Leveling of prosodic patterns in paradigms for affix allomorphy (title revised)

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- *Phenomena*:
Nonpast affix allomorphy
- *Language*: Ariake Western Saga dialect of Japanese (AWSJ), spoken in the western district of Saga near the coast of the Ariake Sea in Japan.[1]

[1] The area where AWSJ is spoken includes Kashima City, Ashikari of Ogi City, and Shiroishi of Kishima County.

Table 1: Stems

verb stem types

C-final	*tor* 'take', *kir* 'cut' *kaer* 'go home', *sur* 'rub'
V-final	*oki* 'get up', *ki* 'wear'
X*e*/X	*tabe/tab* 'eat', *ka(j)e/kaj* 'change'
C/CV	*k/ko* 'come', *s/se* 'do'

- *Data*:
four (4) verb stem types (Table 1) and three (3) affix allomorphs (Table 2) (Koga, 2009; 2012; 2023)

Table 2: affix

nonpast affix	
-u	(default)
-ru	(default)
-uru	(alternative)

- See Appendix I for the motivation of the alternative affix allomorph /-uru/.

Question: Which allomorph pairs with which stem?

Proposal: Prosodic pattern leveling based on similarity (Zodak and Bat-El, 2015) within Optimality Theory (Prince and Smolensky, 1993/2004): predicts restriction of morphologically well-formed forms (M-forms) to prosodically well-formed ones (P-forms)

Constraints

- Affix Subcategorization - AffSub: The shorter stem alternant is selected by the nonpast affix (Koga 2012).
See Stump (2016) for stem alternation as the function of morphosyntactic properties.
- Prosodic minimality - PM: A phonological word smaller than two moras is prohibited.
- Uniform Exponence - UE: The lexical stem has the same realization in the various forms in the paradigm of the lexeme.

- Stem Domain of Alternative Allomorphs - DomAlt: The alternative affix allomorph parses the stem prosodically if and only if the default one cannot do so under the constraints ranked higher than the constraint DomAlt (McCarthy and Prince, 1993:117).
- **Prosodic Pattern Leveling** - **PPL**: (will be presented in slide 20 in 2.3)

Ranking

- {AffSub $\gg$ PM $\gg$ **PPL** $\gg$ UE}, DomAlt

Road map to Prosodic Pattern Leveling constraint

- Leveling directionality (2.1)
- Similarity (measurement) (2.2)
- Prosodic pattern leveling (2.3)

Constraints

- No stem alternation constraint: The directionality of leveling is from a paradigmatic prosodic pattern without stem alternation to one with stem alternations.
- Similarity constraint: 'The more similar the inflectional classes [or paradigmatic patterns] are, the more likely they are to interact in interparadigm leveling' [brackets are mine]. (Zodak and Bat-El, 2015: 275)
- Lexical frequency constraint in Zodak and Bat-El's (2015):

Ranking

- No stem alternation constraint $\gg$ Similarity constraint $\gg$ Lexical frequency constraint

The similarity measurement between paradigmatic patterns can be explicit by the four-place analogy of Albright's (2005) derivational rules among forms, (1) and (2).
- A derivational rule is identified to derive the verb form of each morphosyntactic property (e.g., $F_{L,n}$ in Figure 1) from the source form ($F_{L,1}$) in the LEVELING paradigmatic pattern P_L (Albright, 2005).

(1) Apply each rule (e.g., Rule n-1) to the source form ($F_{T,1}$, or $F_{T-by-L,1}$) of the TARGET paradigmatic prosodic pattern P_T to derive the LEVELED counterpart of the morphosyntactic property ($F_{T-by-L,n}$) of the leveled paradigmatic prosodic pattern P_{T-by-L}.

(2) The prosodic structure of the source form of the LEVELING pattern P_L is contained in that of the corresponding source form of the TARGET pattern P_T; otherwise, leveling of the target pattern P_T by the leveling pattern P_L could not be computed.

