

Another Complex Phenomenon for Harmonic Serialism and Against Standard Parallel OT*

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Abstract This paper proposes a complete analysis of a morphophonological complex phenomenon—the interaction of apocope with compensation for the further absence of the word-final liquid—in the harmonic serialism of optimality theory and argues that harmonic serialism is superior to standard parallel OT in explaining this complex phenomenon. Built on the established constraints with the ranking of consonant cluster simplification in harmonic serialism, 1) the faithfulness constraint on the marked manners of articulations and 2) the constraint on the final vowel of the underlying nonpast forms with both ranked above the constraint CODACOND, are shown to explain the apocope. Which constraint outranks the constraints HAVEPLACE and NOLINK[Place] between the constraint IDENT[Cons] and a novel constraint on emphasizing the reanalyzed ‘stem’ of the suppletive form explains the compensation that occurs. Because no concept of intermediate forms is available, standard parallel OT, by contrast, is argued i) to incorrectly associate the geminate of the first consonant $*[...Vr_i.r_i...]$ together with the second consonant absent with the underlying forms $/...Vr_iu\#C_j.../$ and ii) not to be able to exclude constraints and rankings that predict the interaction of unnatural liquid syncope with the lengthening of the first vowel of the back vowel sequences and somehow correctly predict the non-past forms ending with /uru/ or /oru/. A novel analysis of the nonpast forms of ‘vowel /e/-final’ stem and ‘irregular’ verbs explains the provided data for the ends of the nonpast forms, being extendable to other morphophonological data and those of other dialects and old Japanese.

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1 Introduction

The central phenomenon this paper addresses is that the sequence /ru/ at the end of nonpast forms alternates with i) the first half of the geminate of the initial consonant of the next word or the glottal stop in the Takeo Saga dialect of Japanese, as observed by Hayata (1998), or ii) the second half of the lengthened vowel immediately before the sequence /ru/ in some verb forms in the western part of Japan, as observed in the literature, for example, Uwano (1989: 74). Hayata (1998) observes that the glottal stop occurs if the next word or morpheme begins with a vowel. He proposes rules Verb Final /u/ Deletion $u \rightarrow \emptyset / r_ ___]_{verb}$ and /r/-regressive Complete Assimilation $r \rightarrow C_j / ___]_{verb} \# C_j$ in Chomsky’s *SPE* framework to explain part of the complex phenomenon, assuming that the phenomenon with consonant geminates is complex, as schematized in the associations of the following underlying forms (UFs) (1a), the intermediate forms (IFs) (1b), and the first of the phonetic forms (PFs) (1c).

- (1) a. UF: /...Vru # C_j.../ or /...Vru + C_j.../
 b. IF: ...Vr.C_j...
 c. PF: [...VC_j.C_j...] or [...V:.C_j...]

This is exemplified in (2) and (3).¹

- (2) a. UF: /nuru # gorira/ (stem: /nur/) ‘a gorilla that paints (it)’
 b. IF: *nur gorira*
 c. PF: [nuɠ_j.g_jo.r^hi.ra] or [nu:go.r^hi.ra]
- (3) a. UF: /okiru # gorira/ (stem: /oki/) ‘a gorilla that gets up’
 b. IF: *okir gorira*
 c. PF: [o.k^hiɠ_j.g_jo.r^hi.ra] or [o.k^hi:go.r^hi.ra]

The symbol ‘+’ indicates a boundary between the stem and the affix. The second part of the lengthened vowel occurs in place of the first part of a geminate consonant, as schematized in the associations of (1) with the second of the two phonetic forms. If the UF /nuru # gorira/ is intended to mean ‘a gorilla that paints (it)’, either of the two PFs (2c) will be pronounced. For the UF /okiru # gorira/, with the meaning ‘a gorilla that gets up’, one of the two PFs (3c) is also pronounced. The relative clause, which consists only of the head finite form, is an adjunct to the noun /gorira/, as in the PS tree of (2) presented in Figure 1.

The author follows Hayata’s (1998) assumption of the sequence of the complex phenomenon of the pattern (1), yet he or she departs from the framework of Hayata’s (1998) rule-based analysis, which may not allow prosodic notions and misses the functional unity of triggers for apparently irrelevant rules, whereas optimality theory allows triggers as constraints (Kager 1999; Tanaka 2009), as will be shown by OCP-related constraints in section 3.2.1.

Saga dialects are 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,

¹ See Hayata (2000) for his further analysis.

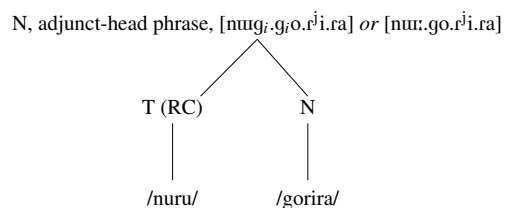


Fig. 1 Syntactic structure of an adjunct-head phrase

and Fujitsu City of Saga Prefecture in Japan.² The dialect in the current paper is spoken in Takeo City (population approximately 51,000 in 2011). The linguistic data on the Takeo Saga dialect of Japanese in the current paper, except for those taken from Hayata (1998), were obtained by the author through his own two elicitation studies with native speakers of the Takeo Saga dialect as informants: one from 2010 to 2021 and the other in 2023. One is a 55-year-old man, Takeshi Edakuni, who is one of native rough sound lovers (RSL speakers), and the other is a 30-year-old woman Madoka Yoshii (former Kawasoe), who is one of soft sound accepters (SSA speakers) in the first study. In the later field work, which will be given in the second half of section 2.2, two are an approximately 50-year-old male RSL speaker Takumi Yamaguchi and a 57-year-old female SSA speaker Fumie Tokunaga. The author of the current paper is a native speaker of another dialect from an area close to Takeo City, being sensitive to subtle linguistic differences in the Takeo Saga dialect. All the linguistic data in this paper were verified by the informants.

If Hayes's (1989) moraic theory is employed, the associations between the PFs and the IFs of the pattern (1) of the Takeo Saga dialect of Japanese, which is a mora-respecting language, will be analyzed as COMPENSATION, which is prevalent in many languages. This theory posits that either the consonant of the next word or morpheme already partly occurs or the vowel immediately preceding the liquid is lengthened to fill the mora in the absence of the liquid. This is exemplified and represented in the prosodic structures of the IF and the PFs of the noun phrase with the meaning 'a gorilla that paints (it)' (2) in Figure 2 or 3 and the other with the meaning 'a gorilla that sleeps' in Figure 2.

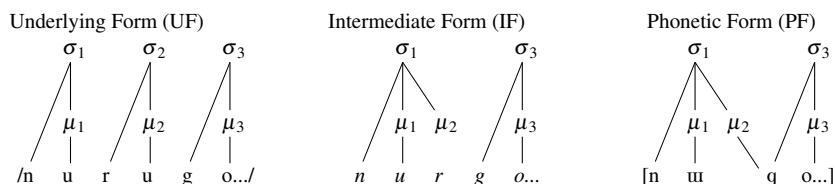


Fig. 2 The first half of a geminate consonant occurring in place of /ru/ sequences with the ambiguous meaning 'sleep-nonpast' or 'paint-nonpast'

It is assumed that every word, comprising phonological segments, must be prosodically licensed (Ito 1986). Specifically, the segments of a word must be structured into syllables, each of which comprises a nucleus and, optionally, its onset or its coda. Only the nucleus and

² It is said that the dialect originates from the 13th century spoken language of the Muromachi Era.

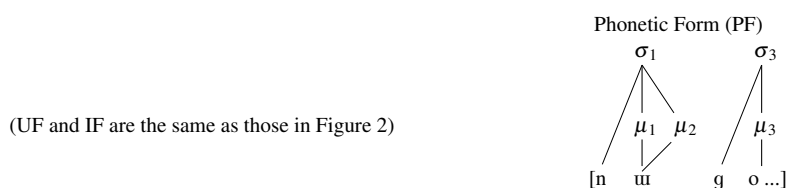


Fig. 3 The second half of the lengthened vowel occurring in place of a /ru/ sequence with the meaning ‘paint-nonpast’.

the coda are associated with moras (Hayes 1989). If a syllable contains no overt nucleus segment, no syllable structure forms. Instead, moras are preserved. A stranded mora acquires a novel association with an adjacent syllable, specifically a previous syllable. Because a mora such as μ_2 in the figures 2 and 3 is present, whereas a syllable such as σ_2 is absent, lacking the nucleus by apocope, the mora becomes associated with a previous syllable such as σ_1 and is filled with the lengthened prior-or-post closest segment (Hayes 1989). Notably, the absence of a segment (the coda consonant /r/) occurs in a consonant cluster (a sequence of the coda and onset consonants /r.g/ in this case). It is assumed that syllabification agreeable to the given segments is available at every level of UF, IF, and PF. Yamada (1990) provides the syllabification of words in the Tokyo dialect based on the sonority hierarchy of Japanese phonemes. The central phenomenon of the paper, as patterned in (1), is thus the interaction of apocope with the compensation—by *either* the first half of a geminate consonant or the glottal stop *or* the second part of the lengthened vowel—for the further absence of the word-final liquid.

A relevant typological and morphological observation is that which compensation occurs in the dialect of Japanese depends on i) the morphological context of the vowel preceding the sequence /ru/ and ii) the difference in the two groups of native speakers of the dialect. The underlying sequence /ru/s at the ends of the nonpast forms of all the verbs, regardless of their morphological stem types, are pronounced only as the first part of a consonant geminate in the group of RSL speakers of the Takeo Saga dialect. By contrast, the underlying sequence /ru/s at the ends of the /r/ consonant-final stem verbs and the vowel /i/-final stem verbs are pronounced as either the first half of the geminate consonant or the second half of the lengthened vowel, whereas the underlying sequence /ru/s at the ends of the ‘vowel /e/-final stem’ verbs and the strong stem verbs are pronounced as the first half of the geminate consonant, NOT as the second half of the lengthened vowel among the group of SSA speakers.³ These are exemplified by (4), (5), (6), and (7).

(4) (*a* and *c* is (2))

- a. UF: /nuru # gorira/ (stem: /nur/) ‘a gorilla that paints (it)’
- b. PF: [nuɔg_j.g_jo.r^hi.ra] cf. *[nuu:go.r^hi.ra] [RSL]

³ There may be another group of native speakers who do not accept the first halves of geminate consonants at the end of the nonpast forms of the /r/ consonant-final stem verbs and the vowel /i/-final stem verbs and, instead, accept only the first halves of geminate consonants at the underlying sequence /ru/s at the ends of the ‘vowel /e/-final stem’ verbs and the strong stem verbs. Such individuals may be called SSL (soft sound lover) speakers.

c. PF: [nuŋ_j.g_jo.r^hi.ra] *or* [nu:̄.go.r^hi.ra] [SSA]

(5) (*a* and *c* is (3))

a. UF: /okiru # gorira/ (stem: /oki/) ‘a gorilla that gets up’

b. PF: [o.k^hi.g_j.g_jo.r^hi.ra] cf. *[o.k^hi:̄.go.r^hi.ra] [RSL]

c. PF: [o.k^hi.g_j.g_jo.r^hi.ra] *or* [o.k^hi:̄.go.r^hi.ra] [SSA]

(6) a. UF: /nuru # gorira/ (stem: /ne/ by Hayata (1998)) ‘a gorilla that sleeps’

b. PF: [nuŋ_j.g_jo.r^hi.ra] [RSL], [SSA]

(7) a. UF: /kuru # gorira/ (stem: /ku/ by Hayata (1998)) ‘a gorilla that comes’

b. PF: [kuŋ_j.g_jo.r^hi.ra] [RSL], [SSA],

The underlying sequence /ru/s at the ends of the nonpast forms of the ‘vowel /e/-final stem’ verbs and the strong stem verbs are pronounced only as the first part of a consonant geminate in both RSL and SSA speakers, as exemplified by the association of the UF /neru # gorira/ ‘a gorilla that sleeps’ with the PF (6b) only and by the association of the UF /kuru # gorira/ ‘a gorilla that comes’ with the PF (7b) only.

Wilson (2001) cites several languages in which the (underlying) intervocalic consonant clusters /...VC_i.C_jV.../ or ...VC_i.C_jV... which syncope interacts with (for the sequence /...VC_iV.C_jV.../) in a complex phenomenon are associated with the same as those except for the first consonant being absent [...VC_j.C_jV...]. Similarly, Japanese is a language in which the (underlying or intermediate) consonant clusters /...VC_i.C_jV.../ or ...VC_i.C_jV... which apocope interacts with (for the sequence /...VC_iV.C_jV.../) in the complex phenomenon in question are associated with the same as those except for the first consonant being absent [...VC_j.C_jV...]. Independently from the complex phenomenon in question, the underlying consonant clusters /...Vr+tV.../ are associated with the phonetic forms [...Vt_j.t_jV...] with compensation by the first half of the geminate of the second consonant for absence of the morpheme-final liquid in the Takeo Saga dialect of Japanese (as well as in Tokyo Japanese), as exemplified by the pair of underlying and phonetic forms of a past form (8a). Similarly, the underlying intervocalic consonant clusters /...Vw+tV.../ are associated with the phonetic forms [...V:tV...] with compensation by the second half of the lengthened vowel for absence of the morpheme-final approximant in the Takeo Saga dialect of Japanese, as exemplified by the pair of underlying and phonetic forms of a past form (8b).

(8) a. [nutta] /nur+ta/
paint+Past
‘(He) painted (it).’

b. [nu:̄:ta] /nuw+ta/
sew+Past
‘(He) sewed (it).’

The first consonant of the cluster (8a) is liquid, and that of the cluster (8b) is the labio-palatal approximant. Both are sonorants. Therefore, the conclusion that the intermediate forms of the complex phenomenon of the Takeo Saga dialect are consonant clusters is justified. That is, the IF ...V₁r.C_jV₂... is associated with the PF [...V₁C_j.C_jV₂...] or [...V₁:̄.C_jV₂...] in (1).

In addition, the apocope assumed in the analysis of the complex phenomenon of the Takeo Saga dialect of Japanese occurs in many languages. For example, short unstressed

vowels are present or absent synchronically in the environment of V(owel) [*sono(rant)*] __# in Isthmus Nahuatl, spoken in Veracruz, Mexico (Kenstowicz and Kisseberth 1979: 298).

- (9) a. kikówa ~ kików ‘he buys it’
 b. kítaja ~ kítaj ‘he already sees it’
 c. šikakíli ~ šikakíl ‘put it in it’
 d. támi ~ tám ‘it ends’

The short unstressed vowels are alternatively absent at the word-final syllables [*sonorant_{onset} V_{nucleus}*]*syllable*, specifically, /wa/, /ja/, /li/, and /mi/. Each of the word-final sonorants /w/, /j/, /l/, and /m/ is added to the previous syllable as the coda.⁴ Therefore, such an analysis is motivated as an apocope of the underlying forms with the liquid /r/ preceding the final vowel in the complex phenomenon of the Takeo Saga dialect. That is, the UF /...V₁r.C_jV₂.../ is associated with the IF ...V₁r.C_jV₂... in (1). From the aforementioned two observations (8) and (9), the complexity of the central phenomenon of the Takeo Saga dialect is justified, as apocope interacts with compensation for the absence of the further word-final liquid of the nonpast forms. That is, the UF /...V₁r.C_jV₂.../ is associated with the IF ...V₁r.C_jV₂..., which is further associated with the PF [...V₁C_j.C_jV₂...] or [...V₁∶.C_jV₂...] in (1). McCarthy (2008a) further postulates another intermediate form ...V₁H.C_jV₂... between the PF and the IF, where *H* is the placeless counterpart of the absent consonant, as will be discussed in section 3.2.2.

