

A Descriptive Generalization of Apocope of /u/ and /r/ and Compensatory Geminates of the Non-past Forms*

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Abstract

The current study will formulate a descriptive generalization of Hayata's 1998 provided phenomenon, the former part of geminates at the finals of the non-past forms in Takeo Saga dialect of Japanese, which he analyzed only with generative rules. It will be shown through observations of relevant phenomena in Japanese dialects and other languages that the phenomenon is actually a part of one 'conspiracy' in languages and requires richer representations, including syllables and moras, than those of segmental phonology, and the phenomenon thus motivates Optimality Theory and questions generative rules only.

[**Keywords**]: conspiracy, sonorant-vowel syllables, apocope

1 Introduction

McCarthy 2008a clarifies the way to do research in Optimality Theory, and emphasizes that a descriptive generalization is an essential intermediate step between a phenomenon and an analysis, and that descriptive generalizations in Optimality Theory contain statements about target surface configurations and unfaithful mappings related to those configurations. We formulate such a descriptive generalization of the phenomenon, the former part of geminates at the finals of the non-past forms in Takeo Saga dialect of Japanese, in contrast with other phenomena, as suited to an analysis in Optimality Theory.

2 Phenomena

A descriptive generalization of the phenomenon in Takeo Saga dialect of Japanese that we will obtain at the end of this section is (1).

- (1) **Descriptive Generalization** With a non-initial sonorant-high vowel syllable avoided, the sonorant remains with the high vowel absent only if either the vowel or the sonorant plus the vowel is associated with the non-past tense and the POA of the sonorant is coronal. Furthermore, the geminate of the consonant following the sonorant-high vowel sequence compensatorily occurs in place of the liquid.

*The current study is supported by KAKENHI of Japan Society for the Promotion of Science, specifically Grant-in-aid for Scientific Research (C), No. 24520432 in the academic year 2015.

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(On the other hand, with a non-initial coronal sonorant-high vowel syllable avoided, the vowel remains with the liquid absent only if the vowel is associated not with the non-past tense, e.g., the present participle or a part of a noun, and the POA of the sonorant is coronal.)

We observe the non-past forms in Takeo Saga dialect corresponding to the /ru/-final ones (Hayata 1998), the /nu/-final ones and ones not /ru/- or /nu/-final of Yanagawa Fukuoka dialect in sections 2.1-2.3. Since the constraints are universal in Optimality Theory, we need observations of various languages in order to obtain an accurate descriptive generalization of the phenomenon in question. The other phenomena we will observe are 1) the /ru/-final nouns in Saga dialects in general in section 2.4, 2) the only /u/ absence with the liquid /r/ remaining in Tarama Okinawa dialect in section 2.5, 3) apocope of vowels or consonants in other languages in section 2.6, 4) the only liquid absence in western Saga dialect in section 2.7 and 5) the only glide (a kind of sonorants) absences in the glide-vowel sequences in Japanese and its dialects in section 2.8.

2.1 Non-past Forms Corresponding to /Ru/-final Ones of Yanagawa Fukuoka Dialect, Hayata 1998

If the counterpart in Yanagawa Fukuoka dialect ends with /ru/, then the ‘non-past’ form in Takeo Saga dialect will end with either i) the former part of the geminate consonant if immediately followed by a consonant whichever consonant it is (like [g] in [...g {gohan, ge:mu, gonin}] ‘{rice, game, five people} that ... will ...’) or ii) the glottal stop otherwise, or sentence-finally or followed by a vowel, as given in Hayata 1998, as in Table 1.