(3) Compute prosodic differences between 1) each form of the leveled TARGET pattern by the LEVELING pattern P_{T-by-L} (e.g., $F_{T-by-L,n}$) and 2) its corresponding real (or candidate) form ($F_{T,n}$) of the TARGET pattern P_T.

- The prosodic difference between an actual (or candidate) form and its leveled form will be two if a vowel is existent in one and not in the other, one if the qualities of the vowels are different, and one if a consonant is existent in one and not in the other (Zodak and Bat-El, 2015).

- The degree of similarity between the TARGET pattern P_T and a LEVELING pattern P_L is indicated by the sum of the differences between each LEVELED form (of P_{T-by-L}) and its corresponding real (or candidate) form (of P_T) (Zodak and Bat-El, 2015).

Table 3: Which paradigmatic prosodic pattern levels which

AWSJ	[1]	[2]	[3]
X*e*/X stem	2	from V-final: 0/0 from C-final: 6/8	19% (*e*-final)
C/CV stem (k/ko, s/se)	2	from V-final: 2/5 from C-final: 4	19.02%
V-final	1	-	0.04% (*i*-final)
C-final	1	-	56%

[1]: Stem alternants, [2]: Prosodic Differences
[3]: Lexical frequency in Tokyo dialect

- If the lexical frequency constraint were ranked higher, as is in Zodak and Bat-El (2015),
- the directionality of leveling should be from the paradigmatic pattern of the (X)*e*/(X) stem verbs to that of the V-final stem verbs.
– It is because the number of the C-final stem verbs: 56% of the total in the Tokyo dialect in Japanese textbooks,
– that of V(*e*)-final stem verbs: 19%,
– that of the V(*i*)-final stem verbs: 0.04%,
– that of the *s*/*si* stem verbs: 19%, and
– that of the *k*/*ko* stem verbs is 0.02% (Table 3).

- P_V, but not P_C, levels $P_{Xe/X}$.
- It is because P_V is more similar to $P_{Xe/X}$ than P_C is.

(4) a. $P_{Xe/X}$: <**(X)V**, -, (X)Vsasuru, (X)Vta, (X)VN/(X)VraN>

b. P_V: <**XV**, -, **XV**sasuru, **XV**ta, **XV**N/**XV**raN>

c. If $P_{Xe/X}$ is leveled by P_V, the leveled pattern $P_{Xe/X-by-V}$ would be <**(X)V**, -, **(X)V**sasuru, **(X)V**ta, **(X)V**N/**(X)V**raN>, e.g., <tabe, -, tabesasuru, tabeta, tabeN/taberaN>

d. The differences (Δs) of $P_{Xe/X-by-V}$ from $P_{Xe/X}$ is <**(X)V** - **(X)V**, -, **(X)V**sasuru - (X)Vsasuru, **(X)V**ta - (X)Vta, **(X)V**N/**(X)V**raN - (X)VN/(X)VraN> = <0, -, 0, 0, 0/0>. Therefore, the sum of Δs = 0/0.

(5) a. (= (4a)) $P_{Xe/X}$: <**(X)V**, -, (X)Vsasuru, (X)Vta, (X)VN/(X)VraN>

b. P_C <**XCV**$_1$, -, **XC**$\underline{V_2 suru}$, **XC**$\underline{(V_1)ta}$, **XC**$\underline{V_2 N}$>[2]

c. If $P_{Xe/X}$ is leveled by P_C, the leveled pattern $P_{Xe/X-by-C}$ would be <**(X)V**$_1$, -, **(X)**$\underline{V_2 suru}$, **(X)**$\underline{(V_1)ta}$, **(X)**$\underline{V_2 N}$>, e.g., <tabe, -, tabasuru, tabta [tanda], tabaN>

d. The differences (Δs) of $P_{Xe/X-by-C}$ from $P_{Xe/X}$ are <**(X)V**$_1$ - **(X)V**, -, **(X)**$\underline{V_2 suru}$ - (X)Vsasuru, **(X)**$\underline{(V_1)ta}$ - (X)Vta, **(X)**$\underline{V_2 N}$ - (X)VN/(X)VraN>, i.e., <0, -, 3, 2, 1/3>. Therefore, the sum of Δs = 6/8.