Wilson (2001:182) notes that standard parallel OT cannot explain the complex phenomenon of syncope interacting with the absence of the first consonant of the intervocalic consonant cluster in Carib and Tunica and explains only part of the phenomenon—the absence of the first consonant of an intervocalic consonant cluster—leaving an analysis of the rest for other research.⁵ See Wilson (2001) for the CV sequences in which the syncope leads to the intervocalic consonant cluster in the two languages. McCarthy (2011) argues that standard parallel OT cannot explain the complex phenomenon of syncope interacting with consonant cluster simplification, as schematized in [VC_jV] (cf. *[VC_iV]) -/V.C_iV.C_jV/, by a perception-by-cue approach, whereas HS-OT can explain it by the postulation of the intermediate forms VC_i.C_jV. Both the consonant C_i and the consonant C_j are underlyingly perceptually salient, each being an onset consonant in underlying forms. By contrast, the consonant C_i is a coda consonant and is not perceptually salient, and the consonant C_j is perceptually salient in intermediate forms. The current study addresses another complex phenomenon by taking McCarthy’s (2008a) debuccalization approach.

There was a P-OT analysis by Sasaki (2013; 2015) of a similar phenomenon over /ru/-final nonpast forms and the copula in the Hasaki Ibaraki dialect of Japanese, as in PF [kut_j.t_ja] for UF /kuru+da/ ‘come [nonpast]+Copula [nonpast]’. Sasaki (2013) provided the first OT analysis of geminate consonants at the ends of nonpast forms in a Japanese dialect. He assumes that the place of articulation (PoA) of the liquid has no value, whereas the other consonants have some value in the dialect. Not noticing the compensation of the phenomenon, he reviews neither Hayes’s (1989) nor McCarthy’s (2008a) analysis of the consonant cluster simplification, which had been established in the literature. His assumption may be an alternative to McCarthy’s (2008a) explanation. It will be argued in the body

⁴ This can be considered as an instantiation of the tendency in Japanese and old Japanese, as observed by Kubozono (1995: 230-257).

⁵ Wilson (2001) cites the Billiri dialect of Tangale and Erromangan, where similar cases are found.

of the paper that harmonic serialism is superior to parallel OT in explaining the complex phenomenon in the current paper, and Sasaki's (2013; 2015) analysis suffers the same incorrect prediction and inadequacy of the framework of parallel OT as those discussed in section 4. For example, Sasaki's (2013) parallel OT (P-OT) analysis cannot explain the degree of ungrammaticality of *[kur_j.r_ja] corresponding to UF /kuru+da/ because of the lack of (the concept of) intermediate forms.

Koga and Ono (2010) analyze the difference in the PFs of the nonpast forms between the /r/-consonantal final stem verbs (4) and the vowel /i/-final stem verbs (5), on the one hand, and the 'vowel /e/-final stem' verbs (6) and the irregular verbs (7), on the other hand, in their morphological structures. The author will review the literature on the morphological analysis of the nonpast forms and argue for a particular morphological analysis by Koga and Ono (2010) in the last part of this introduction.

Hayata (1998) argues for the postulation of the sequence /ru/ for the underlying forms corresponding to the first halves of geminate consonants of the phonetic forms at the ends of the nonpast forms. He analyzes the UFs as /ru/, specifically 1) /r+ru/ of the /r/-consonantal final stem verbs such as /tor+ru/ 'take-nonpast' for [toʔ] and 2) /ru/ of the vowel-final stem verbs such as /oki+ru/ 'get up-nonpast' for [okʲiʔ]. The underlying stem-final /r/ in the case of consonant-final stem verbs is motivated because the stem-final consonant /r/ [r] occurs in other verb forms, for example, the negative, causative, passive, and volitional forms such as [nurasuʔ], [nuraN], [nuraruʔ] and [nuroj] of the verb /nur/ 'paint'. Appealing to the null hypothesis, he assumes that the underlying forms for the first halves of the geminate consonants of the vowel-final stem verbs are also /ru/, even though no direct supporting evidence is attested in the dialect. The /ru/-final UF-faithful underlying forms are currently used among some native speakers, as will be discussed in section 2.2. The author follows Hayata's (1998) analysis that the underlying forms corresponding to the first halves of geminate consonants of the phonetic forms at the ends of the nonpast forms are /ru/, but he or she departs from the assumption that the allomorphs of the nonpast affix are /ru/ only. Here, the author follows Hall et al.'s (2018) allomorphy analysis of the nonpast affix of the Tokyo dialect. The nonpast affix associates not with /ru/, as in Hayata (1998), but with two allomorphs /(r)u/.⁶ The vowel-initial allomorph /u/ pairs with the stems of consonant-final verbs such as /tor+u/ ([toʔ] or [to:]) 'take-nonpast' cf. */tor+ru/, as explained by either CodaCond, if the stem final consonant is underlyingly associated with a mora (Hall et al. 2018), or *ComplexOnset, if the stem final consonant is underlyingly associated with no mora (Koga 2020). In contrast, the consonant-initial /ru/ pairs with the stems of vowel-final stem verbs such as /oki+ru/ ([okʲiʔ] or [okʲi:]) 'get up-nonpast' cf. */oki+u/, as explained by the constraint Onset (i.e., *[_σ V]).⁷

⁶ Most of the inflectional and derivational affixes of Japanese and its dialects have vowel- and consonant-initial allomorphs, e.g., /N/, /raN/, and /aN/ 'not-nonpast'.

⁷ Hayata's (1998) analysis suffers from the absence of the second member but NOT the first member of clusters such as /tor+ru/ and /yom+ru/, which Kurusu (2012) noted. By contrast, Hall et al.'s (2018) allomorph selection, similar to Koga and Ono's (2010) and Koga's (2012) morphological analysis, does not suffer from this problem. There is no problematic consonant cluster simplification over stem-affix junctures, as in /tor+u/ and /yom+u/ 'read-nonpast' in their analysis. The morphological analyses of Koga and Ono (2010), Koga (2012), and Hall et al. (2018) are in line with Kiyose (1995), who advocates for the common characteristics of agglutination among Japanese and other Altaic languages.

The paradigms of the ‘vowel /e/’-final stem verbs (but not those of the ‘irregular’ verbs) contain that of the potential verb without the meaning of ‘can’ at their ends, and the suppletive form /Xuru/ replaces the nonpast forms of not only the ‘vowel /e/’-final stem verbs but also the ‘irregular’ verbs without the meaning of ‘can’ exactly the same way as the suppletive form replaces the nonpast form of the potential verb, as examples given in Table (10).

(10) Paradigms of the potential verb, ‘vowel /e/’-final stem verbs, and ‘irregular’ verbs among SSA speakers of the Takeo Saga dialect of Japanese

Negative	Adv.	Past	Nonpast	Imp.	Meaning
- tor ^j ieN	- tor ^j ie	- tor ^j ieta	tor ^j ijuu? (/tori+j+uru/) cf. *tor ^j ijuu: -	- tor ^j iero	can take
- tabeeN	- tabee	- tabeeta	tabejuu? (/tabe+j+uru/) cf. *tabejuu: -	- tabeero	can eat
- oboeeN	- oboee	- oboeta	obojuu? (/oboe+j+uru/) cf. *obojuu: -	- oboero	can memorize
- tabeN	- tabe	- tabeta	tabuu? (/taburu/) cf. *tabuu: -	- tabero	eat
- oboeN	- oboe	- oboeta	obojuu? (/obojuru/) cf. *obojuu: -	- oboero	memorize
- koN	- k ^j i	- k ^j ita	k ^u u? (/kuru/) cf. *k ^u u: -	- ke:	come
- seN	- f ⁱ	- f ⁱ ta	suu? (/suru/) cf. *suu: -	- sero	do

Every potential form of a verb consists of its present participle form for the complement and the potential verb for the head as in the past potential form of the verb /tab(e)/, /tabe-e-ta/ ‘eat [Present Participle]-be able-Past’.⁸ The paradigm of the inflectional forms of the potential verb is </eN/[neg.], /e/[adv.], /eta/[past], /uru/[nonpast] and /ero/[imp.]>.⁹ The palatal glide appears and avoids hiatus. Exactly the same way as the vowel alternations in the paradigm of the potential verb </e/, /e/, /e/, /u/, /e/>, the vowel alternations in the paradigms of the ‘vowel /e/-final’ stem verbs </Xe(ra)N/[neg.], /Xe/[adv.], /Xeta/[past], /Xuru/[nonpast], /Xero/[imp.]> are </e/, /e/, /e/, /u/, /e/>. Therefore, the paradigms of the inflectional forms of the ‘vowel /e/-final’ stem verbs contain that of the potential verb without the meaning of ‘can’ as the morphological head. It follows that the suppletive form /Xuru/, consisting of X plus the

⁸ The present participle form is the stem plus the vowel /i/ if the verb is a consonant-final stem or strong stem verb and the same as the vowel-final stem allomorph if the verb is a vowel /i/ or ‘e/-final’ stem verb.

⁹ The paradigms of inflectional forms of verbs are written in the form of the ordered five-tuples < - [negative form], ~ [adverbial form], ~ [past form], ~ [nonpast form], ~ [imperative form] > in this paper.

suppletive form of the potential verb /uru/, replaces the nonpast forms of the ‘vowel /e/-final stem verbs with the potential meaning absent exactly the same way as the suppletive form /uru/ replaces the nonpast form of the potential verb. This explains the identity between the phonetic realizations, the glottal stop [ʔ] but not the second half of the lengthened vowel [(V):], at the ends of the suppletive nonpast forms /Xuru/ of the ‘vowel /e/-final’ stem verbs and the suppletive nonpast form /uru/ of the potential verb among SSA speakers of the dialect, as between the first, second, and third upper parts for the latter and the fourth and fifth upper parts for the former (as previously in (6)) of Table (10) in contrast to (4) and (5).

By contrast, the paradigms of the inflectional forms of the ‘irregular’ verbs are </koN/ or /seN/[_{neg.}], /Ci/[_{adv.}], /Ci_{ta}/[_{past}], C/uru/[_{nonpast}], /koi/ or /sero/[_{imp.}]/>; the vowel alternations are </o/, /i/, /i/, /u/, /o/ > and </e/, /i/, /i/, /u/, /e/ >, which are distinct from those of the potential verb </e/, /e/, /e/, /u/, /e/ >. Indeed, it is not the case that the paradigms of the inflectional forms of the ‘irregular’ verbs contain that of the potential verb as the morphological head. It is only the case that the suppletive /uru/, which is the same as the suppletive nonpast form of the potential verb, PF [uʔ] but not *[u:] of UF /uru/, replaces the nonpast allomorph of the nonpast forms of the ‘irregular’ verbs, without the potential meaning and with morphophonological property. (This is also true in the ‘irregular’ verbs of the Tokyo dialect.) This suppletion analysis can explain the identity between the phonetic realizations, the glottal stop [ʔ] but not the second half of the lengthened vowel [(V):] at the ends of the nonpast forms /Curu/ of the ‘irregular’ verbs and at the ends of the suppletive nonpast form /uru/ of the potential verb among SSA speakers of the dialect, as between the first and second upper parts for the latter and the fifth and sixth upper parts (as previously in (7)) for the former of Table (10) in contrast to (4) and (5).

Koga and Ono (2010) analyze the final sequence /uru/ of the nonpast forms of the ‘vowel /e/-final’ stem verbs and the strong stem verbs as one allomorph of the nonpast affix. The allomorphs of the nonpast affix of the Takeo Saga dialect of Japanese are thus /u/, /ru/, and /uru/. It follows that each of the ‘vowel /e/-final’ stem verbs is associated with the longer /e/-final stem allomorph and the shorter stem allomorph, with the final /e/ of the longer stem allomorph being absent. They are verbs with X_e/X stem allomorphs, as exemplified by /ne/ and /n/ for [nuʔ] ‘sleep-nonpast’, /tabe/ and /tab/ for [tabuʔ] ‘eat-nonpast’. Similarly, each of the strong stem verbs is associated with the shorter stem allomorph with only one consonant /k/ ‘come’ or /s/ ‘do’ and the longer /o/-final stem allomorph /ko/ for /k/ ‘come’ and the longer /e/-final stem allomorph /se/ for /s/ ‘do’. They are verbs with C/Co or C/Ce (C/CV) stem allomorphs. See Koga (2012) for an explanation of which allomorph of the nonpast affix pairs with which verb stem allomorph. If this morphological novel analysis of Japanese linguistics is adopted, the previous set of data (6) and (7) is actually one of (11) and (12), respectively, with morphological analyses revised.

(11) (the same as (6) except for analysis)

- a. UF: /nuru # gorira/ (stem: /n/, affix: /uru/) ‘a gorilla that sleeps’
- b. PF: [nuʔ_j.gjo.r^hi.ra]

(12) (the same as (7) except for analysis)

- a. UF: /kuru # gorira/ (stem: /k/, affix: /uru/) ‘a gorilla that comes’
- b. PF: [kuʔ_j.gjo.r^hi.ra]

The difference in the phonetic realizations of the final /ru/ sequences of the underlying forms of the nonpast forms between (11) and (12), on the one hand, and (2) (= (4)) and (3) (= (5)), on the other, is attributed to whether the nonpast affix is the suppletive nonpast allomorph

or not. The relevant constraint, which is as violable as usual in OT, is that the reanalyzed ‘stem’ does not contrast if it is in a suppletive form, whereas the stem contrasts if it is not in a suppletive form.

The morphological analysis is further specified by Koga and Ono (2010). The zero morpheme expresses the unmarked (or default) value, in contrast to a morpheme expressing the marked value of a feature in many languages. For example, Vietnamese has morphemes for the past and future and no morphemes for the present. Thus, plausibly, the weakest consonant or vowel or a phonological feature is realized as an unmarked value in some languages. Following Koga and Ono (2010), the author assumes that /*(r)u*/ and the combination of them [*tense* [*tense* *u*] [*tense* *ru*]], or /*uru*/, are the allomorphs of the affix, or the tense expletive, in the dialect, as will be motivated by the analysis of [*affix* [*stem* *u*] [*affix* *ru*]] of the suppletive nonpast allomorph in section 3.2.3. The general consensus in the linguistic literature is that the values of the tense are past, present, and future. If the affix of the allomorphs /*(r)u*/ and /*uru*/ is analyzed as the tense expletive or lexically unspecified for the tense value, then the implication of the affix of the allomorphs /*(r)u*/ and /*uru*/, in contrast with the past affix in the language, is the rest of the past tense, i.e., the present or future tense, in short the nonpast tense. The nonpast tense affix selects the shorter allomorphs of the stems, for example, /*n*/ ‘sleep’, as in the left part of Figure 4.

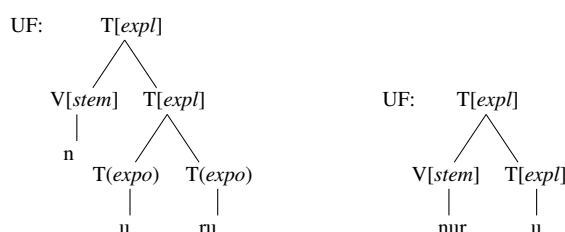


Fig. 4 The morphological structures of the nonpast form /*n+uru*/ ‘sleep-nonpast’ and /*nur+u*/ ‘paint-nonpast’

The nonpast tense affix selects, for example, /*nur*/ ‘paint’ since only one stem allomorph is associated with consonant-final stem verbs. The affix’ allomorph /*u*/ pairs with the verb stem /*nur*/ ‘paint’, as in the right figure.¹⁰

The introduction here showed a few examples of the phenomenon the author is concerned with, including the phonetic realizations [uʔ], but not *[u:], of the final /*uru*/ of the nonpast forms of the *Xe/X* stem verbs and *C/CV* stem verbs. It also provided ideas and discussions that will be relevant in sections 3 and 4; i) Hayata’s (1998) generative rules of part of the complex phenomenon in the *SPE* framework, ii) Hayes’s (1989) moraic theory, iii) Hall et al.’s (2018) allomorphic analysis of the nonpast affix, iv) the superiority of OT to the rule-based framework, v) Wilson’s (2001) motivation for complex phenomena, vi) OT analyses of complex phenomena via the perception-by-cue approach by Wilson (2001) and

¹⁰ Koga (2012) explains why the nonpast affix selects shorter stem allomorphs such as /*n*/ ‘sleep’ instead of /*ne*/ ‘sleep’ if there is more than one allomorph. Koga (2020) explains i) why the vowel-initial affix’ allomorph /*uru*/, but NOT /*u*/, pairs with the consonant-final stem allomorph X or C of the *Xe/X* stem verbs and *C/CV* stem verbs and ii) points out that his analysis cannot explain why the vowel-initial affix’ allomorph /*u*/, but NOT /*uru*/, pairs with the consonant-stem final verbs.