Table 1: The non-past forms corresponding to /ru/-final ones of Yanagawa Fukuoka dialect

	S-final	RC#N	condi.	Neg. Imp.	causative	
consonant /r/-final stem verbs						
Takeo	toʔ	tog (g...)	(torya:)	tonna	torasug (g...)	‘take’
Tokyo	toru	toru (g...)	toreba	toruna	toraseru (g...)	
Yanagawa	toru	toru (g...)	toreba	toruna	torasuru (g...)	
vowel /e/-final stem verbs						
Takeo	tabuʔ	tabug (g...)	(taburya:)	tabunna	tabesasug (g...)	‘eat’
Tokyo	taberu	taberu (d...)	tabereba	taberuna	tabesaseru (g...)	
Yanagawa	taburu	taburu (g...)	tabureba	taburuna	tabesasuru (g...)	
vowel /i/-final stem verbs						
Takeo	okiʔ	okig (g...)	(okirya:)	okinna	okisasug (g...)	‘get up’
Tokyo	okiru	okiru (g...)	okireba	okiruna	okisaseru (g...)	
Yanagawa	okiru	okiru (g...)	okireba	okiruna	okisasuru (g...)	
strong stem verbs						
Takeo	kuʔ	kug (g...)	(kurya:)	kunna	korasug (g...)	‘come’
Tokyo	kuru	kuru (g...)	kureba	kuruna	koraseru (g...)	
Yanagawa	kuru	kuru (g...)	kureba	kuruna	korasuru (g...)	
strong stem verbs						
Takeo	suʔ	sug (g...)	(surya:)	sunna	sasug (g...)	‘do’
Tokyo	suru	suru (g...)	sureba	suruna	saseru (g...)	
Yanagawa	suru	suru (g...)	sureba	suruna	sasuru (g...)	

RC#N is a pattern of a relative clause adjoining to a noun.¹ Note that /ru/, a sequence of the final

¹Japanese and its dialects are all head-final, and N is the head of RC#N.

vowel and the final but one consonant, is absent at each, and the glottal stop or the former part of a geminate occurs in Takeo Saga dialect.

When the verb is vowel /e/-final, if the segment preceding /e/ is a vowel, then the corresponding part of the counterpart of Takeo Saga dialect will be [... juʔ], as in [kikojuʔ] for [kikojuru] in Yanagawa dialect (and [kikoeru] in Tokyo dialect).

Native speakers say that they pronounce ‘sokuon’, the glottal stop ʔ or the former part of the geminate, as in [toʔ] ‘take-Non-past’ and [tog gohan] ‘the rice that (I) will take’, the same as the former part of the geminate of [kitte] ‘stamp’. Linguists agree that there is no actual sound heard for the glottal stop or the former part of a geminate. Following Fujimoto’s 2014 physiological study, we assume that a glottal constriction at least, some kind of tension of the vocal folds, is involved where Hayata 1998 assumes the glottal stop or the former part of a geminate occurs.

2.2 Non-past Forms Corresponding to /Nu/-final Ones of Yanagawa Fukuoka Dialect

There is actually only one non-past form that ends with /nu/, /sinu/ ‘die-Non-past’. The final of this ‘non-past’ form in Takeo Saga dialect will be either i) the nasal with its POA identical to that of the consonant following that nasal like [m] in [sim mori] (/sin mori/) ‘forest that will die’ whichever consonant follows that nasal or ii) the nasal with its POA coronal otherwise, or sentence-finally or followed by a vowel, as in Table 2.

Table 2: The finals corresponding to the /nu/-final ones of Yanagawa Fukuoka dialect

	S-final	RC#N	condi.	Neg. Imp.	caus.	
consonant /n/-final stem verbs						
Takeo	si <u>n</u>	si <u>n</u> (g...)	(sinya:)	si <u>nn</u> a	sinas <u>u</u> g (g...)	‘die’
Tokyo	sinu	sinu (g...)	sineba	sinuna	sinaseru (g...)	
Yanagawa	sinu	sinu (g...)	sineba	sinuna	sinas <u>u</u> ru (g...)	

Note that /u/ of /nu/ only is absent with the nasal remaining. The high back vowel will thus be absent if the preceding consonant is either the liquid or the coronal nasal in Saga dialects in general.