[2] If the consonant C of **XC**$\underline{(V_1)ta}$ is /b/, the form will be **XC**$\underline{ta}$, or **Xb**$\underline{ta}$, which phonetically realizes itself as [Xnda].

- Given a form of a target paradigmatic prosodic pattern for leveling, language may allow only its prosodic structure of consonants and vowels to be leveled.

(6) a. Prosodic Pattern Leveling (PPL): Assign one violation mark to a paradigmatic prosodic pattern P_T if one form of the pattern P_T differs in prosodic structures of C and V from its leveled counterpart of the leveled pattern by another pattern P_L, P_{T-by-L}.

b. {AffSub $\gg$ PM $\gg$ PPL $\gg$ UE}, DomAlt

- The leveled nonpast forms of the (X)*e*/(X) stem verbs by the paradigmatic prosodic pattern of the V-final stem verbs is:
- computed as Z by the analogy (7a).

(7) a. XV : XVru (of P_V) = (X)V : Z (of $P_{Xe/X}$)

b. Z = (X)V*ru*

c. The leveled paradigmatic prosodic pattern$_{Xe/X-by-V}$ would be <**(X)V**, **(X)V**ru, **(X)V**sasuru, **(X)V**ta, **(X)V**N/**(X)V**raN>, e.g., <tabe, taberu, tabesasuru, tabeta, tabeN/taberaN>.

(8) a. An abstracted leveled paradigmatic prosodic pattern $P_{Xe/X-by-V}$: <(X)V_1, (X) $\underline{V_2}$ru, (X)V_1sasuru, (X)V_1ta, (X)V_1N/(X)V_1raN>

b. For example, <tabe, tab$\underline{V_2}$ru, tabesasuru, tabeta, tabeN/taberaN>

- The variable V_2 has the quality abstracted away from the vowel V_1, or /e/, and can be instantiated by any vowel.

- The paradigmatic prosodic pattern <(X)e, (X)uru, (X)esasuru, (X)eta, (X)eN/(X)eraN> does not violate PPL (6a), whereas the pattern with its nonpast form (X)u violates the constraint, as in Tableaux 5a.

Tableau 5a: Some M-form instantiates leveled PP

		[1]	[2]	**[3]**	[4]	[5]
/(X)(e)+{u, ru, uru}/*nonpast*						
☞	a. (X)+uru				*	
	b. *(X)+u			*!	*	
/{C, CV}+{u, ru, uru}/*nonpast*						
☞	a. C+uru			/*		
	b. *C+u		*!	*/		
	c. CV+ru	*!		/*	*	

[1]: AffSub, [2]: PM, [3]: PPL, [4]: UE, [5]: DomAlt

Tableau 5b: Some M-form instantiates leveled PP

		[1]	[2]	**[3]**	[4]	[5]
/...C+{u, ru, uru}/*nonpast*						
☞	a. ...Cu					
	b. *...Curu					*!

[1]: AffSub, [2]: PM, [3]: PPL, [4]: UE, [5]: DomAlt

- See Appendix II for an implication of the leveling to differentiating forms without the qualities of vowels and consonants.

- If Prosodic Pattern Leveling constraint were not ranked high, the nonpast forms of the (X)*e*/(X) stem verbs, X*uru* cf. *X*u*, could not be explained.
- The both candidates X*u* and X*uru* equally violate UE.
- The candidate X*uru* furthermore violates DomAlt.
– Because the candidate X*u* is not less optimal than X*uru* under the constraints ranked higher than the DomAlt constraint.
- It would be incorrectly predicted that the nonpast forms of the (X)*e*/(X) stem verbs is *X*u*, but not X*uru*.

- In OT, all constraints are universal and violable, and for any constraint, the higher it is ranked, the larger is its effect.
- The prosodic minimality constraint PM outranks the prosodic pattern leveling constraint PPL (as in Tableaux 5a, b).
- For the nonpast forms of the C/CV stem verbs, whichever stem paired with the default affix allomorph, C$\underline{u}$, violates the minimality constraint, being one mora.