McCarthy (2011), vii) the PoA-less liquid analysis by Sasaki (2013; 2015), and viii) Koga and Ono's (2010) morphological analysis of the nonpast forms of the *Xe/X* and *C/CV* stem verbs. The current paper continues as follows: Section 2 describes the complex phenomenon and provides relevant sets of examples in the Takeo Saga dialect of Japanese. Section 3 presents an analysis of the complex phenomenon in harmonic serialism of optimality theory. Section 4 discusses whether or not standard parallel OT is an appropriate framework to have constraints and rankings be stated and work for the complex phenomenon.

2 Nonpast forms of verbs of the Takeo Saga dialect of Japanese

This section repeats Hayata's (1998) data set and provides four new data sets obtained from the author's own two field studies to support Hayata's observation—i) whether the UF-faithful phonetic forms are used among the native speakers in the area after confirming the psychological representation reflecting the grammar as a whole, ii) at what syllable, specifically consisting of which onset consonant and the nucleus vowel /u/, compensation is present, iii) at what consonant for the initial consonant of the next word or morpheme compensation by geminate consonants is present, and iv) which compensation is present among different groups of speakers of the Takeo Saga dialect.

2.1 Hayata's (1998) observation and other verb forms

Every nonpast form ending with [ru] (/ru/) in the Tokyo dialect *either* i) ends with the first half of the geminate consonant when followed by a consonant, regardless of the consonant *or* ii) ends with a glottal stop when followed by a vowel or when it comes at the end of a sentence in the Takeo Saga dialect (Hayata 1998), as in the four kinds of syntactic contexts of sentences in the nonpast tense in (13).

(13) First halves of geminate consonants at the ends among RSL speakers of the Takeo Saga dialect (Hayata 1998)¹¹

	S-final	RC#(Noun)	conditional	Neg. Imp.	causative	
a. consonant-final stem verbs with the stem-final consonant /r/						
Takeo	toʔ	tog(g...)	toggʲi:	toNna	torasʊʔ	'take'
Tokyo	torʊ	torʊ (g...)	toreba	torʊna	toraserʊ	
b. <i>Xe/X</i> -stem verbs						
Takeo	tabʊʔ	tabʊg(g...)	tabʊggʲi:	tabʊNna	tabesʊʔ	'eat'
Tokyo	taberʊ	taberʊ (g...)	tabereba	taberʊna	tabesaserʊ	
c. vowel /i/-final stem verbs						
Takeo	okʲiʔ	okʲig(g...)	okʲiggʲi:	okʲiNna	okʲisʊʔ	'get up'
Tokyo	okʲirʊ	okʲirʊ (g...)	okʲireba	okʲirʊna	okʲisaserʊ	
d. <i>k/ko</i> stem verbs						
Takeo	kuʔ	kuʊg(g...)	kuʊggʲi:	kuʊNna	kosʊʔ	'come'
Tokyo	kuʊrʊ	kuʊrʊ (g...)	kuʊreba	kuʊrʊna	kosaserʊ	
e. <i>s/se</i> stem verbs						
Takeo	sʊʔ	sʊʊg(g...)	sʊʊggʲi:	sʊʊNna	sʊʊʔ	'do'
Tokyo	sʊʊrʊ	sʊʊrʊ (g...)	sʊʊreba	sʊʊrʊna	sʊʊrʊ	

¹¹ Lengthened vowels are described as V:, and hiatuses are described as VV in this paper.

The first column of the table provides the sentence-final form of the verb, the second column provides the relative clause in the nonpast tense adjoined to a /g/-initial noun, the third column provides the conditional form of the nonpast form plus the affix /gi:/ ‘if’, and the fourth column provides the negative imperative form of the nonpast form plus the affix /na/ ‘do not’. The fifth column provides the causative form of the stem plus the nonpast derivational causative verb /-(s)as+uru/ (or [(s)asu?]) and clarifies the stem for each verb, as mentioned in the introduction. It is also confirmed by the other verb forms, negative, passive and volitional forms, as provided in (14).

(14) Negative, passive and volitional forms among the RSL and SSA speakers of the Takeo Saga dialect

	negative	passive	volitional	
a. consonant-final stem verbs with the stem-final consonant /r/				
Takeo	toraN (/toraN/)	toraru? (/tararuru/)	toroj (/toroi/)	‘take’
Tokyo	toranai	torareru	toro:	
b. <i>Xe/X</i> -stem verbs				
Takeo	tabeN (/tabeN/)	taberaru? (/taberaruru/)	tabui (/tabui/)	‘eat’
Tokyo	tabenai	taberareru	tabejo:	
c. vowel /i/-final stem verbs				
Takeo	ok ^j iraN/ok ^j iN (/oki(ra)N/)	ok ^j iraru? (/okiraruru/)	ok ^j iroi (/okiroi/)	‘get up’
Tokyo	ok ^j inai	ok ^j irareru	ok ^j ijo:	
d. <i>k/ko</i> stem verbs				
Takeo	koN (/koN/)	koraru? (/koraruru/)	k ^j ui/k ^j u: (/kui/)	‘come’
Tokyo	konai	korareru	kojo:	
e. <i>s/se</i> stem verbs				
Takeo	seN (/seN/)	saru? (/saruru/)	sjui/sju: (/sui/)	‘do’
Tokyo	finai	sareru	fijo:	

For example, the stem /tor/ of the consonant-final stem verb occurs in all the verb forms of the causative, negative, passive and volitional forms. If the allomorphs of the negative affix are assumed to be /N/, aN/, and /raN/, and those of the volitional affix are assumed to be /ui/, /oj/, and /roj/, then it will turn out that the analyses of the stems of the four kinds of verbs are on the right track.

Native speakers say that they pronounce ‘sokuon’, or the glottal stop, 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 one physiological study (Fujimoto, 2014). An assumption in this paper is that at a 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 ends of the nonpast forms are pronounced as the first half of a geminate consonant or the glottal stop.

As the author noted with the alternations of the UF-faithful phonetic forms in the introduction, the final sequence [ru] (UF /ru/) if any of a UF-faithful phonetic form alternates with the first half of a geminate consonant among RSL speakers of the Takeo Saga dialect: for example, i) [toru] alternating with [to?], ii) [toru (g...)] alternating with [tog(g...)], iii)

[toru g:] alternating with [togg^hi:], and iv) [toru na] alternating with [toNna] together with [torasuruu] alternating with [torasuʔ], as will also be discussed in the next section.¹²

2.2 Data set #1 to support Hayata (1998): /ru/-final phonetic forms are actually used

Up to now, the author mentions that /ru/-final phonetic forms are also used sometimes and among some native speakers, as data will be provided in the second half of this section. If underlying forms are only the psychological reality in phonology and are not beyond it, the patterns of the underlying forms for the four prosodic types of verbs, for example, among the SSA speakers, are clarified and summarized as each of (15)-(18) for each prosodic type.

(15) r-final:

- a. UF: /...rX/
- b. PF: [...C_i(C_i...)] (or [...ʔ]) or [...(V_i):] [SSA] See (2)(= (4)) for an example.

(16) V-final:

- a. UF: /...Y/
- b. PF: [...C_i(C_i...)] (or [...ʔ]) or [...(V_i):] [SSA] See (3)(= (5)) for an example.

(17) Xe/X-stem:

- a. UF: /...C_i(C_i...)/ (or /...ʔ/) (PF-faithful)
- b. PF: [...C_i(C_i...)] (or [...ʔ]) [SSA] See (6) for an example.

(18) C/CV-stem:

- a. UF: /...C_i(C_i...)/ (or /...ʔ/) (PF-faithful)
- b. PF: [...C_i(C_i...)] (or [...ʔ]) [SSA] See (7) for an example.

The native speakers compute the final part of the PFs, the first half of geminates or the glottal stop [...C_i(C_i...)](or [...ʔ]) and the second part of the lengthened vowel [(V_i):], from the final part of the underlying forms /rX/ for the C-final stem verbs. The variable X may be a segment or zero. They compute the final part of the PFs from the final part of the underlying forms /Y/ for the V-final stem verbs. Here they say that they have no consciousness of using different phonetic realizations, which means that their psychological reality is an abstract Y, which may be a segment or a sequence of phonemes, and phonetically realizes itself as either the first half of geminates (or the glottal stop) or the second half of the lengthened vowel. The same native speakers do not compute the phonetic realization, the first half of geminates or the glottal stop only, for the Xe/X-stem and C/CV-stem verbs because the underlying forms are PF-faithful.

Assuming that the underlying forms of sequences of phonemes are not the psychological reality only in phonology, but the psychological representation necessitated by the grammar as a whole, consisting of semantics, syntax, morphosyntax, morphology, phonology including phonotactics, what psychological representation is for each of the underlying forms for

¹² The first half of a geminate of the nasal is syllabic, as in the negative form [tabuNna] but not *[tabuɲna] (UF /taburu+na/). The observation of the syllabic nasal is from the author's own research and was noted by the two native speakers. Hayata (1998) did not notice it.

the verbs in the grammar of the Takeo Saga dialect of Japanese is clarified below. Specifically, it is examined 1) what segment or sequence of segments is possible for each psychological representation based on phonotactics of the dialect, morphosyntactic properties, and the same affixal exponence at the same position, and 2) whether each of the candidates can realize itself as the first half of a geminate (or the glottal stop) or the second half of the lengthened vowel. The psychological representations of the final /rX/ as the underlying forms for the nonpast forms of the C-final verbs in the grammar as a whole are of the pattern /r/ or /ru/, as discussions summarized in (19).

(19) Instantiations of Variable X for Final /rX/ of Nonpast Forms of C-final Verbs

	stem-final X	phonotactics	morphosyntactic property	same affixal exponence	UF → PF	Max[Manner: Marked]
トク トク	r r u r o r a r i r e r C	*	* * *(a) *(b)	* * * * *	Vr → V?/: Vru → V?/:	(high)
a: [present participle/gerundive], b: [imperative]						
attested	t u		nonpast			
attested	k u		nonpast			
attested	s u		nonpast			
attested	b u		nonpast			
attested	g u		nonpast			
attested	n u		nonpast		(nu → N)	
attested	m u		nonpast			
attested	w u		nonpast		wu → uq	

As given in Hayata's discussions on page 13, the stem-final /r/ of the *r*-final stem verbs is required to postulate in the underlying forms; if it is not assumed in the UFs of the verbs, the author wonders why it appears in the other verb forms, as exemplified in the paradigm of the verb /tor/ 'take' <toraN, tor^hi, totta (UF: /tor+ta/), to?/to:, tore>. If a vowel /o/, /a/, /i/, or /e/ instantiates the variable X, the native speakers will consider it as the morphosyntactic property different from the nonpast tense: for example, /i/ for the present participle or the gerundive and /e/ for the imperative. The variable X cannot be any consonant by the phonotactics of the dialect; no consonant-initial affix cannot affix a consonant-final stem by *COMPLEXONSET (See page 7.). By the tendency that the affixal exponents of the same morphosyntactic properties appear in the same sequences of segments (Stump 2001: 19), as the causative affixal verb /s)as(e)/, the adverbial affix (i), the negative affix /a)N, raN/, etc. do, the variable X can be /u/. The vowel /u/ appears as the nonpast affix in the other C-final stem verbs. The UF /r/ or /ru/ can be associated with the PF the first half of a geminate (or

the glottal stop) or the second half of the lengthened vowel without violating any constraint, for example, Max[Manner: Marked], as will be further clarified in the current paper as a whole. The liquid is a sonorant, which is not a marked value of the manner of articulation. The vowel /u/ is one of the two least sonorous vowels.

The psychological representations of the final /Y/ in the underlying forms for the nonpast forms of the V-final verbs is also /t/ or /ru/, as discussions summarized in (20).

(20) Instantiations of Variable Y for Final /Y/ of Nonpast Forms of V-final Verbs

	stem-final Y	phonotactics	morphosyntactic property	same affixal exponence	UF → PF	ID[Nasal]	Max[Manner: Marked]	Max[Place: Marked]
☞	i r i w i j i h i s i z i t i d i k i b i g i n i m i V	*			ir → iʔ/i: iw → iʔ/i: ij → iʔ/i: ih → iʔ/i: is → iʔ/i: iz → iʔ/i: it → iʔ/i: id → iʔ/i: ik → iʔ/i: ib → iʔ/i: ig → iʔ/i: in → iʔ/i: im → iʔ/i:		*	*
☞	i ru i ra i ri i re i ro		*	*	iru → iʔ/i:			

The variable Y can never be instantiated as a vowel by the constraint ONSET as on page 7. The variable cannot be labiovelar approximant /w/ or the palatal approximant /j/ because the PoAs of them are marked specifications, labial or dorsal. The UFs /w/ to the PFs the first half of a geminate (or the glottal stop) and the second half of the lengthened vowel violate the faithfulness constraint of the marked specifications of the PoA. The variable cannot be /h/, /s/, /z/, /t/, /d/, /k/, /b/, or /g/ because they are not sonorants, i.e., are marked specifications of MoA, obstruents. The UFs /h/, /s/, /z/, /t/, /d/, /k/, /b/, and /g/ to the PFs the first half of a geminate (or the glottal stop) and the second half of the lengthened vowel violate the faithfulness constraint of the marked specifications of the MoA. The variable cannot be a nasal because nasality is preserved. The UFs /n/ and /m/ and the PFs the first half of a geminate (or the glottal stop) and the second half of the lengthened vowel violate the faithfulness constraint of the nasals. If the variable is /rV/, then /ru/ can instantiate the

variable. The native speakers consider every one of the other vowels /a/, /i/, /e/, and /o/ as a morphosyntactic property different from the nonpast: for example, /e/ and /o/ for the imperative. The UF /ru/ to the PF the first half of a geminate (or the glottal stop) does not violate any constraint, as discussed. The discussions for the V-final stem verbs hold true for the Xe/X stem and C/CV stem verbs. Because the compensation realizes itself as the first half of a geminate (or the glottal stop), the PF-faithful candidate can be the UF for the Xe/X stem and C/CV stem verbs. The psychological representations of the underlying forms for the nonpast forms of the Xe/X stem and C/CV stem verbs is /r/ or /ru/ are ...C_i(C_i...)/ (or /...?/), /...r/, or /...ru/.

The patterns of the underlying forms for the four prosodic types of verbs, for example, among the SSA speakers, are summarized as each of (21)-(24) for each prosodic type unless a further data is not provided.

(21) *r*-final:

- a. UF: /...r/ or /...ru/
- b. PF: [...C_i(C_i...)] (or [...?]) or [...(V_i):] [SSA] See (2)=(4) for an example.

(22) *V*-final:

- a. UF: /...r/ or /...ru/
- b. PF: [...C_i(C_i...)] (or [...?]) or [...(V_i):] [SSA] See (3)=(5) for an example.

(23) *Xe/X*-stem:

- a. UF: /...C_i(C_i...)/ (or /...?/) (PF-faithful), /...r/, or /...ru/
- b. PF: [...C_i(C_i...)] (or [...?]) [SSA] See (6) for an example.

(24) *C/CV*-stem:

- a. UF: /...C_i(C_i...)/ (or /...?/) (PF-faithful), /...r/, or /...ru/
- b. PF: [...C_i(C_i...)] (or [...?]) [SSA] See (7) for an example.

Now the result of the author's second field work is provided. The facts (25) were revealed from the discussions with the informants.

- (25) a. There are sure to be some male native speakers, although not many, who dare to use /ru/-final non-past forms like [tabuuru] 'eat-nonpast', [firabuuru] 'investigate-nonpast', [so:daNsuuuru] 'consult-nonpast', [ok^hiru] 'get up-nonpast' and [hafiru] 'run-nonpast' whichever prosodic type they are. They prefer to use them without reducing them to the first half of geminates (or the glottal sound).
- b. Even those who normally do not use [ru]-final non-past forms use the [ru]-final ones when they want to make clear or emphasize the forms, as in (26) with each of (27) embedded, and the [ru]-final past forms of such derivational verbs as C-final stem verb /joru/ 'be' (which is /iru/ in the Tokyo Japanese), which takes a verb phrase with its head being the present participle form, as in (28) with each of (29) embedded.

