *matu* and UF /toru/ is associated with IFs *tor* and *toru*. This is related to the issue of multiple optimal forms in OT. I will leave the discussion of multiple optimal forms in the framework of HS-OT for next paper.

(43) Harmonic improvements of /n+uru/ 'sleep-Non-past' for 'soft sound lovers'



Prediction for /nur+u/ (C_i...) 'paint-Non-past...' The first and second steps are the same as those for /n+uru/ 'sleep-Non-past', namely, those of (40). The two forms [nuɯk_i] ([kodomo]) and [nuɯː] ([kodomo]) incur the least serious violations of the constraints; both are optimal. The form [nuɯː] violates IDENT[Cons], and the form [nuɯk_i] ([k...]) violates NOLINK[Place]. These two constraints are the same in (39). Both violate MAX[Man-ner]. The form [nuɯː] ([kodomo]) does not violate IDENTa_{ffix}[Long].

Based on these two predictions, the PF [nuɯ$k_i$$k_i$odoN] is correctly predicted to be ambiguous in two ways among soft sound lovers: either the child that paints something or the child who sleeps. By contrast, the PF [nuɯːkodoN] is correctly predicted to be interpreted uniquely as the child that paints something. The proposed HS-OT

analysis explains all the phenomena related to the compensatory GCs and the CL vowels at the finals of the non-past forms of Takeo Saga dialect.

6 Summary

I analyzed the apocope and consonant cluster simplification of the non-past forms of Takeo Saga dialect in the framework of HS-OT, and presented arguments for the analysis. I reviewed analyses in the literature and demonstrated their inadequacy. The analysis that I proposed employed five basic concepts and contained additional constraints. I demonstrated how the proposed analysis as a whole correctly predicts the apocope and consonant cluster simplification of Takeo Saga dialect and that the different rankings explain the grammaticality judgments of the majority and minority of the native speakers regarding which occurs between the first half of geminate consonants or the glottal stop or and the second half of lengthened vowels for the compensation.

Section 2.1 provides Hayata's (1998) dataset. Further evidence was provided that supports Hayata's (1998) observation. If the last consonant of the UF of a non-past form is not the liquid, for example, the labio-velar semivowel, the coronal nasal, neither a geminate consonant nor a lengthened vowel occurs. In addition, even if the initial consonant of the word following the /ru/-final non-past form is, for example, a fricative, the liquid, or the labio-velar semivowel, a geminate consonant or the lengthened vowel occurs (section 2.2). Section 2.3 provides a new observation: A minority of native speakers accepts the second half of lengthened vowels as well for compensation at the final if the verb is an /i/-final stem verb or a consonant /r/-final stem verb. Two phonological analyses were reviewed in section 3: Hayata (1998) and an extension of Sasaki (2013, 2015).

Hayata's analysis of the first half of geminate consonants as /ru/ underlyingly was evaluated, and it was unable to explain why the apocope occurs only if the last consonant is the liquid. His analysis in the framework of SPE, as long as its practices of disallowing notions beyond segments are followed, cannot explain why the liquid changes to a part of the next consonant or a part of the previous vowel.

Sasaki's (2013, 2015) P-OT method to explain the apocope only after the liquid was evaluated. The apocope occurs because the liquid is Placeless and can be absent at the final, not violating a highly ranked constraint MAX[Place] in his analysis. P-OT allows no intermediate form to be postulated and thus cannot capture the apocope and compensation of the Takeo Saga dialect as complex. It was argued in favor that the liquid is absent because its MoA and its PoA were the least marked, to explain the other two types of consonant cluster simplification. The distinctive characteristic of the liquid in contrast with the other consonants in the dialect was clarified: Its PoA and MoA were the least marked. It was shown that this is the cause of the apocope and consonant cluster simplification.