- Because of the higher ranking of PM, the affix allomorph that pairs with the stems of the C/CV stem verbs is determined on the alternative allomorph *-uru* prior to the effect of the lowerer ranked leveling constraint.

– The non past forms C*uru* are bimoraic, and does not violate the minimality.

– They do not violate DomAlt, either.

- The paradigmatic prosodic pattern P_C <Ci, Curu, Casuru, C(V)ta, CaN> is optimal rather than PP_C <Ci, Cu, Casuru, C(V)ta, CaN>.[3]

[3] See Koga (2012) for explaining the causative and negative forms CV*sasuru* as opposed to *C*asuru* and CV*N* as opposed to *C*aN*.

- The effect of the prosodic pattern leveling constraint for the C/CV stem verbs is immaterial.
- See Appendix III for the PPL's effect in the case of the C/CV stem verbs.

- The paradigmatic pattern of the X*e*/X stem verbs is a complex of a consonant-final verb stem X plus that of the 'potential' verb without the meaning of potential.
- <Xe, Xuru, Xesasuru, Xeta, XeN/XeraN> (where X is, for example, /tab/, /kaj/)
= <X, X, X, X, X/X> + the paradigm of the 'potential' verb <e, (j)uru, esasuru, eta, eN/eraN>
- The nonpast form of the 'potential' verb without the meaning of potential as the nonpast allomorph /-uru/ independently pairs with the shorter stem of each of the C/CV stem verbs and the verbs of one Chinese character plus /s/ (e.g., /ai-s/ 'love').

- Without the allomorph analysis, it would be difficult to explain why the final /ru/ cannot phonetically realize itself as the latter half of the lengthened vowel if and only if the verb is an X*e*/X stem verb, as in *[tabu:] (/taburu/) 'eat-nonpast' (Koga 2023), a C/CV stem verb, as in *[ku:] (/kuru/) 'come-nonpast' (Koga 2023), or a verb of one Chinese character plus /s/, as in *[aisu:] (/aisuru/) 'love-nonpast' (Koga 2019), in contrast with the vowel stem verbs and the /r/-final stem verbs like [oki:] (/okiru/) 'wake up' and [to:] (/toru/) 'take'.
- The paradigmatic pattern of the verbs of one Chinese character plus /s/is <CCsi, CCsuru, CCsasuru, CCsita, CCsaN> like <aisi, aisuru (archaic form aisu), aisasuru, aisita, aisaN>.

- If we see the obtained optimal nonpast forms in the paradigms, the target paradigmatic pattern and the leveling paradigmatic pattern become even more similar.
– First, they interact since they are similar.
– Second, the target verb forms of the same morphosyntactic property must be the same in terms of the prosodic structures.
- In the affix allomorphy of the dialect, the paradigmatic prosodic pattern of the V-final stem verbs and that of the X*e*/X-stem verb are the same apart from their nonpast forms.
- By the leveling, the patterns of their nonpast forms become the same.
- Therefore, their paradigmatic prosodic patterns are the same, as in (9), as exemplified in (10).

(9) $<\mathrm{n}\times\mu_{adverbial}$, $(\mathrm{n}+1)\times\mu_{nonpast}$, $(\mathrm{n}+3)\times\mu_{causative}$, $(\mathrm{n}+1)\times\mu_{past}$, $\overline{(\mathrm{n}+1)\times\mu/(\mathrm{n}+2)\times\mu}>$,
where $\mathrm{n}\times\mu$ indicates *n*-occurrences of a mora μ.