- (26) [oj-tatʃi-ga (each of (27)) keN joka jo]
 I-Plural-Nom because is alright Emph
 'It will be alright since we ...'

- (27) a. [tabuuru]
eat-nonpast
'... eat (it) ...'
- b. [m'izu ba kajuuru]
water Acc change-nonpast
'... change water ...'
- c. [soj ba ʃirabuuru]
it Acc investigate-nonpast
'... investigate it ...'
- d. [ak'iramuru]
abandon-nonpast
'... abandon (it) ...'
- e. [soj ba motte-kuuru]
it Acc bring-nonpast
'... bring it ...'
- f. [soodzi-suuru]
sweep-nonpast
'... sweep (there) ...'

The native speakers say that they use the [ru]-appearing forms of even the *Xe/X* stem verbs and the *C/CV* stem verbs, as in these examples, and they use the [ru]-appearing forms more if the verb is either an *r*-final stem verb or a V-final verb, maybe influenced by those of the Tokyo dialect.

- (28) [kodomo-tatʃi-ga (each of (29)) jo]
child-Plural-Nom Emph
'Actually the children ...'

- (29) a. [tabejuuru]
are eating
'... are eating (it) ...'
- b. [m'izu ba kaejuuru]
water Acc change-nonpast
'... are changing water ...'
- c. [soj ba ʃirabejuuru]
it Acc are investigating
'... are investigating it ...'
- d. [ak'iramejuuru]
are abandoning
'... are abandon (it) ...'

- e. [soj ba motte-k^jijoru]
 it Acc are bringing
 ‘... are bringing it ...’
- f. [soodzi-fijoru]
 are sweeping
 ‘... are sweeping (there) ...’

The native speakers say that they avoid the non-past forms of the progressive verbs with the first part of the geminate (or the glottal stop) or the second part of the lengthened vowel since they cannot immediately notice which simplex verb the progressive verb such as [tabejoʔ] or [tabejo:] is; their assumption is that the nonpast forms are those of the simplex verbs, which is soon abandoned after a second thought.¹³

Being conservative, how deep underlying forms are in their minds across native speakers may differ, as may how deep the underlying forms are across verb forms. That is, as the reviewer noted, the underlying form of the final /ru/s of the nonpast forms may be /ru/, /r/, /ʔ/ or /C_i(C_i)/ for every ‘/ru/-final’ verb and /ru/, /r/, /ʔ/, /C_i(C_i)/ or (V_i): for every C-final or V-final verb for SSA, as summarized as follows:

(30) C-final:

- a. UF: /...ru/ or /...r/
- b. Stem-Affix Segmentation: /...r+u/
- c. PF: [...C_i(C_i...)] (or [...ʔ]) or [...(V_i):] [SSA]

(31) V-final:

- a. UF: /...ru/, /...r/, /...ʔ/, /...C_i(C_i...)/, or /...(V_i):/
- b. Stem-Affix Segmentation: /...+ru/
- c. PF: [...C_i(C_i...)] (or [...ʔ]) or [...(V_i):] [SSA]

(32) Xe/X-stem:

- a. UF: /...ru/, /...r/, /...ʔ/, or /...C_i(C_i...)/
- b. Stem-Affix Segmentation: /...+uru/
- c. PF: [...C_i(C_i...)] (or [...ʔ])

(33) C/CV-stem:

- a. UF: /...ru/, /...r/, /...ʔ/, or /...C_i(C_i...)/
- b. Stem-Affix Segmentation: /...+uru/
- c. PF: [C_i(C_i...)] (or [...ʔ])

The underlying form of the final ‘/ru/’s of the nonpast forms in this paper is assumed to be /ru/, as they are in Hayata, considering the SSA native speakers who use not only /C_i(C_i)/ (or /ʔ/) for every ‘/ru/-final’ verb and (V_i): for C-final or V-final verbs in addition but also the

¹³ The author believes that child native speakers hypothesize a generalized grammar to generate both their native language and another language when they face another similar language in their neighboring areas instead of having two independent and only corresponding grammars. This is a kind of deep learning network.

UF-faithful [ru]. At the end of section 3, if the underlying forms, or inputs, of the final ‘/ru/’s of the nonpast forms are not restricted to /ru/, i.e., can be any, including the other intermediate and PF-faithful ones /r/, /ʔ/, /C_i(C_i)/, and optionally (V_i)_i, as in (30)-(33), whether the constraints and the ranking the author propose work in the standard parallel OT, which assumes richness of the base, will be discussed.

2.3 Data set #2 to support Hayata (1998): if UF is not /ru/-final

The nonpast 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 the Takeo Saga dialect, as exemplified in (34).

- (34) There is no geminate consonant at the final in the Takeo Saga dialect if the consonant of /Cu/ at the final of the nonpast form is not liquid.

	S-final	RC#(Noun)	conditional	Neg. Imp.	causative	
f. consonant-final stem verbs with the stem-final consonant NOT /r/						
Takeo	auɥ	auɥ(g...)	auɥg ^h i:	auɥna	awasu?	‘meet’
Tokyo	auɥ	auɥ (g...)	aeba	auɥna	awaseru	
Takeo	finu	finu(g...)	finuɥg ^h i:	finuuna	finasu?	‘die’
Tokyo	finu	finu (g...)	fineba	finuuna	finaseru	
Takeo	amu	amu(g...)	amuɥg ^h i:	amuuna	amasu?	‘knit’
Tokyo	amu	amu (g...)	ameba	amuuna	amaseru	
Takeo	tobu	tobu(g...)	tobuɥg ^h i:	tobuuna	tobasasu?	‘fly’
Tokyo	tobu	tobu (g...)	tobeba	tobuuna	tobaseru	
Takeo	matsu	matsu(g...)	matsuɥg ^h i:	matsuna	matasu?	‘wait’
Tokyo	matsu	matsu (g...)	mateba	matsuna	mataseru	
Takeo	waku	waku(g...)	wakuɥg ^h i:	wakuuna	waka(sa)su?	‘boil’
Tokyo	waku	waku (g...)	wakeba	wakuuna	waka(sa)seru	
Takeo	kogu	kogu(g...)	koguɥg ^h i:	koguuna	kogasu?	‘row’
Tokyo	kogu	kogu (g...)	kogeba	koguuna	kogaseru	
Takeo	hanasu	hanasu(g...)	hanasuɥg ^h i:	hanasuna	hanasasu?	‘talk’
Tokyo	hanasu	hanasu (g...)	hanaseba	hanasuna	hanaseru	

The legend for this table is the same as that of Table (13). Notably, the approximant /w/ and the liquid /r/ are sonorants, but the nonpast 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 [kauɥ] of /ka.wu/ is not a light syllable but a heavy syllable. The rhyme of the last syllable of the nonpast form is a diphthong, with the second being the short high-back vowel, [auɥ].

2.4 Data set #3 to support Hayata (1998): if the next word or morpheme begins with a sonorant, a voiced or voiceless fricative, or a voiced obstruent

Even if the initial segment of a word that follows the nonpast form is a sonorant (or an approximant or the liquid or a nasal, e.g., the coronal nasal in (13)) or a voiced or voiceless

fricative, the sequence /ru/ alternates with the geminate consonant in the Takeo Saga dialect, as in (35a) and (35b) for alveolar and postalveolar fricatives, (35c) for the glottal fricative, (35d) for the palatal fricative, (35e) for the labio-velar approximant, (35f) for the palatal approximant, (35g) for the liquid, and (35h) for a coronal nasal.

- (35) a. mottekus suɸi (Noun) cf. [kko stem verb]
bring [nonpast] sushi
'the sushi that (I) bring there'
- b. kuɸrasuɸ ʃeeto (Noun) cf. [Xe/X stem verbs]
punch [nonpast] student
'the student who punches (them)'
- c. kakuh hajaka ɕito (Noun) cf. [Xe/X stem verbs]
run [nonpast] fast man
'the fast man who runs'
- d. kakuɕ ɕito (Noun) cf. [Xe/X stem verbs]
run [nonpast] man
'the man who runs'
- e. misoʃiru ni iruw wakame (Noun) cf. [Xe/X stem verbs]
miso soup in put [nonpast] seaweed
'the sea weed that (I) put in miso soup'
- f. kʲezuj jasuri (Noun) cf. [consonant-final]
sharpen [nonpast] file
'the file with which (I) sharpen (it)'
- g. tabur ra:meN (Noun) cf. [Xe/X stem verbs]
eat [nonpast] ramen noodle
'the ramen noodle that (I) eat'
- h. rjo:rʲistu namako (Noun) cf. [s/se stem verbs]
cook [nonpast] sea cucumber
'the sea cucumber that (we) cook'

See Matsuura (2016) for geminates of voiced obstruents in Kyushu dialects, as in [...g.g...] in (13).¹⁴ Hayata (1998: 2) provides one example of the liquid geminate in a future form of a verb, [tabuɸro:] (/taburu + rou/) 'will eat' for the Tokyo counterpart [taberuɸaro:]. Notably, the first half of the geminate of the nasal in (35h) [rjo:rʲistu namako] is not syllabic, as confirmed by *[rjo:rʲisuN namako].¹⁵

¹⁴ The first halves of voiced geminate consonants are voiced as in [tabuɸ gohaN], but not *[tabuɸ gohaN].

See Matsuura (2016) for the degree of voicing.

¹⁵ What determines the alternation of the final sequence /ru/ with either a nasal that can be syllabic [N] or a nasal that cannot be syllabic [n] is whether the following word is an affix or (part of) an adjunct, as in the contrast between [tabuNna] (UF /taburu+na/) in (13) and [tabun namako] (UF /taburu namako/ 'sea cucumber that (we) eat'). We will leave an analysis of the syllabic nasal to future work.

2.5 Data Set #4: Compensation among SSA speakers

Compensation among SSA speakers of the Takeo Saga dialect of Japanese was discussed in the introduction; they judge the vowel-lengthened counterparts of the vowel /i/-final and consonant /r/-final stem verbs to be acceptable, whereas they judge those of the *Xe/X* stem verbs and *C/CV* stem verbs unacceptable, as in the examples given in Table (10) and exemplified in the four kinds of syntactic contexts of sentences with the nonpast tense in (36).

(36) Compensation among SSA speakers of the Takeo Saga dialect of Japanese

	S-final	RC#(Noun)	conditional	Neg. Imp.	causative	
consonant-final stem verbs with the stem-final consonant /r/						
(V):	to:	to: (g...)	to:g ^h i:	to:na		‘take’
<i>C_i(C_i)</i>	to?	tog (g...)	togg ^h i:	toNna	torasur?	
(V):	k ^h i:	k ^h i: (g...)	k ^h i:g ^h i(V):	k ^h i:na		‘cut’
<i>C_i(C_i)</i>	k ^h i?	k ^h ig (g...)	k ^h igg ^h i:	k ^h iNna	k ^h irasur?	
<i>Xe/X</i> stem verbs						
* <i>(V)</i> :	*tabur:	*tabur: (g...)	*tabur:g ^h i:	*tabur:na		‘eat’
<i>C_i(C_i)</i>	tabur?	tabug (g...)	tabugg ^h i:	tabuNna	tabesaur?	
* <i>(V)</i> :	*nur:	*nur: (g...)	*nur:g ^h i:	*nur:na		‘sleep’
<i>C_i(C_i)</i>	nur?	nug (g...)	nugg ^h i:	nuNna	nesaur?	
vowel /i/-final stem verbs						
(V):	ok ^h i:	ok ^h i: (g...)	ok ^h i:g ^h i:	ok ^h i:na		‘get up’
<i>C_i(C_i)</i>	ok ^h i?	ok ^h ig (g...)	ok ^h igg ^h i:	ok ^h iNna	ok ^h isasur?	
(V):	k ^h i:	k ^h i: (g...)	k ^h i:g ^h i:	k ^h i:na		‘wear’
<i>C_i(C_i)</i>	k ^h i?	k ^h ig (g...)	k ^h igg ^h i:	k ^h iNna	k ^h isasur?	
<i>k/ko</i> stem verbs						
* <i>(V)</i> :	*kur:	*kur: (g...)	*kur:g ^h i:	*kur:na		‘come’
<i>C_i(C_i)</i>	kur?	kuug (g...)	kuugg ^h i:	kuNna	kosaur?	
<i>s/se</i> stem verbs						
* <i>(V)</i> :	*sur:	*sur: (g...)	*sur:g ^h i:	*sur:na		‘do’
<i>C_i(C_i)</i>	sur?	sug (g...)	sugg ^h i:	suNna	saur?	

For example, [toru] also alternates with [to:], [toru (g...)] also alternates with [to:(g...)], [toru g^hi:] also alternates with [to:g^hi:], [toru na] also alternates with [to:na], and [torasuru] alternates only with [torasur?]. SSA speakers judge *[nur:] to be ungrammatical if the verb is a *Xe/X* verb meaning ‘to sleep’, whereas they judge the same phonetic form to be grammatical when the verb is a consonant /r/-final stem verb meaning ‘to paint’. Notably, whether geminate consonants, lengthened vowels, or both are grammatical is the same in the vowel /i/-final stem verbs and the consonant /r/-final stem verbs on the one hand and in the *Xe/X* stem verbs and the *C/CV* stem verbs on the other hand. The same compensation occurs before nonsonorants and before sonorants also among SSA speakers, as in [mot-tekus/*mottekur: suɸi] ‘sushi that (I) bring’, [k^hezuj/k^hezur: jasuri] ‘a file that (I) sharpen it with’, [tabur/*tabur: ra:meN] ‘ramen noodle that (I) eat’, [ok^hiç/ok^hi: çito] ‘a man that wakes up’, and [rjo:r^hisun/*rjour^hisur: namako] ‘the sea cucumber that (I) cook’, as was seen among RSL speakers in (35).

To summarize the data among RSL speakers of the Takeo Saga dialect of Japanese in sections 2.1-2.4 and in this section, a heavy syllable occurs at the ends of some nonpast forms, as schematized in (37).

(37) Data among RSL speakers of Takeo Saga dialect of Japanese

- a. If the final syllable is underlying the approximant /w/ for the onset and the high-back vowel /u/ for the nucleus, the sequence $/(C_i)V_j.wu/$ will be $[(C_i)V_j.u]$ phonetically, which has the short high-back vowel u added to the previous syllable, as in $[mu.kau]$ for /mu.ka.wu/ ‘confront-nonpast’.
- b. With a nonpast form plus a word, for example in the adjunct and (part of) its head, $/...V_1.C_1V_2/\#/S.../$, where V_1 and V_2 are vowels, C_1 is a consonant, and S is a segment, the UF-faithful PF will alternate with $[...V_1S.S...]$ if C_1 is liquid and S is a consonant and will alternate with $[...V_1?.S...]$ if C_1 is liquid and S is a vowel.
- c. Elsewhere, the PF is the same as the final syllable of UF, namely, $[...V_1.C_1V_2.S...]$.

The final consonant of every underlying nonpast form C_1 in the scheme is one of the consonants—/t, s, k, b, g, n, m, r, w/—in the Takeo Saga dialect (and in the Tokyo dialect). The data among the group of SSA speakers of the Takeo Saga dialect of Japanese are the same as those among the group of RSL speakers, except that the former accept the second half of the lengthened vowel as well if the verb is an /r/ consonant-final verb or a vowel /i/-final verb, as summarized in (38).

(38) Data among SSA speakers of the Takeo Saga dialect of Japanese

- a. = (37a)
- b. = (37b). In addition, for a nonpast form plus a word $/...V_1.C_1V_2/ + /S.../$, if C_1 is liquid and the verb is either an /r/ consonant-final verb or a vowel /i/-final verb, the UF-faithful PF can also alternate with $[...V_1:.S...]$.
- c. = (37c)

See the patterns of the UF forms and the PF realizations for the four prosodic types of verbs in the Takeo Saga dialect of Japanese in (30) to (33) again.

3 Proposal

After providing some basic ideas of the serial version of OT in Section 3.1, the author presents an analysis of harmonic serialism in Section 3.2.