2.3 Non-past Forms Corresponding to Ones Not /Ru/ or /Nu/-final of Yanagawa Fukuoka Dialect

If the counterpart in Yanagawa Fukuoka dialect does not end with either /ru/ or /nu/, equivalently does end with either /wu/ [u], /tu/ [tsu], /mu/, /bu/, /ku/, /gu/ or /su/, then the ‘non-past’ form in Takeo Saga dialect will be the same as that of Yanagawa Fukuoka dialect, as in Table 3.²

The high back vowel is thus absent only if the preceding consonant is either the liquid or the coronal nasal. The tables 1-3 represent all of the stem types of verbs of Japanese, thirteen (13) types in total, i.e., five (5) in Table 1, one (1) in Table 2 and seven (7) in Table 3.

What follows is a summary of the observations of the phenomenon of Takeo Saga dialect, specifically differences among Takeo Saga dialect, Yanagawa Fukuoka dialect and Tokyo dialect:

(2) **Observation 1** The finals of the non-past forms alternate:

between [...ʔ # V...] or [...C_i # C_i...] in Takeo Saga dialect and [...ru # V or C] in Yanagawa Fukuoka dialect if the verb is either one with strong stems, vowel /e/-final, vowel /i/-final or consonant /r/-final.

²See section 2.7 for how /u/ replaces /wu/ in modern Japanese and its dialects.

Table 3: The non-past forms corresponding to ones not /ru/ or /nu/-final of Yanagawa Fukuoka dialect

	S-final	RC#N	condi.	Neg. Imp.	caus.	
consonant /t/-final stem verbs						
Takeo	matsu	matsu (g...)	(matja:)	matsuna	matasug (g...)	‘wait’
Tokyo	matsu	matsu (g...)	mateba	matsuna	mataseru (g...)	
Yanagawa	matsu	matsu (g...)	mateba	matsuna	matasuru (g...)	
consonant /w/-final stem verbs						
Takeo	au	au (g...)	(awya:)	auna	awasug (g...)	‘meet’
Tokyo	au	au (g...)	aeba	auna	awaseru (d...)	
Yanagawa	au	au (g...)	aeba	auna	awasuru (g...)	
consonant /m/-final stem verbs						
Takeo	yomu	yomu (g...)	(yomja:)	yomuna	yomasug (g...)	‘read’
Tokyo	yomu	yomu (g...)	yomeba	yomuna	yomaseru (g...)	
Yanagawa	yomu	yomu (g...)	yomeba	yomuna	yomasuru (g...)	
consonant /b/-final stem verbs						
Takeo	yobu	yobu (g...)	(yobja:)	yobuna	yobasug (g...)	‘call’
Tokyo	yobu	yobu (g...)	yobeba	yobuna	yobaseru (g...)	
Yanagawa	yobu	yobu (g...)	yobeba	yobuna	yobasuru (g...)	
consonant /k/-final stem verbs						
Takeo	kaku	kaku (g...)	(kakja:)	kakuna	kakasug (g...)	‘write’
Tokyo	kaku	kaku (g...)	akeba	kakuna	kakaseru (g...)	
Yanagawa	kaku	kaku (g...)	akeba	kakuna	kakasuru (g...)	
consonant /g/-final stem verbs						
Takeo	kagu	kagu (g...)	(kagja:)	kaguna	kagasug (g...)	‘meet’
Tokyo	kagu	kagu (g...)	kageba	kaguna	kagaseru (g...)	
Yanagawa	kagu	kagu (g...)	kageba	kaguna	kagasuru (g...)	
consonant /s/-final stem verbs						
Takeo	kasu	kasu (g...)	(kasja:)	kasuna	kasasug (g...)	‘lend’
Tokyo	kasu	kasu (g...)	kaseba	kasuna	kasaseru (g...)	
Yanagawa	kasu	kasu (g...)	kaseba	kasuna	kasasuru (g...)	

between [...n # V] or [...N[POA α] # C[POA α]...] in Takeo Saga dialect and [...nu # V or C] in Yanagawa Fukuoka dialect if the verb is consonant /n/-final.