In section 4, an HS-OT analysis was proposed. First, basic concepts were introduced: HS-OT, as developed in McCarthy (2008a, 2010, 2016, 2019), Hayes' (1989) moraic theory, McCarthy's (2008a) constraints for consonant cluster simplification,

de Lacy's (2006) markedness theory applying to PoA and MoA and Koga and Ono's (2010) morphophonological analysis of non-past forms of the dialect. HS, Hayes (1989), and McCarthy (2008a) make clear that the target phenomenon is nothing new and is a complex of two atomic phenomena. The pattern is that the path *V.ru* C_j - either *V:*.C_j or *VC.*C_j is a chain of 1) *V.ru* C_j - 2) *Vr.*C_j - 3) *VH.*C_j (- 4) $V^{\mu}C$) - 5) either *VC*$_j$.C_j or *V:*.C_j. Apocope and compensatory GCs and CL vowels are prevalent in languages. McCarthy (2008a) is responsible for *Vr:*C_j - *VH.*C_j (- $V^{\mu}C$). It was argued that the final /uru/ of the non-past forms of the 'vowel /e/-final' stem verbs and the strong stem verbs is an allomorph of the inflectional affix (Koga and Ono 2010).

Based on the basic concepts, the following constraints were proposed to be ranked at high ranks in section 4.2. The constraint *...[$_{\sigma}$ (C)V]$_{[Tns\ expl]}$# prohibits light syllables at the finals of the non-past forms. The constraint CONTIG(UITY) prevents *Vru* from being associated with *Vu* but allows *Vwu* to be associated with *Vu*. The two faithfulness constraints related to the marked or unmarked values of MoA, which is an application of de Lacy's (2006) markedness theory, explain the absence of the liquid, but NOT any other consonant. The faithfulness constraint IDENT[Cons] prohibits, for example, the association between *nu:* and *nur* of /nur+u/ 'paint-Non-past'. The positional faithfulness constraint IDENT$_{affix}$[Long] prohibits a lengthened vowel from being associated with the non-lengthened one only in the inflectional affix, for example, the association between *nu:* and *nur* of /n+uru/ 'sleep-Non-past-form' (as Torres-Tamarit's (2016) constraint prohibits a vowel with a certain quality from being associated with another with a different quality only in affixes). All the rankings were argued. Five predictions were provided in section 5. The judgments among a minority of the native speakers of Takeo Saga dialect were explained by a different ranking as usual in OT. With eight constraints with their rankings the same, the harsh sound lovers, or the majority of the native speakers, have IDENT[Consonantal] ranked higher than NOLINK[Place] in their minds whereas the soft sound lovers, or the minority of the native speakers, have IDENT$_{affix}$[Long] higher than NOLINK[Place] and have IDENT[Consonantal] at the same rank as NOLINK[Place]. The constraint IDENT$_{affix}$[Long] is morphophonological, which demonstrates that the component of morphology is auto-nomous in the dialect of Japanese.

This study implies further research on

- whether the proposed analysis in this paper can be extended to explain the phonetic realizations of the underlying final /ru/ sequences of the non-past forms in other Kyushu dialects of Japanese,
- whether the vowel '/i/-final stem' verbs are the two stem verbs in some Kyushu dialects (the same as the vowel '/e/-final' stem verbs in Takeo Saga dialect), and
- what modification of the proposed analysis is necessary to explain the other types of consonant cluster simplification of the dialect and other dialects, especially one over the verb stems and the /t/-initial affixes.

Notably, the dataset of the consonant cluster simplification of the inflectional forms in Takeo Saga dialect slightly differs from those of Tokyo dialect, for example, the

past forms of the /w/-final verbs and the /b/-final verbs with the latter only in the native speakers with strong accents.[30]

Declarations:

Fundings-XX
Conflict of interest-XX
Availability of data and material-Not applicable.
Code availability-Not applicable.

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[30] Differently from the Tokyo dialect, the past form [tooda] is associated with /tob-ta/ for example among native speakers with strong accents in Takeo Saga dialect. The consonant clusters of this type occur at STEM-AFFIX junctures, which is underlyingly in the pattern of /...C/+/C.../. The target phenomenon in this paper, however, occurs at junctures of a FINITE FORM and another word, which necessarily takes the pattern of /...(C)V/+/(C)V.../.

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