3.1 Harmonic Serialism of Optimality Theory (HS-OT)

The current study adopts McCarthy’s (2008a, 2010, 2011, 2016, 2019) HS-OT as the framework, which is still developing.¹⁶ The association between UF and PF in HS-OT is stepwise, with harmony incrementally achieved through IFs and with only one difference allowed between a form on the UF side and one on the PF side of each step. For example, there is only one difference in associations between the intermediate form $Vr.C_j$ and another intermediate form $VH.C_j$ and between the intermediate form $VH.C_j$ and the phonetic form $[VC_j.C_j]$ in the complex phenomenon, while there would be two differences in ungrammatical associations between the intermediate form $Vr.C_j$ and the phonetic form $[VC_j.C_j]$.¹⁷ (P-OT, by

¹⁶ Prince and Smolensky (2004) started OT and considered a serial architecture of OT, called HS.

¹⁷ See page 25 for the vowel absence.

contrast, can postulate no intermediate form.) Gen and Eval iterate, sending the output of Eval such as IF_n from the input IF_{n-1} back into Gen as a new input, and this loop continues until the derivation converges. In HS-OT, if no series of paths gradually and harmonically improves between the UF and the PF, the UF and the PF cannot be associated. Technically, if the UF and the PF are associated in the series $\langle UF, IF_1, \dots, IF_n, \dots, IF_m, PF \rangle$, then $\langle UF, IF_1 \rangle$ improves harmony, $\langle IF_n, IF_{n+1} \rangle$ improves harmony, where $n = 2, 3, \dots, m - 1$, and $\langle IF_m, PF \rangle$ improves harmony. There is one or less than one difference between UF and IF_1 , between IF_1 and IF_2, \dots , between IF_n and IF_{n+1}, \dots , and between IF_m and PF. In addition, as Wilson's (2001) argument for complex phenomena has been adopted, the step $\langle UF, IF_1 \rangle$ must be supported in at least one other language. The rest of the steps $\langle UF, IF_1 \rangle$, $\langle IF_n, IF_{n+1} \rangle$, where $n = 1, 2, 3, \dots, m - 1$, and $\langle IF_m, PF \rangle$ must be motivated in the language.¹⁸ Wilson's (2001) argument for complex phenomena is restrictive on whether a phenomenon can be analyzed as complex or not. Of course, HS inherits most of OT's fundamental notions, the violability and universality of constraints, and predictions of typological data by ranking differences, as it is a version of optimality theory.

3.2 Proposal of constraints and rankings

Constraints and rankings are proposed for each step of i) the apocope, as schematized in the association between the UF and the IF_1 of (39) (which is the same as (1) except that the intermediate form IF_2 is added), ii) debuccalization, as schematized in the association between the IF_1 and the IF_2 , and iii) compensation, as schematized in the association between the IF_2 and the PF, in this order.

- (39) a. UF: /...Vru # C_j.../ or /...Vru + C_j.../
 b. IF_1 : ...Vr.C_j...
 c. IF_2 : ...VH.C_j...
 d. PF: [...VC_j.C_j...] or [...V:C_j...]

3.2.1 For apocope, or the path /...ru # C_j.../ ↔ ...r.C_j...

To explain after which consonant the apocope immediately occurs, the author proposes to employ three constraints $*V_{[nucleus]}nonpast\#$, MAX[Manner: Marked], and CODACOND with the (unspecified) ranking among them.¹⁹

¹⁸ The candidate UFs for morphology and phonology are assumed to be restricted to those that satisfy the constraints of morphology and syntax. The grammar of morphology and syntax appears to contradict the richness of the base in OT. This is not the case if the grammar of morphology 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 morphological and syntactic components and the morphophonological and phonological component.

¹⁹ In place of $*V_{[nucleus]}nonpast\#$, Kubozono's (1995: 230-257) tendency of CV.CV to CVC in Japanese and old Japanese may be working.

- (40) a. MAX[Manner: M(arked)]: Assign one violation mark for every input marked Manner tier that has no correspondent output marked Manner tier (Dinnsen et al. 1998).
 b. Rankings: $\{ *V_{[nucleus]}nonpast\# , MAX[Manner: Marked], CODACOND \}$

The constraint $*V_{[nucleus]}nonpast\#$ forces the final vowel to be absent as far as the tense of the verb form at the end of the word is non-past and the vowel is the nucleus of the syllable. There is grammatical pressure to preserve marked elements. If an element x is more marked than another y , the element x can be unaffected by a process while the element y is forced to undergo it (de Lacy 2006). The marked manners of articulation (or the marked MoA) of the consonants are stop (or plosive), fricative, affricate and nasal, whereas the unmarked manners of articulation (or the unmarked MoA) are approximant, liquid, and lateral. The definition of CODACOND will be given in the next section.

The three constraints with the unspecified ranking (40) correctly predict that the final /Cu/ cannot be associated with either the first half of a geminate consonant (or the glottal stop) or the second half of the lengthened vowel if the consonant of the final CV sequence of a nonpast form is not a liquid, i.e., is either of /t/, /k/, /g/, /s/, /b/, /n/, and /m/ except for the palatal approximant /w/. This is observed in section 2. The difference between the liquid /r/ and /l/, /k/, /g/, /s/, /b/, /n/ and /m/ is that the liquid is a non-nasal sonorant and the consonants /t/ (stop), /k/ (stop), /g/ (stop), /b/ (stop), and /s/ (fricative) are obstruents, i.e., are not non-nasal sonorants. The step 3 from IF *toH* to *to?* of UF /toku/, where the placeless palatal stop *H* is [stop], violates MAX[Manner: M(arked)], as the violation mark appears in Tableau (41).

- (41) Harmonic improvements of Steps 1 to 3 </to.ku/, *toku*>

		$*V_{[nucleus]}nonpast\#$	MAX[Manner: Marked]	CODACOND
Step 1: /tok+u/				
☞	tok			*
☞	to.ku	*		
Step 2: <i>tok</i>				
☞	toH			
	tok			*
Step 3: <i>toH</i>				
☞	toH			
	to?			*

Step 3 reaches the dead end as *toH* must remain to be the same *toH*. The other optimal candidate in step 1 wins. The input /toku/ is thus correctly predicted to be associated with itself. The rankings (40b), including no ranking between $*V_{[nucleus]}nonpast\#$, on the one hand, and MAX[Manner: Marked] and CODACOND, on the other, explain why the final of the phonetic form of a nonpast form is (also) UF-faithful if the consonant of the final CV sequence is any

of the consonants of /r, t, k, s, b, g, n, m/.²⁰ One form on the UF side can be associated with multiple optimal forms on the PF side in the step, as UF /toru/ is associated with IFs *tor* and *toru*. This captures the fact that the UF-faithful candidate [toru] synchronically alternates with [toʔ] and [to:], as will be analyzed in 3.2.3. By contrast, the step from *toH* to *toʔ* of the UF /toru/, where the placeless liquid *H* is a sonorant, does not violate MAX[Manner: M(arked)], as will be shown to be predicted by other constraints ranked lower than the constraints *V_[nucleus]nonpast, MAX[Manner: Marked] and CODACOND in the next section.

3.2.2 For debuccalization, the path ...Vr.Cj... ↔ ...VH.Cj...

The author shows how McCarthy's (2008a) constraints and rankings in harmonic serialism work well to explain the debuccalization of the complex phenomenon of the Takeo Saga dialect of Japanese.

The association between the final /ru/ of the nonpast forms and the first half of a geminate consonant or the second half of the lengthened vowel, represented in Figures 2 and 3, is further analyzed in McCarthy (2008a). McCarthy (2008a) proposes the placeless counterpart *H* of the absent consonant. This further postulation of the placeless (debuccalized) counterpart of a consonant is key for explaining why the first consonant, but NOT why the second consonant, of consonant clusters is absent with the geminate of the other consonant. The underlying nonpast form with /ru/ as its final (42a), 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/ (42d) or (42e), on the other hand, can be associated through another intermediate form with the final liquid debuccalized to be *H* (its placeless counterpart) (42c).

- (42) a. UF: /...V₁ru # (C_j...)/ e.g., /toru (gorira)/ by apocope
 b. IF: ...V₁r (C_j...) *tor* (gorira) by debuccalization
 c. IF: ...V₁H (C_j...) *toH* (gorira) by absence of the placeless counterpart of liquid
 d. PF₁: [...V₁C_j (C_j...)] [tog_j(g_jor^jira)] by compensation
 e. PF₂: [...V₁: (C_j...)] [to:(gor^jira)] by compensation

That is, the complex phenomenon is the association i) between *ru* and *r*, ii) between *r* and *H*, and iii) between *H*, the liquid minus coronal, and either the first half of a geminate consonant or the second half of the lengthened vowel. (McCarthy (2019) further claims that the absence of vowels also occurs step by step in the paths of *a* - {*u*, *i*} - ə - [∅], for example, /toru/ - *torə* - *tor*. However, the author has not found any evidence to support it in the Saga dialects of Japanese.)

McCarthy's (2008a) ranking of the constraints is (43).

- (43) CODACOND ≫ {HAVEPLACE, MAX[Place]} ≫ NOLINK[Place] (McCarthy 2008a: 285)

The constraint CODACOND states the following: 'assign one violation mark for every token of Place not associated with a segment in syllable onset' (McCarthy 2008a: 279). It requires

²⁰ A total ordering of constraints cannot usually be established in languages (McCarthy 2008b: 48). In this paper, no vertical line is used in place of dotted lines, as is common in OT practice.

the PoA of the coda consonant to be token-identical to that of the onset of the next syllable: the same PoA values alone are not sufficient. HAVEPLACE states the following: ‘assign one violation mark for every segment with no Place specification’. Finally, NOLINK[Place] states the following: ‘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’.

McCarthy’s (2008a) constraints with the ranking (43) together with $*V_{[nucleus]}nonpast\#$ and MAX[Manner: Marked] correctly predict the path ...Vr.Cj... (42b)- ...VH.Cj... (42c), which is continued from (41), as computed in Tableau (44).

(44) Harmonic Improvement of </toru g.../, tor.g..., toH.g...>

		$*V_{[nucleus]}nonpast\#$	MAX[Manner: Marked]	CODACOND	MAX[Place]	HAVEPLACE	NOLINK[Place]
	Step 1: /tor+u g.../						
☞	tor g...			*			
☞	to.ru g...	*					
	Step 2: tor.g...						
☞	a. toH.g...				*	*	
	b. tor.g...			*			
	c. tor.H...			*	*	*	
	Step 3: toH						
☞	a. togi.gi...						*
	b. toH.g...					*	

The intermediate form *tor.g...* is correctly predicted to be associated with the candidate *toH.g...*. The candidate *toH.g...* does not violate CODACOND. To satisfy CODACOND, the liquid *r* is made to be its debuccalized (or placeless) counterpart. If the segment at the coda has no place feature, the constraint CODACOND is satisfied vacuously. By contrast, the candidate *tor.g...* violates CODACOND because the PoA of the coda consonant is not token-identical to that of the onset *g*. The candidate *tor.H...* violates CODACOND for the same reason. The last point explains why /toru#g.../, for example, can never be associated with $*[tor_j.r_j...]$, which would be the phonetic form of the incorrect intermediate form *tor.H...*. Because CODACOND is ranked higher than the other constraints, the candidate *toH.g...* is optimal. All that differs is that the consonant cluster simplification of McCarthy (2008a) is within words, whereas the consonant cluster simplification of the Takeo Saga dialect is across the boundary between two words or morphemes. The candidate *tor.H...* violates another such faithfulness constraint on the initial segments of words as L-ANCHOR, which is not expressed in the tableau. The degree of ungrammaticality of the candidate form *tor.H...*, which would be further associated with $tor_i.r_i...$, is greater than the violation of only a faithfulness constraint such as L-ANCHOR. If the research is done in the framework of standard parallel OT, the geminate of the first consonant $*[...Vr_i.r_i...]$ together with the second consonant absent would be incorrectly associated with the underlying forms $l...Vr_iu\#C_j.../$, as will be discussed in section 4.1.

We saw the prediction in which *toH* to *to?* of the UF /*toku*/, where the placeless palatal stop *H* is a stop, violates MAX[Manner: M(arked)] in the previous section. This prediction holds true when the consonant of the final /*Cu*/ is /*t*/, /*k*/, /*g*/, /*s*/, /*b*/, /*n*/, or /*m*/. By contrast, the step from *toH* to *to?* or *tog_i g_i...* of the UF /*toru*/, where the placeless liquid *H* is a sonorant, does not violate MAX[Manner: M(arked)], as no violation mark appears in the tableau because the MoA of the liquid is unmarked, being [sonorant]. The form *toH* of the UF /*toru*/ proceeds to *to?* or *tog_i g_i...*

The difference between the remaining possible consonant /*w*/ and the liquid for the consonant of the final *Cu* sequence of the nonpast forms is that the labiovelar approximant is similar to the high back vowel, can join the previous vowel to make a diphthong and not to keep violating the constraint CODACOND. The form [kau] (*kau*) does not violate CODACOND, as given in Tableau (45).

(45) Harmonic improvements of Steps </ka.wu/, *kau* ([kau])>

		*V _[nucleus] nonpast#	MAX[Manner: Marked]	CODACOND	MAX[Place]	HAVEPLACE
Step 1: /kaw+u/						
☞	kaw		*			
☞	ka.wu	*				
Step 2: <i>kaw</i>						
☞	kau					
	kaw		*			
	kaH				*	*

We have seen that the constraints with the ranking { *V_[nucleus]nonpast#, MAX[Manner: Marked], CODACOND } ≫ { MAX[Place], HAVEPLACE } correctly predict that either the first half of a geminate consonant (or the glottal stop) or the second half of the lengthened vowel occurs at the final of the non-past form if the consonant of the final *Cu* sequence is /*r*/ and that it does not occur if the consonant is either of /*t*, *k*, *g*, *s*, *b*, *n*, *m*, *w*/—in the Takeo Saga dialect of Japanese.

3.2.3 For compensation, the path ...VH.C_j... ↔ ...VC_j.C_j... or ...V:.C_j...

Below, the author proposes and argues for the constraints and rankings involved in predicting which compensation is present, depending on the group makeup of RSL and SSA speakers and on the morphological context of the vowel immediately before the sequence /*ru*/ at the final of the nonpast form.

To explain why the suppletive nonpast form of the potential verb and the suppletive nonpast allomorph of the *Xe/X* and *C/CV* stem verbs phonetically realize themselves as [u?] but NOT *[u:], a further analysis of the two suppletive forms of /*uru*/ is in order. If compared with the paradigms of the vowel-final stem verbs, for example, those of /*oki*/

‘wake up’, the third part of (46), it is observed that the SUPPLETIVE form /uru/ replaces i) the expected nonpast form */e+ru/ in the paradigm of the inflectional forms of the potential verb </e+N/, /e/, /e+ta/, /uru/ cf. */e+ru/, /e+ro/>, as in the first upper part of (46), and ii) the expected nonpast sequence */e+ru/ in the paradigms of the Xe/X stem verbs </Xe+N/, /Xe/, /Xe+ta/, /X+uru/ cf. */Xe+ru/, /e+ro/>, as in the second upper part of (46).

(46) Paradigms of inflectional forms of potential verb, an Xe/X stem verb, and a vowel-final stem verb among SSA speakers of the Takeo Saga dialect of Japanese

Negative	Adv.	Past	Nonpast	Imp.	Meaning
tabe+eN	tabe+e	tabe+eta	[tabej <u>u</u> ?] tabe+j+uru *tabe+eru	tabe+ero	can eat
-	-	-	[tab <u>u</u> ?] taburu *taberu	-	eat
oki+(ra)N	oki	oki+ta	[ok ^j i?]/[ok ^j i:] oki+ru	oki+ro	wake up

If the paradigms of the potential verb and the Xe/X stem verbs followed those of the vowel-final stem verbs, the nonpast forms of the potential verb and the Xe/X stem verbs should be */(X)eru/ because they must be the common segment of the other forms of </(X)eN/, /(X)e/, /(X)eta/, -, /(X)ero/>, /(X)e/, plus the consonant-initial nonpast allomorph /ru/.²¹ Actually, the form /(X)uru/ occurs in place of the expected nonpast forms */(X)eru/ in the potential verb and the Xe/X stem verbs. The form /(X)uru/ is thus a suppletive form for the potential verb </eN/, /e/, /eta/, /uru/ cf. */eru/, /ero/> and for the Xe/X stem verbs </XeN/, /Xe/, /Xeta/, /Xuru/ cf. */Xeru/, /Xero/>. This indicates that the difference between the suppletive form /(X)uru/ and the expected forms */(X)eru/ is that the former is the vowel /u/ and the latter is vowel /e/ before the final /ru/, and that the suppletion is interpreted as that of the stem vowel /u/ replacing the stem vowel /e/.