- (3) **Observation 2** If the verb is so-called a vowel /e/-final verb, then the vowels preceding the final [ʔ] or [ru] alternate between [u] in Takeo Saga and Yanagawa Fukuoka dialects and [e] in Tokyo dialect.

2.4 /Ru/-final Nouns in Saga Dialects

If the word is a noun instead of a non-past form, then there will be no ‘glottal stop’ or the former part of a geminate consonant at its final in Takeo Saga dialect corresponding to /ru/-finals ones of Yanagawa Fukuoka dialect, as in (4a) and (4c) in contrast respectively in the order with those of verbs (4b) and (4d).

- (4) a. haru/*haʔ [Takeo Saga]
 spring
 ‘spring [noun]’

- b. ha? [Takeo Saga] cf. haru [Tokyo dialect]
paste [Non-past]
'(He) will paste (it).'
- c. siru/*si? [Takeo Saga]
juice
'juice [noun]'
- d. si? [Takeo Saga] cf. siru [Tokyo dialect]
know [Non-past]
'(He) will know (it).'

2.5 Finals at Non-past Forms in Tarama Okinawa Dialect Alternating among [Ru], [L], Etc.

Similarly to the nasal remaining in Saga dialects and differently from the liquid as well as the final high back vowel absent for the /ru/-final past forms in Takeo Saga dialect, the liquid can remain as the final even if the final high back vowel is absent in another dialect of Japanese, Tarama Okinawa dialect, as reported in Takahashi 1995.

- (5) a. sjamatail~sjamataiN~sjamatairu [Tarama Okinawa] cf. samatageru [Tokyo]
prevent [Non-past]
'(He) will prevent (him) (from it).'
- b. arakil~arakiN~arakiru [Tarama Okinawa] cf. arati wo kirihiraku [Tokyo]
cultivate [Non-past]
'(He) will cultivate (it).'
- c. ukutaril~ukutariN~ukutariru [Tarama Okinawa] cf. hekotareru [Tokyo]
get tired [Non-past]
'(He) will get tired.'
- d. kail~kaiN~kairu [Tarama Okinawa] cf. kaeru [Tokyo]
exchange [Non-past]
'(He) exchanges (them).'
- e. takil~takiN~takiru [Tarama Okinawa] cf. unaru (tagiru) [Tokyo]
exclaim [Non-past]
'(He) will exclaim (it).'
- f. naMmil~naMmiN~naMmiru [Tarama Okinawa] cf. nameru [Tokyo]
lick [Non-past]
'(He) will lick (it).'

The liquid and the high back vowel alternate with the liquid /l/ only and the syllabic nasal only. See Takahashi 1995 for more examples. This suggests that the phenomenon of Takeo Saga dialect we will analyze on this paper is actually a complex of the two phenomena one of which is the association between /ru/ and r (or l).

2.6 Word-Final Vowel and Consonant Absences

The phenomenon of Takeo Saga dialect will not be peculiar as similar but separate phenomena are found among other languages. For example, short unstressed vowels are present or absent synchronically in the environment of V(owel)[+voiced, +sonorant] __# in Isthmus Nahuatl (Kenstowicz and Kisseberth 1979: 298).

- (6) a. *šikakíli* ~ *šikakíl* ‘put it in it’
b. *kítaya* ~ *kítay* ‘he already sees it’
c. *kikówa* ~ *kików* ‘he buys it’
d. *támi* ~ *tám* ‘it ends’

The final vowel is absent in the various sequences of a sonorant and a vowel in this language. See an argument in favor of their claim that the consonant final ones in (6) are surface ones.