To explain why the nonpast forms /(X)uru/ of the potential verb and the Xe/X and C/CV stem verbs phonetically end with [u?] but NOT *[u:], the author proposes a constraint *[STEM_{contrast} + AFFIX]_{suppletion}, as formulated in (47).

(47) *[STEM_{contrast} + AFFIX]_{suppletion}: Assign one violation mark if the ‘stem’ of a suppletive form if ever reanalyzed is contrasted.

Assuming that the suppletive forms are not analyzable further, the constraint states ‘if ever a suppletive form is analyzed further, the stem cannot be in emphasis, i.e., cannot contrast’. The constraint is general and explains the oddness of such a pair of questions and responses as follows.

(48) a. A: John went there.

²¹ Koga (2020) proposes that the paradigms of the Xe/X stem verbs and those of the vowel-final stem verbs collapse into one abstract schema among the consonant-final stem verbs, the vowel-final /i/ stem verbs, the Xe/X stem verbs, and the C/CV stem verbs, and explains why the nonpast affix of the nonpast forms is /uru/, but not /u/ by paradigm pattern uniformity. Koga (2012) explains why the shorter allomorphs of the stems are selected by the nonpast affix.

b. B: No, he will {go/*wend} there tomorrow.

The response with ‘wend’ is correctly predicted to be odd because the suppletive past form ‘wend’ is morphologically reanalyzed as the stem ‘wend’ and the past tense, and the reanalyzed stem ‘wend’ contrasts in the response. The form ‘wend’ is the suppletion for the past form of ‘go’, which is not morphologically analyzable further.

What the constraint (47) predicts regarding the suppletive nonpast forms of the potential verb and the *Xe/X* stem verbs is that the final sequence /uru/ is morphologically reanalyzed as the stem /u/ plus the nonpast allomorph /ru/, as in /u_{stem}+ru_{nonpast}/, as represented through the first leftmost figure to the second leftmost figure of Figure 5.

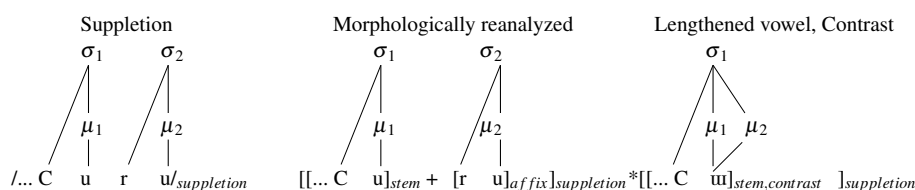


Fig. 5 $*[\text{STEM}_{\text{contrast}} + \text{AFFIX}]_{\text{suppletion}}$ for the nonpast form of the potential verb PF $*(j)uru/$ for UF $/(j)uru/$

The stem containing the lengthened counterpart of a short vowel contrasts, because the lengthened counterpart of a short vowel is interpreted as emphasis on the morpheme containing it (Kawahara and Braver, 2013). In conjunction with this idea of lengthened vowels, the constraint (47), for example, correctly predicts what follows. The reanalyzed stem /u/ of the final sequence /uru/ of the suppletive nonpast forms of the potential verb and the *Xe/X* stem verbs is not associated with $*[ur:]$ but with $[ur?]$, as in $*[tabejur:]$ but $[tabejur?]$ and $*[tabur:]$ but $[tabur?]$. This is because the vowel of the reanalyzed ‘stem’ associates with a FLOATING mora, being its lengthened counterpart, and the suppletive nonpast form with the stem contrasting, $*[[X]ur:]_{\text{stem,contrast}} + \text{affix}]_{\text{suppletion}}$, as in the right figure of Figure 5, violates the constraint.²²

By contrast, the paradigms of the inflectional forms of the *C/CV* stem verbs do not contain the paradigm of the potential verb at the head, as discussed in the introduction. Despite this, the author’s analysis is that the same form /uru/ as the suppletive nonpast form of the potential verb is another SUPPLETIVE allomorph of the nonpast affix for the *C/CV* stem verbs. The SUPPLETIVE nonpast allomorph /uru/ replaces the expected nonpast allomorph $*/u/$ in the paradigms of the *C/CV* stem verbs, as in the first and second upper

²² Because the Takeo Saga dialect, as well as Japanese in general, is a head-final language, the affix is final. If the lengthened vowel accompanies a mora created in the PF-side form instead of a floating mora, it violates the constraint $\text{MAX-}\mu$, which is ranked high in mora-respecting languages. Like the Tokyo dialect, the Takeo Saga dialect has a vowel length distinction involving differences in the number of moras, for example, between $[ho:ko]$ (/houko/) ‘a place with a big number of something’, which is trimoraic, and $[ho.ko]$ (/hoko/) ‘sword’, which is bimoraic. To avoid breaking the constraint $\text{MAX-}\mu$, the adjacent vowel must also associate with a floating mora of the UF-side form.

parts of (49) if compared with the paradigms of the consonant-final stem verbs, for example, the third and fourth upper parts of (49).

(49) Paradigms of the inflectional forms of the C/CV stem verbs and consonant-final stem verbs among SSA speakers of the Takeo Saga dialect of Japanese

Negative	Adv.	Past	Nonpast	Imp.	Meaning
ko+N	k+i	k+ta	[kuʔ] cf. *[ku:] k+uru *k+u	[ke:] k+e	come
se+N	s+i	s+ta	[suʔ] cf. *[su:] s+uru *s+u	se+ro	do
[kakaN] /kak+aN/	[kaki] /kak+i/	[kajta] /kak+ta/	[kaku] /kak+u/	[kake] /kak+e/	write
[osaN] /os+aN/	[oʃi] /os+i/	[oʃita] /os+ta/	[osu] /os+u/	[ose] /os+e/	push

If the paradigms of the C/CV stem verbs followed those of the consonant-final stem verbs, the nonpast forms of the potential verb should be */Cu/ because they must be the most common segment of the other forms of <*/CaN/ cf. /koN/ and /seN/, /Ci/, /Cta/, -, /Ce/>, C, plus the vowel-initial nonpast allomorph /u/.²³ In fact, the form /Curu/ occurs in place of the expected nonpast forms */Cu/ in the C/CV stem verbs. The nonpast form /Curu/ is thus a SUPPLETIVE form for the C/CV stem verbs </ko+N/, /k+i/, /k+ta/, /k+uru/ cf. */ku/, /ke:/> and </se+N/, /s+i/, /s+ta/, /s+uru/ cf. */su/, /se+ro/>. This indicates that the difference between the suppletive form /Curu/ and the expected forms */Cu/ is that the former is larger than the latter by the vowel /u/ immediately before the nonpast allomorph /ru/ or /u/, and that the suppletion is interpreted as that of the stem vowel /u/ added. The losing candidates *[ku:] for the nonpast form UF /kuru/ ‘come-nonpast’ and *[su:] for the nonpast form UF /suru/ ‘do-nonpast’ violate the constraint NOCONTRASTWITHINSUPPLETION because the stem vowel of the suppletive form is lengthened, i.e., contrasts, as in the representation of *[[ku:]_{stem,contrast}+affix]_{suppletion}. Notably, the nonpast suppletive allomorph /uru/ inherits the morphological characteristic of the suppletive nonpast form of the potential verb: *[STEM_{contrast} + AFFIX]_{suppletion}.

Summarizing, the constraint NOCONTRASTWITHINSUPPLETION (47) correctly predicts the compensation difference, for example, in the pair /nur+u/ ‘paint-nonpast’ and /n+uru/ ‘sleep-nonpast’. They differ only in whether the nonpast affix is the suppletive form or not.²⁴ The allomorphs of the nonpast tense are /u/, /ru/, and /uru/. The allomorph /uru/ is the suppletive form, and the others are not. The nonpast affix of the underlying nonpast forms of Xe/X-stem verbs, for example, /n+uru/ ‘sleep-nonpast’, (and C/CV stem verbs)

²³ Koga (2020) proposes that the paradigms of the C/CV stem verbs and those of the consonant-final stem verbs collapse into one abstract schema among the consonant-final stem verbs, the vowel-final /i/ stem verbs, the Xe/X stem verbs, and the C/CV stem verb, and explains why the nonpast form is /Curu/ instead of /Cu/ in the C/CV stem verbs by prosodic minimality.

²⁴ The place of the accent, or the syllable with a HL falling pitch contour, and the boundary of the stem and the affix (or the morphological structure) cannot be reduced to each other, as in the contrast between /me.ku-ru/ ‘turn-nonpast’ ([me.kuʔ] or [me.ku:] among SSA speakers) and /ku-ru/ ‘come-nonpast’ ([kuʔ]

are the suppletive form. By contrast, the nonpast affix of the /r/ consonant-final stem verbs, for example, /nur+u/ ‘paint-nonpast’, and vowel /i/-final stem verbs are not the suppletive form. Therefore, the penultimate phoneme /u/ of /n+uru/ ‘sleep-nonpast’ cannot be associated with its lengthened counterpart of *[u:] (through the IFs *r* of *nur* and *H* of *nuH*) because *[nu:]_{stem,contrast} + affix]_{suppletion} violates the constraint NOCONTRASTWITHINSUPPLETION (47). By contrast, the penultimate phoneme /u/ of /nur+u/ ‘paint-nonpast’ can be associated with its lengthened counterpart of [u:] because [[nu:]_{stem,contrast} + affix] does not violate the constraint. Without Koga and Ono’s (2010) morphological analysis of the nonpast forms of the dialect, no phonological constraint could have explained, for example, the contrast between [nuʔ] and *[nu:] ‘sleep’ and [nuʔ] and [nu:] ‘paint’ for the same UF /nuru/, among SSA speakers of the Takeo Saga dialect. The fact that the constraint cannot be described only with phonology indicates that morphology is autonomous in the dialect of Japanese. This contributes to the morphological study of verb forms in dialects and classical Japanese.

To explain the fact that the group of the RSL speakers of the Takeo Saga dialect does not allow a consonant to be pronounced as a vowel sounding softer in any situation, the constraint IDENT[Cons(onantal)] (50) in Ito and Mester (2001) suffices.

(50) 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).

The placeless counterpart of the liquid (H), which contains, for example, [sonorant (liquid)] without the PoA value, is absent and compensated by the first half of the geminate consonant or the second half of the lengthened vowel. This is predicted by ranking MAX[Manner] at the bottom or lower than NOLINK[Place]: NOLINK[Place] ≫ MAX[Manner]. The constraint MAX[Manner] states the following: ‘assign one violation mark for every input Manner tier that has no correspondent output Manner tier’. The values of Manner of the Takeo Saga dialect are obstruent, nasal, approximant, liquid, and glottal. The obstruent (or [-sonorant] and [+/-continuant]) and nasal values are marked. The approximant and the liquid are unmarked.

As usual in OT, the constraint rankings for RSL and SSA speakers of the Takeo Saga dialect differ, and the ranking difference explains the typological differences. Which compensation occurs in each dialect is explained by the ranking of either IDENT[Cons(onantal)] or *[STEM_{contrast} + AFFIX]_{suppletion} above McCarthy’s (2008a) two constraints HAVEPLACE and NOLINK[Place]. McCarthy’s (2008a) constraints contain the ranking of HAVEPLACE ≫ NOLINK[Place], as we have seen. This is discussed further below. **RSL speakers of Takeo Saga dialect:** That all the sequence /ru/s at the ends of the nonpast forms alternate only with the first half of the geminate of the initial consonant of the next word or the glottal stop among RSL speakers of the Takeo Saga dialect of Japanese is confirmed if we rank the constraint IDENT[Cons] (50) above the constraint HAVEPLACE and rank the constraint *[STEM_{contrast} + AFFIX]_{suppletion} (47) at any rank, as in the left part of Tableau (51).

(51) Step 3 <nuH, [nuʔ] or [nu:]> for/nur+u/ ‘paint’ and Step 3 <nuH, [nuʔ]> for /n+uru/ ‘sleep’, continued from Step 2 (44), which continued from Step 1 (41)

or *[ku:] among SSA and RSA speakers) and the contrast between /su-ru/ ‘rub-nonpast’ ([suʔ] or [su:] among SSA speakers) and /su.ru-/ ‘do-nonpast’ ([suʔ] or *[su:] among SSA and RSA speakers).

RSL speakers				SSA speakers			
	IDENT[Cons]	HAVEPLACE	NOLINK[Place]		*[STEM _{contrast} + AFFIX] _{suppletion}	HAVEPLACE	IDENT[Cons]
<i>nuH</i> (/nur+u/ 'paint')							
☞	a. nu?	*	*	☞	a. nu:	*	*
	b. nuH	*		☞	b. nu?	*	*
	c. nu:	*			c. nuH	*	
<i>nuH</i> (/n+uru/ 'sleep')							
☞	a. nu?	*	*	☞	a. nu?	*	*
	b. nuH	*			b. nuH	*	
	c. nu:	*	*		c. nu:	*	*

The prediction regarding UF /nuru (nur+u)/ 'paint [nonpast]' is as follows, as computed in the upper left part of the tableau. The candidate nuk_i (k_iodoN) incurs the least serious violations and is thus optimal. The candidate violates NOLINK[Place], while $nu:$ violates IDENT[Cons]. The latter constraint ranks higher than the former. A form nu^μ , which has a mora μ dominating no segment and violates the constraint, is not included as a candidate because the constraint $\mu \rightarrow S$ (egment) is assumed to rank higher. The meaning of the interpretation of the PF $[nuk_i (k_iodoN)]$ is thus correctly predicted to be the child who will paint (it). Notably, if IDENT[Cons] did not rank higher than NOLINK[Place], the form $nu:$ would incorrectly win against $[nuk_i(k_i...)]$; therefore, IDENT[Cons] must rank higher than NOLINK[Place]. If IDENT[Cons] ranks lower than NOLINK[Place], ranking $*[STEM_{contrast} + AFFIX]_{suppletion}$ higher than NOLINK[Place] does not help. The form $nu:$ still would incorrectly win against $[nuk_i (k_i...)]$ because the form $nu:$ of UF /nur+u/ does not violate $*[STEM_{contrast} + AFFIX]_{suppletion}$. Next, the prediction regarding UF /nuru (n+uru)/ 'sleep [nonpast]' is the same as that of /nur+u/ 'paint-[Nonpast]' except for one difference. The form $nu:$ in the third step with the suppletive nonpast allomorph of Figure 5 in the morphosyntactic structure on the left side of Figure 4 violates not only IDENT[Cons] but also $*[STEM_{contrast} + AFFIX]_{suppletion}$ because the lengthened vowel /u/ is part of the reanalyzed 'stem' of the suppletive nonpast allomorph /uru/. Regardless of where $*[STEM_{contrast} + AFFIX]_{suppletion}$ is ranked, the violation makes no difference because $nu:$ violates IDENT[Cons], which dominates NOLINK[Place], and nuk_i (k_iodomo) violates NOLINK[Place]. The PF $[nuk_i (k_i...)]$ is, thus, optimal for /n+uru (#k...)/ 'sleep [nonpast]' (k...). Notably, when explaining nuH 'sleep-nonpast' $\leftrightarrow [nuk_i(k_i...)]$, either $*[STEM_{contrast} + AFFIX]_{suppletion}$ or IDENT [Cons] must rank higher than NOLINK[Place]; because IDENT[Cons] must rank higher than NOLINK[Place] for nuH 'paint-nonpast' $\leftrightarrow [nuk_i(k_i...)]$, $*[STEM_{contrast} + AFFIX]_{suppletion}$ does not have to rank higher than NOLINK[Place] and can, thus, be at any rank. From these two predictions, it follows that the phonetic form / $nuk_j k_jodomo$ / is ambiguous between the child who sleeps and the child who paints (it). This is a correct prediction.