Word-final /r/ will be absent if it is preceded by a stressed vowel in Catalan (Kikuchi 2004).

- (7) a. *primer* (m.sg.) [primé]
cf. *priméra* (f.sg.) [primérə]
‘first (...)’
b. *clar* (m.sg.) [klá]
cf. *clara* (f.sg.) [klárə]
‘clear (...)’
c. *tirar* [tirá] ‘to throw’

See Kikuchi 2004 for other examples and examples in which *r* is present when followed by enclitics like *tirar-ho* [tiráru] ‘to throw it’. The sound /r/ will be present if it is not word-final and be absent if it is word-final.

The apocope of /ru/ as a whole is peculiar in languages whereas apocope /u/ and apocope /r/ independently are prevalent in languages. This suggests that the phenomenon of Takeo Saga dialect can be two independent associations of 1) /ru/ and *r* (or *l*), as suggested in the previous section, and then 2) *r* and the ‘glottal stop’ or the former part of a geminate, as Hayata 1998 assumes. If so, the only high back vowel absence in Tarama Okinawa dialect will be only the former of the two. See Sasaki 2013 for the assumption that it is one phenomenon from the schematic pattern, e.g., between /...ru k.../ and the pattern [...k k...].

2.7 Liquid Absences in Sequences of Liquid and High Front Vowel

As opposed to the vowels absent in the liquid-high back vowel sequences at the finals of the non-past forms, the liquid will be absent in western Saga dialect, as in (8) and (9), if the sequence of a liquid and the high vowel forms a non-initial syllable for its counterpart of Yanagawa Fukuoka dialect (and Tokyo dialect) and either the value of the tense is the present participle or it is a part of a noun.³

- (8) a. *ari* ~ *ai* ‘aunt’
b. *iri* ~ *ii* ‘parch’
c. *uri* ~ *ui* ‘melon’

³The same as the existential verb /*(y)oru*/ ‘exist temporally’, the purpose /*gya*/ in western Saga dialect corresponding to the locative /*ni*/ takes the present participle forms, as in [kii gya] ‘in order to cut (it)’.

- d. ori ~ oi ‘cage’
- (9) a. ki: ~ kii yo: [western Saga] cf. kiri yoru [Yanagawa Fukuoka]
cut [*prp*] is temporally
‘(He) is cutting (it).’
- b. hui yo: [western Saga] cf. huri yoru [Yanagawa Fukuoka]
rain [*prp*] is temporally
‘(It) is raining.’
- c. se: ~ sei yo: [western Saga] cf. seri yoru [Yanagawa Fukuoka]
compete [*prp*] is temporally
‘(He) is competing (with her).’
- d. hoi yo: [western Saga] cf. hori yoru [Yanagawa Fukuoka]
dig [*prp*] is temporally
‘(He) is digging (there).’
- e. ai yo: [western Saga] cf. ari yoru [Yanagawa Fukuoka]
be held [*prp*] is temporally
‘(It) is being held.’

The vowel /i/ in the examples (9) and (10) is the morpheme of the present participle in Japanese and its dialects. The liquid absence is also found in the humble and honorific verbs in Tokyo dialect, as in (10).

- (10) a. gozai masu [Tokyo] cf. gozari masu [Old Japanese]
be [*prp*] polite-Non-past
‘(It) is humbly (here).’
- b. irasshai masu [Tokyo] cf. irasshari masu [Old Japanese]
be [*prp*] polite-Non-past
‘(He) is graciously (here).’
- c. osshai masu [Tokyo] cf. osshari masu [Old Japanese]
say [*prp*] polite-Non-past
‘(He) says (so) graciously.’
- d. nasai masu [Tokyo] cf. nasari masu [Old Japanese]
do [*prp*] polite-Non-past
‘(He) graciously does (it).’
- e. kudasai masu [Tokyo] cf. kudasari masu [Old Japanese]
give [*prp*] polite-Non-past
‘(He) give (it) graciously.’

The phenomenon in this subsection indicates that the pattern of the liquid-high vowel sequence is one that Takeo Saga dialect (as well as western Saga dialect, Tarama Okinawa dialect and Tokyo dialect) tries to avoid, by using the liquid absence or the vowel absence, or a ‘conspiracy’ in the

dialect what Haj Ross and Kisseberth called. Note that the liquid absences in (9)-(10) imply that Saga dialects do not avoid hiatus within words and stems.⁴

2.8 Glide Absences in Sequences of Glide and Vowel

Similarly to instability of some $\{/n,r/\}-\{/i,u/\}$ sequences we saw in previous sections, as summarized in the cells in the coordinates of $\{/n/, /r/\}$ and $\{/i/, /u/\}$, some sequences of the coronal nasal and the mid back vowel are unstable, as given in the cell of the coordinate of $/n/$ and $/o/$ in Table 4, as the nominative morpheme, which is an affix, is synchronically either $/no/$ or the syllabic nasal in Saga dialects, as in [ame- $\{no, N\}$ hu:] [rain-Nom fall [Non-past] ‘It will rain.’

Table 4: Sonorant-Vowel Sequences in Saga Dialects

features	/n/	/r/	/j/	/w/
/i/	√/*[ni]	*/√[ri]	*[ji]	*[wi]
/u/	√/*[nu]	√/*[ru]	√[ju]	*[wu]
/e/	√[ne]	√[re]	*[je]	*[we]
/o/	√/*[no]	√[ro]	√[jo]	*[wo]
/a/	√[na]	√[ra]	√[ja]	√[wa]

Some sequences of a glide and a vowel, specifically $/ji/$, $/je/$, $/wi/$, $/wu/$, $/we/$ and $/wo/$, are not attested in modern Japanese as well as dialects, as summarized in Table 4. Modern Japanese uses the sonorant-absent ones $/i/$, $/e/$, $/i/$, $/u/$, $/e/$ and $/o/$ respectively in place of the classical sequences $/ji/$, $/je/$, $/wi/$, $/wu/$, $/we/$ and $/wo/$, as in [omoi] ‘think [Present Participle]’ in modern Japanese for [omowi] in Old Japanese.

The instability of the glide-high/mid or front/back vowel sequences has something to do with close tongue positions between each sonorant and vowel. If the place of articulation (= POA) of a glide and the tongue position of a vowel are in the vicinity, then the glide will be absent by assimilation. For example, the POAs of the glides from labial through alveolar to palatal $/j/$ and $/w/$, as given in Table 5, and the tongue positions of the front vowels $/i/$ and $/e/$, as given in Table 6, are close.

Table 5: Features of Sonorants

features	n	r	j	w
Consonantal	+	+	-	-
Sonorant	+	+	+	+
Syllabic	-/+	-/+	-	-
Nasal	+	-	-	-
Voiced	+	+	+	+
Continuant	-	+	+	+
POA	alveolar	alveolar	palatal	labial velar
Sibilant	-	-	-	-

⁴Hiatus may be avoided in the boundaries between stems and affixes in Japanese and its dialects.

Table 6: Features of Vowels

features	i	u	e	o	a
High	+	+	-	-	-
Low	-	-	-	-	+
Back	-	+	-	+	-

Thus, /i/, of which the glides are absent, replaces /wi/ and /ji/ and /e/, of which the glides are absent, replaces /we/ and /je/.⁵ The POA of the glide at velar /w/, as given in Table 5, and the tongue positions of the back vowels /u/, as given in Table 6, are close. Thus, /u/ replaces /wu/, and /o/ replaces /wo/.⁶