SSA speakers of the Takeo Saga dialect: The sequence /ru/s at the ends of the non-past forms of the *Xe/X* stem verbs and the *C/CV* stem verbs alternate only with the first half of the geminate of the initial consonant of the next word or the glottal stop, and those of the /t/-consonant-final stem verbs and the vowel /i/-final stem verbs alternate with either the first half of the geminate of the initial consonant of the next word or the glottal stop or the second half of the lengthened vowel immediately before the sequence /ru/ among SSA speakers of the Takeo Saga dialect of Japanese. This will be obtained if we rank constraint $*[\text{STEM}_{\text{contrast}} + \text{AFFIX}]_{\text{suppletion}}$ (47) above constraint $\text{NOLINK}[\text{Place}]$ and rank constraint $\text{IDENT}[\text{Cons}]$ (50) and constraint $\text{NOLINK}[\text{Place}]$ equally, as in the right part of the tableau. For the prediction regarding /nur+u/ ($C_j\dots$) ‘paint-nonpast...’, the two candidates $[\text{nuk}_j]$ ($[\text{k}_j\text{odomo}]$) and $[\text{nur:}]$ ($[\text{kodomo}]$) incur the least serious violations of the constraints; both are optimal. The form $[\text{nur:}]$ violates $\text{IDENT}[\text{Cons}]$, and the form $[\text{nuk}_j]$ ($[\text{k}_j\dots]$) violates $\text{NOLINK}[\text{Place}]$. $\text{IDENT}[\text{Cons}]$ and $\text{NOLINK}[\text{Place}]$ are ranked the same. Both violate $\text{MAX}[\text{Manner}]$. Notably, the candidate $[\text{nur:}]$ /nur+u/ ($C_j\dots$) ‘paint-nonpast...’ ($[\text{kodomo}]$) does not violate $*[\text{STEM}_{\text{contrast}} + \text{AFFIX}]_{\text{suppletion}}$. For /n+uru/ ‘sleep-nonpast’, any constraint ranked higher than the two constraints $\text{NOLINK}[\text{Place}]$ and $\text{IDENT}[\text{Cons}]$ and disallowing only one of the two candidates, $[\text{nuk}_j]$ ($[\text{k}_j\text{odomo}]$) and $*[\text{nur:}]$, determines which wins against the other. The constraint $*[\text{STEM}_{\text{contrast}} + \text{AFFIX}]_{\text{suppletion}}$ disallows $*[\text{nur:}]$ and allows $[\text{nuk}_j]$ ($[\text{k}_j\text{odomo}]$). (The constraint $\text{MAX}[\text{Manner}]$ disallows both.) Therefore, the candidate $[\text{nuk}_j]$ ($[\text{k}_j\text{odomo}]$) wins against $*[\text{nur:}]$ and incurs the least serious violations of the constraints. Only the PF form $[\text{nuk}_j]$ ($[\text{k}_j\text{odomo}]$) is optimal for /n+uru/ (kodomo) ‘sleep-nonpast (child)’, even for SSA speakers. Based on these two predictions, the PF $[\text{nuk}_j\text{k}_j\text{odoN}]$ is correctly predicted to be ambiguous in two ways among SSA speakers: either the child who paints something or the child who sleeps. By contrast, the PF $[\text{nur:kodoN}]$ is correctly predicted to be interpreted uniquely as the child who paints something. The proposed HS-OT analysis explains all the complex phenomena in the Takeo Saga dialect.

The rankings of the proposed constraints for RSL speakers of the Takeo Saga dialect are summarized as (52) and represented in the Hasse Diagram of Figure 6.

(52) For RSL speakers of the Takeo Saga dialect of Japanese

- a. $\{*\text{V}_{[\text{nucleus}]}]_{\text{nonpast}\#}, \text{MAX}[\text{Manner: Marked}], \text{CODA COND}\} \gg \{\text{MAX}[\text{Place}], \text{HAVE-PLACE}\} \gg \text{NOLINK}[\text{Place}] \gg \text{MAX}[\text{Manner}]$
- b. $\text{IDENT}[\text{Cons}] \gg \text{NOLINK}[\text{Place}]$

The rankings for SSA speakers are summarized as (53) and represented in the Hasse diagram in Figure 7.

(53) For SSA speakers of the Takeo Saga dialect of Japanese

- a. Same as (52a)
- b. $\text{IDENT}[\text{Cons}]$ is given the same rank as $\text{NOLINK}[\text{Place}]$.
- c. $*[\text{STEM}_{\text{contrast}} + \text{AFFIX}]_{\text{suppletion}} \gg \text{NOLINK}[\text{Place}]$

Notably, the ranking (52a), or $\{*\text{V}_{[\text{nucleus}]}]_{\text{nonpast}\#}, \text{MAX}[\text{Manner: Marked}], \text{CODA COND}\} \gg \{\text{MAX}[\text{Place}], \text{HAVEPLACE}\} \gg \text{NOLINK}[\text{Place}] \gg \text{MAX}[\text{Manner}]$, is common for the two groups of native speakers of the dialect.

Because harmonic serialism (HS) is a version of OT and is the same as parallel OT except that it posits serial derivations with intermediate steps, as explained in section 3.1, the

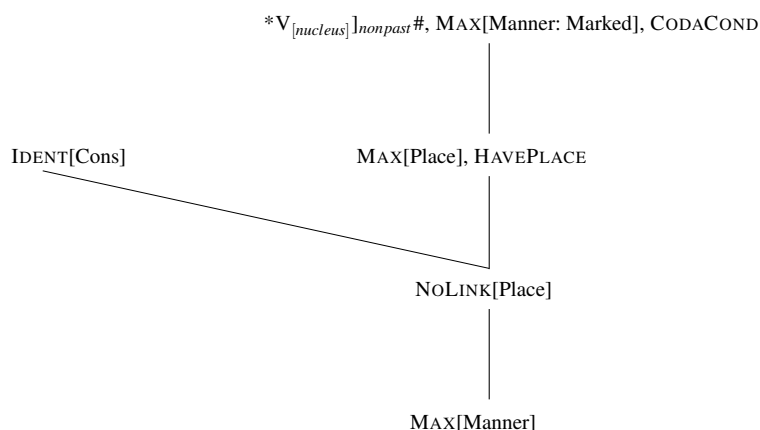


Fig. 6 Hasse diagram for RSL speakers of the Takeo Saga dialect of Japanese

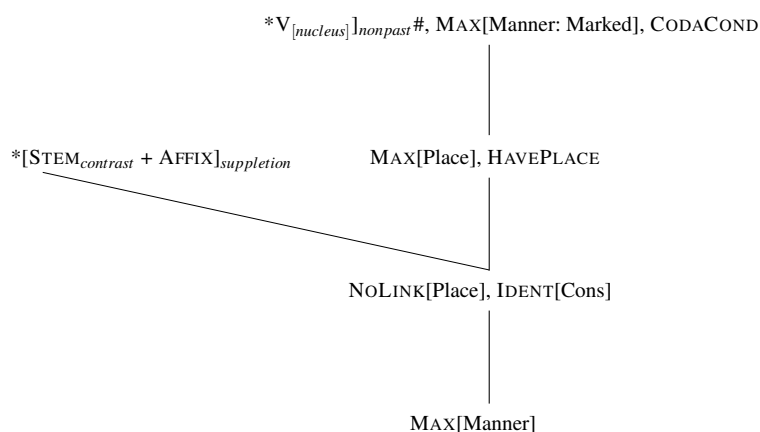


Fig. 7 Hasse diagram for SSA speakers of the Takeo Saga dialect of Japanese

proposed constraints and rankings in this section will work well except for one problem related to multiple optimal forms if they are stated in the standard parallel OT, which assumes the standard assumption, richness of the base. On the basis of this assumption, the inputs /nuru/, /nur/, /nuH/ (or /nu?/), and /nu:/ are not optimal, and the input /nuk_i (k_iodoN)/ is optimal, for example, for the non-past form /nuru (kodoN)/ ‘the child who sleeps’ for SSA, as in (54).²⁵

²⁵ Without the base form /nuru/, it is not clear whether the candidates violate the faithfulness constraints or not.

(54) OT's predictions of [nuk_ik_iodoN] 'the child who goes to bed'

		*V _{[nucleus]_{nonpast}} #	MAX[Manner: Marked]	CODACOND	MAX[Place]	HAVEPLACE	NOLINK[Place]	IDENT[Cons]	MAX[Manner]	*[STEM _{contrast} + AFFIX] _{suppletion}	NOLINK[Place]	IDENT[Cons]
☞	a. nuk _i # k _i ...						*		*		*	
	b. nuru # k...	*										
	c. nur # k...		*									
	d. nuH # k...				*							
	e. nu: # k...							*	*	*		*

If the constraint the input /nuru/ violates, *V_{[nucleus]_{nonpast}}#, is ranked at the same as the highest ranked constraints that the optimal candidate violates, or NOLINK[Place] and IDENT[Cons], the candidate /nuru/ as well as /nuk_i # k_i.../ will be optimal, as required. The violation of *V_{[nucleus]_{nonpast}}# by the candidate [nuru] necessitates that the form must be a nonpast one. The violation of *[STEM_{contrast} + AFFIX]_{suppletion} by the candidate [nu:] necessitates that the first half of the final lengthened vowel of the form /u/ is the initial segment of the nonpast suppletive allomorph, which implies that the form is analyzed as /n+uru/ 'sleep+nonpast', i.e., its meaning is 'the child who sleeps'. Thus, the proposed constraints with the ranking with the revision in the framework of the standard parallel OT, which assumes richness of the base, can be an alternative analysis to the proposed HS analysis, being its P-OT version, as the reviewer noted.

4 Standard Parallel OT's Inferiority to Harmonic Serialism

As we have seen, the constraints and rankings of sections 3.2.1-3.2.3 explain the complex phenomenon of the Takeo Saga dialect of Japanese in the framework of harmonic serialism in optimality theory. A natural question arises as to whether the complex phenomenon can be explained in the simpler framework of standard parallel OT. The answer will be argued to be negative below.

4.1 If three sets of constraints and rankings for apocope, debuccalization, and compensation were stated in standard parallel OT.

The author now examines what kind of predictions the constraints and ranking, which were presented in sections 3.2.1-3.2.3, would make for the complex phenomenon in the Takeo Saga dialect of Japanese in the framework of standard parallel OT.

The constraints with rankings of 3.2.1-3.2.3 are i) those for apocope, ii) those for the debuccalization of word-final liquids, and iii) those for compensation for the absence of a debuccalized liquid. Each set of constraints and a ranking is necessary independently to explain each natural phenomenon of apocope, debuccalization, and compensation in standard parallel OT. Therefore, these are reasonable constraints and rankings for testing the framework by examining whether they, as a whole, work well to explain the complex phenomenon in the framework.²⁶ As will be made clear, key for this examination is that standard parallel OT allows no (concept of) intermediate forms. If stated in standard parallel OT, the constraints and rankings for SSA speakers of the Takeo Saga dialect (53), for example, would incorrectly predict that PF *[har_j.r_jaʃi] is equally optimal for UF /haru wasi/ ‘the Japanese paper (I) paste’, as computed in Tableau (55).

(55) Constraints and ranking for SSA speakers in standard parallel OT

	UF: /haru wasi/	CODACOND	MAX[Place]	HAVEPLACE	NOLINK[Place]	IDENT[Cons]
☞	a. [haw _j .w _j aʃi]		*		*	
☞	b. [ha:.waʃi]		*			*
☞	c. *[har _j .r _j aʃi]		*		*	
	e. *[haH waʃi]		*	*		
	d. *[har waʃi]	*				
	f. *[har Haʃi]	*	*	*		

As standard parallel OT allows no intermediate forms, the forms on which the constraints can exert an effect are only underlying forms and phonetic forms in P-OT. The candidate forms are phonetic forms only. One of the candidates is the candidate *c* *[har_j.r_jaʃi]. It violates no higher-ranked constraint than the candidates [haw_j.w_j...] and [ha:.w...] do. (In HS, the first consonant of the consonant cluster is absent, and the second consonant is a geminate consonant, as in the association between IF *harwasi* and PF [haw_j.w_jaʃi].) The three candidates violate only MAX[Place] and either NOLINK[Place] or IDENT[Cons]. The prediction is incorrect because it is inconsistent with the fact that native speakers think that the candidate phonetic form *c* *[har_j.r_jaʃi] cannot receive the meaning of the underlying form

²⁶ The phenomenon of lengthened vowels in compensation is one of opacity (Torres-Tamarit 2016). Many attempts have been made to solve the problem of opacity within OT. The author does not discuss whether any of these attempts within OT, which is not HS, can solve the complex phenomenon, which would necessitate discussing whether it does not really adopt harmonic serialism. The author leaves that issue for future research.

/haru washi/ ‘paste-nonpast-Japanese paper’. They rather consider it to be the phonetic form of the underlying form /haru rashi/ ‘paste-nonpast-?’ (with no word for /rasi/). They would judge that *[har_j.r_jaf_i] contains not only the error of the unfaithful first segment of the second word but also a mysterious error.²⁷ They do not think the error is the geminate of the liquid because it is grammatical in the dialect, as seen in (35g). Even if such a faithfulness constraint as L-ANCHOR on the word’s initial segment, which is implicit in the tableau, is actually high ranking, this constraint cannot explain the mysterious error. This is what the constraints and the ranking in harmonic serialism capture through the intermediate form **har Hashi* violating CODACOND, as we have seen in 3.2.2. Notably, the constraint CODACOND cannot distinguish the candidate *[har_j.r_jaf_i] from the candidates [haw_j.w_jaf_i] and [ha:.waf_i] in standard parallel OT. The correctly predicted ungrammaticality of the candidate *f* *[har.Haf_i] is not relevant at all to the prediction of the candidate *c* in P-OT. (In HS-OT, because the candidate **har Hasi* is not optimal, it follows that *[har_j.r_jaf_i], which is the PF of **har Hasi*, cannot be optimal, not being even a PF candidate.) Therefore, the constraints and rankings (53), motivated independently by the phenomenon of i) apocope and ii) compensation for the further absence of the word-final liquid and doing a fine job in HS-OT, has an ‘overgeneration’ problem in relation to the complex phenomenon in the framework of standard parallel OT.

4.2 Standard parallel OT’s problem of whole-part in consistency of predictions

The author presents a novel argument in this section that standard parallel OT is overly unrestrictive to allow constraints and rankings for part of the complex phenomenon of the Takeo Saga dialect of Japanese.

As readers might have noticed regarding the complex phenomenon of the Takeo Saga dialect of Japanese, regardless of which vowel occurs immediately before the final sequence /ru/ of a nonpast form among /i/, /u/, /e/, /o/, and /a/, the sequence /ru/ alternates with the first half of a geminate consonant or the second half of the lengthened vowel if the verb is an /r/-consonant final stem verb or a vowel /i/-final verb, as in (56a), (56c), (56d), (56e), and (56f), and alternates only with the first half of a geminate consonant if the verb is an *Xe/X* stem verb or a C/CV stem verb, as in (56b), among SSA speakers of the Takeo Saga dialect.

- (56) a. n[̃]i:/n[̃]is se:kaku (Noun) cf. /ni+ru/ [V-final stem verb]
resemble [nonpast] personalities
‘personalities that resemble’
- b. (= (11)) n[̃]ug go[̃]rira (Noun) cf. /n+uru/ [*Xe/X* stem verb]
sleep [nonpast] gorilla
‘the gorilla that sleeps’
- c. (= (2), (4)) nu[̃]r:/n[̃]ug go[̃]rira (Noun) cf. /nur+u/ [C-final stem verb]
paint [nonpast] gorilla
‘the gorilla that paints (it)’

²⁷ See McCarthy (2011) for this discussion when the second of the consonant cluster is in a word, as in [anta] and *[ampa] for /amita/.