The discussions of the glide absences for the glide and front/back or high/mid vowels in Japanese and its dialects suggest that similar phonetic motivations may be relevant to the unstability of the non-glide sonorant-high vowel sequences of Saga dialects. That is, the unstability of the non-glide sonorant-high vowel sequences can be one independent surface constraint. A possible phonetic motivation is that the tongue raised for the coronal nasal and the liquid, on one hand, and that raised for the high front vowel /i/, on the other, are in the vicinity relevantly to assimilation. Another is that the tongue raised for the coronal nasal and the liquid, on one hand, and that raised for the high back vowel /u/, on the other, are too distant relevantly to non-audibility. Note that there is a difference between the glides and the coronal nasal and the liquid that the former is not syllabic, cannot support one mora, and the latter can be syllabic, can support one mora. As we saw, the liquid is syllabic or mora bearing in some dialects of Japanese, e.g., Tarama Okinawa dialect, and is not syllabic or mora bearing in other dialects of Japanese, Takeo Saga dialect, western Saga dialect, Tokyo Japanese.

3 Descriptive Generalization

We now obtain the descriptive generalization of the finals of the non-past forms in Takeo Saga dialect, (1), which was given at the beginning and is repeated here as (11).

- (11) (= (1)) **Descriptive Generalization** With a non-initial sonorant-high vowel syllable avoided, the sonorant remains with the high vowel absent only if either the vowel or the sonorant plus the vowel is associated with the non-past tense and the POA of the sonorant is coronal, as Figure 2 and Figure 3 are associated. Furthermore, the geminate of the consonant following the sonorant-high vowel sequence compensatorily occurs in place of the liquid, as Figure 1 and Figure 2 are associated.

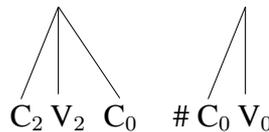


Figure 1: Schematic Pattern of Surface Forms

Here we assume that the underlying forms of the surface non-past forms with the final the former part of a geminate are the same as the surface forms except with the former part of the geminate replaced with the liquid and the high back vowel, as in /taburu gohan/ for [tabug gohan], /okiru/ for

⁵Of course, the language did not have many contexts where the contrasts necessary, e.g., between /wi/ and /i/.

⁶The feature of round may also be relevant.

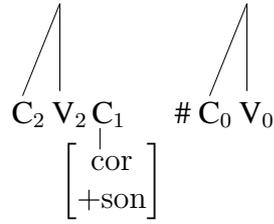


Figure 2: Schematic Pattern of Intermediate Forms

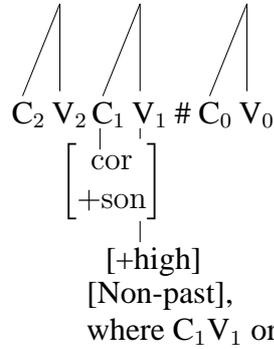


Figure 3: Schematic Pattern of Underlying Forms

[okig gorira], /toru/ for [tog gohan]. The underlying forms happen to be those non-past forms of Yanagawa Fukuoka dialect. See Koga and Ono 2010 for how the the non-past forms are divided into stems and affixes. The phenomenon is thus a compensatory lengthening prevalent in languages, as observed, for example, in Hayes 1989 and Kiparsky 2011. (On the other hand, with a non-initial sonorant-high vowel syllable avoided, the vowel remains with the liquid absent only if the vowel is associated not with the non-past tense, e.g., the present participle and a part of a noun, and the POA of the sonorant is coronal.)

What follows is associations in the other direction: If there is a geminate of a consonant over a word or morpheme boundary, then the liquid (or the coronal non-nasal sonorant) will occur in place of the former part of the geminate, as Figures 1 and 2 are associated. The high vowel, if it or the preceding consonant plus the vowel is the non-past morpheme, occurs immediately after the liquid, resulting in a sonorant-high vowel sequence, as Figures 2 and 3 are associated.

4 Implications

The descriptive generalization that we obtained at the end of the last section implies that the framework or theory that we will state an analysis of the phenomenon in Takeo Saga dialect must 1) be one beyond segmental phonology and 2) be able to state constraints on ‘conspiracies’ in languages.