- d. *ne:/nen* *neNdo* (Noun) cf. /*ner+u/* [C-final stem verb]
 work[nonpast] clay
 ‘the clay that (I) work’
- e. *no:/nod* *dʒiteNʃa* (Noun) cf. /*nor+u/* [C-final stem verb]
 ride on[nonpast] bicycle
 ‘the bicycle that (I) ride on’
- f. *na:/nag* *gakuse:* (Noun) cf. /*nar+u/* [C-final stem verb]
 become[nonpast] student
 ‘the student who becomes (it)’

The relevant part of the complex phenomenon to an argument in this section is the part of (56c) and (56e), where its word-final vowel is lengthened if the vowel immediately before the sequence /*ru/* of the nonpast form is either the high or mid back vowel /*u/* or /*o/*.

The part of (56c) and (56e) if the vowel immediately before the sequence /*ru/* of the nonpast form is either the high or mid back vowel /*u/* or /*o/* apparently enables an apparent complex phenomenon with the reverse interaction, as each pattern given in (57) and (58).

(57) (Hypothetical: the UF-IF association is unnatural) [SSA]

- a. UF: /...uru#/
 b. IF: ...uu
 c. PF: [...u:] or [...u.ru]

(58) (Hypothetical: the UF-IF association is unnatural) [SSA]

- a. UF: /...oru#/
 b. IF: ...ou
 c. PF: [...o:] or [...o.ru]

The absence of the onset liquid interacts i) with vowel lengthening for the hiatus, as in the association between the IF (57b) and the PF (57c), and ii) with lowering of the second high vowel to the mid, as in the association between the IF (58b) and PF (58c). The hiatus /*V_iV_i/* is associated with the lengthened counterpart [*V_i:*]. The sequence of the mid- and high-back vowels is associated with the same, except for the second lowered to the mid-vowel.²⁸ The reverse interaction does not appear to hold when the vowel immediately before the sequence /*ru/* of the nonpast form is one of the nonback vowels, /*i/* (the high front vowel) as in (56a), /*e/* (the mid-front vowel) as in (56d), and /*a/* (the low-mid vowel) as in (56f), because neither of the IF-PF phenomena of *iu* - *[i:], *eu* - *[e:], and *au* - *[a:] occurs in the dialect, and is supported in the language.

The frameworks, parallel standard OT and harmonic serialism, are examined in terms of whether a framework can successfully disallow the apparent complex phenomena of (57) UF /*Xuru/*–IF *Xuu*–PF [*Xu:*] or allow constraints to be constructed and to predict the apparent complex phenomena incorrectly. **Harmonic Serialism:** Harmonic Serialism correctly disallows a set of constraints and rankings that predicts the apparent complex phenomena. There is no problem posed for the framework as argued as follows. In HS, the association between UF and IF_{apparent} and that between IF_{apparent} and PF must be independently

²⁸ Its front-vowel counterpart /*ei/* - [*e:*] is also found in the Takeo Saga and Tokyo dialects.

supported or motivated to analyze the phenomenon as complex (Wilson 2001). The progressively lengthened vowel PF [Xuu:] for the hiatus IF_{apparent} Xuu is motivated in the dialect, as found in the Takeo Saga dialect (and the Tokyo Japanese). Yet, the absence of the onset liquid IF_{apparent} Xuu for UF /Xuru/ is not independently motivated. The UF-IF_{apparent} association violates a highly ranked constraint INPUT-CONTIGUITY, which states ‘assign one violation mark if segmental material contiguous in the input is not contiguous in the output’. If the constraint that blocks word/morpheme-internal deletion is ranked higher than *V_[nucleus]nonpast#, MAX[Manner: Marked], and CODACOND for the Takeo Saga dialect, it will correctly predict the association between UF /Xuru/ and either IF Xur or Xuru, excluding the form without the onset Xuu. Therefore, the apparent complex phenomenon (57) UF /Xuru/–IF Xuu–PF [Xuu:] cannot be a real complex phenomenon in harmonic serialism. There are no constraints and rankings possible to construct for the apparent complex phenomenon in harmonic serialism.

Standard parallel OT: By contrast, standard parallel OT CANNOT reject the apparent complex phenomenon (57) UF /Xuru/–IF Xuu–PF [Xuu:] as unnatural because no (concept of) intermediate forms is available in the framework. As the forms that constraints can exert an effect on in P-OT are only underlying forms and phonetic forms, the apparent complex phenomenon is just of the scheme UF /Xuru#/-PF [Xuu:] in P-OT. ‘P-OT conflates the effects of various phonological processes [interactions] into a single mapping [between UF and PF]’ (McCarthy 2011: 5, brackets are mine). The association between the UF and the PF of the apparent complex phenomenon cannot be considered UNNATURAL in P-OT. Constraints and rankings will be constructed, presented, and examined as follows. **I)** [Constraints and rankings for the absence of the onset liquid of the final syllable]: Suppose INPUT-CONTIGUITY is ranked lower than NOLINK[Place] and IDENT[Cons], as in *V_[nucleus]nonpast# >> MAX[Place] >> {NOLINK[Place], IDENT [Cons]} >> INPUT-CONTIGUITY for the sake of argument. The set of constraints and rankings would predict the absence of the onset liquid of UF /Xuru#/-PF [Xuu:] (Xuu), as will be computed later in a tableau. **II)** [Constraints and rankings for the lengthened vowel for the hiatus]: The set of constraints and rankings for /Xuu/–[Xuu:] are Lunden’s (2018) ALIGN-LEFT(Morph, σ) >> *HIATUS >> *LV(Lengthened Vowel) in conjunction with Poppe’s (2016) ‘accent’ analysis of the nonpast affix of Japanese and dialects as part of the stem in phonology.²⁹ If the second vowel of a hiatus is the first vowel of an affix, the alignment constraint requires the vowel to be syllable initial. This alignment constraint is irrelevant for the nonpast affix according to Poppe’s (2016) accent analysis that the nonpast affix is as if it were not an affix but a part of the stem in terms of accent and phonology in general. Hiatus is avoided sacrificing *LV. **III)** [Constraints and rankings for the entire apparent complex phenomenon]: The set of constraints and rankings integrating the given two sets with such rankings that *HIATUS is ranked the same as NOLINK[Place] and IDENT[Cons] and that *LV is ranked lower

²⁹ The past affix affixes to the morphological stem, and the phonological stem agrees with the morphological stem in the past form. The accent of the stem, if any, occurs at the first mora of the final foot of the P-stem, as in [(ta’be)_{Foot}]_{p-stem}+ta]. In contrast, the morphological stem and the phonological stem do not agree in the nonpast form. If it is assumed that the nonpast affix affixes to the morphological stem and THE NONPAST FORM AS A WHOLE IS THE PHONOLOGICAL STEM, the accent of the stem, if any, is correctly predicted to occur at the first mora of the final foot of the nonpast form, or the P-stem, as in [(ta(be’+ru)_{Foot}]_{p-stem}]. No accent is present in either the nonpast affix or the past affix underlyingly.

than INPUT-CONTIGUITY can happen to predict the phenomenon UF /Xuru#/-PF [Xuu:] precisely in standard parallel OT, as computed in (59).

(59) Constraints and rankings in P-OT (Hypothetical)

	UF: /nur+u g.../	*V _[nucleus] _{nonpast} #	MAX[Place]	NO LINK[Place]	*Hiatus	IDENT[Cons]	INPUT-CONTIGUITY	*LV
☞	a. [nu: g...]		*				*	*
	b. *[nu: ru. g...]	*						
	c. *[nu ru. g...]		*	*			*	
	d. *[nu g _i . g _i ...]		*	*				
	e. *[nu r _i . r _i ...]		*	*				

The candidate [nu:] is optimal because INPUT-CONTIGUITY ranks lower than NO LINK[Place], IDENT[Cons], and *HIATUS. Yet, the integrated set of constraints and rankings predicts the UNNATURAL phenomenon, or the absence of the onset liquid, UF /Xuru#/-PF (= IF in HS) [Xuu: (Xuu)] at the same time in standard parallel OT. That is, the integrated set of constraints and rankings includes a set of constraints and rankings that predicts the UNNATURAL phenomenon of the absence of the onset liquid, UF /Xuru#/-PF (= IF in HS) [Xuu: (Xuu)], although the integrated set predicts the associations between the UFs /Xuru#/ and the PFs [Xuu:] of the apparent complex phenomenon. (The analysis of the ‘complex’ phenomenon /Vru/ - [V:] as /Vru/ - Vu - [V:], where V is /u/ or /o/ is eventually abandoned because it cannot extend to the complex phenomenon with the pre-/ru/ V as /i/, /e/, or /a/.) The discussion reveals whole-part inconsistency of predictions of constraints and rankings in standard parallel OT. If an integrated set of constraints and rankings makes predictions agreeing with the UF and PF of a complex phenomenon, this does not entail that all the constraints and rankings of the integrated set necessarily make correct predictions of natural phenomena of UF-PF (= IF in HS) and UF (= IF in HS)-PF in standard parallel OT. The framework of standard parallel OT thus faces a problem of overly allowing an integrated set of constraints and rankings, containing a set of constraints and rankings that predicts an unnatural phenomenon, to predict the associations between the UFs and PFs.

Summarizing the section 4, the two sets of constraints and rankings, each of which predicts a natural phenomenon independently, make an incorrect prediction in standard parallel OT that an ungrammatical form is grammatical. In addition, the constraints and rankings to predict the associations between the underlying forms /[[back,mid/high].r[back,high]]/ and the phonetic forms [[back,mid/high]:] in standard parallel OT may include the constraints and rankings to predict an unnatural phenomenon. In Harmonic Serialism, by contrast, the integrated set of the constraints and rankings, each of which predicts a natural phenomenon independently, does not make the incorrect prediction. The problem of part making incorrect predictions while the whole predicting the UF-PF association is not possible in Harmonic Serialism. All the steps must be harmonically improving in Harmonic Serialism. Harmonic Serialism is, therefore, superior to standard parallel OT in explaining the complex phenomenon of the Takeo Saga dialect of Japanese.

5 Summary

In the introduction, the complex phenomenon of apocope (UF to IF) interacting with compensation for the absence of the word-final liquid (IF to PF) of the Takeo Saga dialect of Japanese was described along with the adoption of Hayes's (1989) moraic theory. Evidence for Wilson's (2001) motivation for the complex phenomenon was also given for the dialect. Hayata's (1998) postulation of /ru/ for the first half of a geminate consonant was reviewed and supported in the current study. Hall et al.'s (2018) allomorph analysis of the nonpast affix as /-u/ and /-ru/ of the Tokyo dialect was adopted, and Koga and Ono's (2010) postulation of an additional allomorph /uru/ was supported with observations about, for example, the paradigms of the inflectional forms of the 'vowel /e/-final' stem verbs containing that of the potential verb. In section 2, the data sets, including that from Hayata (1998), were provided. New data sets were provided from the author's own research. Hayata's (1998) data set is from a group of native speakers, or rough sound lovers (RSL speakers). The sequence /ru/ at the ends of the nonpast forms alternates only with the glottal stop or the second half of a geminate consonant among the speakers. There is another group of speakers, soft sound acceptors (SSA speakers). These speakers alternate the UF-faithful sequence /ru/s with the glottal stop and the second half of a geminate consonant and the second half of the lengthened vowel if the verb is an /r/-consonant final stem verb or a vowel-/i/ final stem verb. In section 3, an HS-OT analysis was proposed. The set of the constraints and rankings for the apocope is $\{ *V_{[nucleus]}nonpast\#, MAX[Manner: Marked], CODACOND\}$. The set of constraints and rankings for debuccalization is from McCarthy's (2008a) for consonant cluster simplification. McCarthy's constraints and rankings correctly predict the ungrammatical association $Vr:C_j - *Vr:H$, in contrast to the grammatical one $Vr:C_j - VH:C_j$. What is new is that the second consonant of the consonant cluster is the initial segment of the next word or affix in the complex phenomenon. The set of constraints and rankings for the compensation is $\{ IDENT[Cons], HAVEPLACE\} \gg NOLINK[Place]$, where the novel constraint $*[STEM_{contrast} + AFFIX]_{suppletion}$ is ranked at any rank, for RSL speakers, and is $\{ *[STEM_{contrast} + AFFIX]_{suppletion}, HAVEPLACE\} \gg \{ NOLINK[Place], IDENT[Cons]\}$ for SSA speakers. All phenomena in relation to the complex phenomenon are correctly predicted by the constraints and rankings in harmonic serialism of OT. In section 4, the two sets of constraints and rankings proposed in the harmonic serialism, each of which predicts a natural phenomenon independently, incorrectly predict that an ungrammatical form, or the form with the second consonant absent and the geminate of the first consonant of the consonant cluster, is grammatical in standard parallel OT because of the lack of (the concept of) intermediate forms. In addition, the constraints and rankings for predicting the UF-PF associations (between the underlying forms /u.ru/ and the phonetic forms [ur:]) of the apparent complex phenomenon may be incorrect in standard parallel OT, including the constraints and rankings for predicting an unnatural phenomenon. There is part-whole inconsistency in the predictions by the constraints and rankings in standard parallel OT. In contrast, in harmonic serialism, there is no part-whole inconsistency in the predictions because every step of the predictions is harmonically improving.

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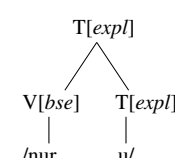
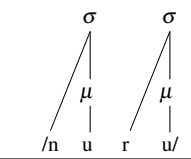
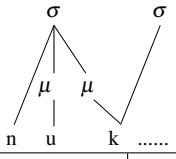
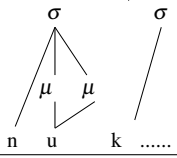
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6 Appendix

A Harmonic improvements of /nur+u/ (C_i...) ‘paint-nonpast’ among RSL speakers

		*V _[nucleus] _{nonpast} #	MAX[Manner: Marked]	CODACOND	MAX[Place]	HAVEPLACE	NOLINK[Place]	MAX[Manner]	IDENT[Cons]	NOLINK[Place]	*[STEM _{contrast} + AFFIX] _{suppletion}
<p>Step 1: /nu.ru # ko.do.mo/</p> <p>M-SS of UF: </p> <p>PS of UF: </p>											
ES ^o	a. nur # k...			*							
ES ^o	b. nu.ru # k...	*									
Step 2: nur # ko.do.mo											
ES ^o	a. nuH # k...				*	*					
ES ^o	b. nur # k...		*								
Step 3: nuH # ko.doN											
ES ^o	a. nuk _i # k _j ...						*	*		*	
											
	b. nuH # k _j ...						*				
	c. nu: # k...							*	*		
											

B Harmonic improvements of /n+uru/ (C_i...) ‘sleep-nonpast’ among RSL speakers

		*V _[nucleus] _[nonpast] #	MAX[Manner: Marked]	CODACOND	MAX[Place]	HAVEPLACE	NOLINK[Place]	MAX[Manner]	IDENT[Cons]	NOLINK[Place]	*[STEM _{contrast} + AFFIX] _[suppletion]		
	UF: /nu.ru # ko.do.mo/	<p>M-SS of UF:</p>											
	PS of UF:												
	Steps 1 and 2 are the same as those of (A)												
	Step 3: nuH # ko.doN												
ES	a. nuk _i # k _j ...							*	*		*		
	b. nuH # k _j ...							*					
	c. nu: # k...								*	*			*

D Harmonic improvements of /n+uru/ ‘sleep-nonpast’ among SSA speakers

		*V _[nucleus] _[nonpast] #	MAX[Manner: Marked]	CODACOND	MAX[Place]	HAVEPLACE	NOLINK[Place]	IDENT[Cons]	MAX[Manner]	*[STEM _{contrast} + AFFIX _{suppletion}]	NOLINK[Place]	IDENT[Cons]
	UF: /nu.ru # ko.do.mo/	<p>M-SS of UF:</p>										
	PS of UF:											
	Steps 1 and 2 are the same as those of (C)											
	Step 3: nuH # ko.doN											
ES	a. nuk _i # k _j ...				*			*				*
	b. nuH # k...				*			*			*	*
	c. nu: # k...				*			*			*	*