4.1 To State Constraints on ‘Conspiracies’ in Languages

If only *SPE*-styled generative rules were available, we would NOT be able to state the conspiracy to ban sonorant, {/n/, /r/}-high vowel, {/i/, /u/} sequences in languages. All we can do using *SPE*-styled generative rules is to propose generative rules:

- such as a /u/-deletion rule (12a) in order for the high vowel absence in the sonorant-high vowel sequences at the finals of the non-past forms in Takeo Saga dialect, (given in sections 2.1-2.3 and summarized in the association between Figures 3 and 2), and

- such as an /r/-deletion rule (12b) in order for the sonorant absence in Saga dialects in general, (given in section 2.7),

as Hayata 1998 has done.

- (12) a. $u \rightarrow \emptyset / Vr_]_{non-pastform}$ ⁷ [Saga]
 b. $r \rightarrow \emptyset / V_i$ [Saga]

Here we followed the rule $V \rightarrow \emptyset / Vr_ \#$, which Kenstowicz and Kisseberth (1979: 299) reviewed and discussed for Isthmus Nahuatl. There is no place with the *SPE*-styled generative rules in which we can state a constraint on the conspiracy that the rules tacitly aim at, that languages avoid sonorant-high vowel sequences. This kind of discussions is one of the well-discussed motivations not to use *SPE*-styled rules only and to use another, Optimality Theory, starting with Kisseberth 1970. Hayata 1998 is such a generative *SPE*-styled analysis of /ru/ $\rightarrow \emptyset$ in Takeo Saga dialect, and thus cannot capture the important generalization on the sonorant-high vowel sequences. We leave the particular review of his analysis for a future study. Sasaki 2013 is the first that analyzed similar phenomena of Japanese dialects in OT.

4.2 To Explain /r/ $\rightarrow C_i / _ C_i$ in Contrast with Others

If our analysis is restricted in segmental phonology, then such rules as (13) and (14) may correctly predict the difference between the absence of the sonorant and the presence of the former part of the geminate if the word-final coronal sonorant is the liquid and the presence of the sonorant with its POA identical to that of the consonant following that if it is nasal.

$$(13) \begin{bmatrix} cor, \\ +sono, \\ -nasal \end{bmatrix} \rightarrow C \begin{bmatrix} f_1 & \alpha_1 \\ f_2 & \alpha_2 \\ \dots \\ f_n & \alpha_n \end{bmatrix} / _ \# C \begin{bmatrix} f_1 & \alpha_1 \\ f_2 & \alpha_2 \\ \dots \\ f_n & \alpha_n \end{bmatrix} \quad [\text{Takeo Saga}]$$

$$(14) \begin{bmatrix} cor, \\ +sono, \\ +nasal \end{bmatrix} \rightarrow [\text{POA } \alpha] / _ \# C [\text{POA } \alpha] \quad [\text{Takeo Saga}]$$

$(f_1, \alpha_1), \dots, (f_n, \alpha_n)$ are the pairs of every possible distinctive feature and its value. The rules, however, cannot explain why this is the case. Even if the values of the nasal are crucial for the presence or absence of the coronal sonorants at the position, the rules cannot explain why it is the case.

In addition, if our analysis is limited within segmental phonology, we may not be able to explain another fact that the former part of a geminate realizes some underlying /ru/'s, as in the case of the phenomenon of Takeo Saga dialect in question, whereas it cannot for others, as in the case of the adjective plus copula, [...ka] for /...k ar u/.

- (15) a. UR: aru gohan [Takeo Saga] cf. arou
 be [Non-past] rice 'is probably'
 'the rice which is here [Noun]'
- b. IR: al gohan
- c. PR: ag gohan cf. *a gohan

⁷Hayata's 1998 rule is $u \rightarrow \emptyset / r_]_v$.

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