(10) a. $<\mu$, $\underline{\mu\mu}$, $\mu\mu\mu\mu$, $\mu\mu$, $\mu\mu/\mu\mu\mu>$ if n $= 1$, (e.g., X*e*/X-stem verb /n(e)/, V-final stem verb /mi/)

b. $<\mu\mu$, $\underline{\mu\mu\mu}$, $\mu\mu\mu\mu\mu$, $\mu\mu\mu$, $\mu\mu\mu/\mu\mu\mu\mu>$ if n $= 2$, (e.g., X*e*/X-stem verb /tab(e)/, V-final stem verb /oki/)

c. $<\mu\mu\mu$, $\underline{\mu\mu\mu\mu}$, $\mu\mu\mu\mu\mu\mu$, $\mu\mu\mu\mu$, $\mu\mu\mu\mu/\mu\mu\mu\mu\mu>$ if n $= 3$, (e.g., X*e*/X-stem verb /sodat(e)/, V-final stem verb /sinzi/),

and so on.

- If which verb is relevant in the context is known, the native speaker can guess the verb form only from the number of the moras in conjunction with its unique pitch fall even if the qualities of the vowels or consonants are not audible enough.

- It cannot be decided which levels $P_{C/CV}$ between P_V and P_C because it is not decisive whether which is more similar to $P_{C/CV}$ between P_V and P_C.
- The value on the left of the thrush in Tableau 5a is one if V-final pattern is considered more similar to the C/CV pattern, and the value on the right is one if C-final pattern is considered more similar to the C/CV pattern.

(11) a. $P_{C/CV}$: <**CV_1**, -, CV_2sasuru, CV_1ta, CV_2N>, e.g., <ki, -, kosasuru, kita, koN>

b. P_V: <**XV**, -, **XV**sasuru, **XV**ta, **XV**N/**XV**raN>, e.g., <oki, -, okisasuru, okita, okiN/okiraN>

c. If $P_{C/CV}$ is leveled by P_V, the leveled paradigmatic prosodic pattern$_{C/CV-by-V}$ would be <**CV_1**, -, **CV_1**sasuru, **CV_1**ta, **CV_1**N/**CV_1**raN>, e.g., <ki, -, kisasuru, kita, kiN/kiraN>

d. The differences (Δs) of $P_{C/CV-by-V}$ from $P_{C/CV}$ is <CV_1 - CV_1, -, CV_1sasuru - CV_2sasuru, CV_1ta - CV_1ta, CV_1N/CV_1raN - CV_2N> = <0, -, 1, 0, 1/4>. Therefore, the sum of Δs = 2 or 5.

(12) a. $P_{C/CV}$: <**CV_1**, -, CV_2sasuru, CV_1ta, CV_2N>, e.g., <ki, -, kosasuru, kita, koN>

b. P_C: <**...CV_1**, -, **...C**asuru, **...C(V_1)**ta, **...C**aN>, e.g., <kaki, -, kakasuru, kaita, kakaN>

c. If $P_{C/CV}$ is leveled by P_C, the leveled paradigmatic prosodic pattern$_{C/CV-by-C}$ would be <CV, -, Casuru, CVta, CaN>, e.g., <ki, -, kasuru, kita, kaN>

d. The differences (Δs) of $P_{C/CV-by-C}$ from $P_{C/CV}$: <CV - CV_1, -, Casuru - CV_2sasuru, CVta - CV_1ta, CaN - CV_2N> = <0, -, 3, 0, 1>. Therefore, the sum of Δs = 4.

- If the differences (Δs) of $P_{C/CV-by-V}$ from $P_{C/CV}$ is considered to be two, then P_V levels $P_{C/CV}$.
- Then, the nonpast form of the leveled pattern of the C/CV stem verbs would be /Ciru/ or $\mu\mu$, as computed below.

(13) a. $XV_1 : XV_1ru$ (of P_V) = Ci : Z (of $P_{C/CV}$)

b. Z = C*iru*

c. The leveled paradigmatic prosodic pattern $P_{C/CV-by-V}$ is <Ci, Ciru, Cisasuru, Cita, CiN/CiraN>, for example, <ki, kiru, kisasuru, kita, kiN/kiraN>.

d. The prosodically abstracted leveled pattern $P_{C/CV-by-V}$ is $< \mu, \mu\mu, \mu\mu\mu\mu, \mu\mu, \mu\mu/\mu\mu\mu >$.

- If the differences (Δs) of $P_{C/CV-by-C}$ from $P_{C/CV}$ is considered to be five, then P_C levels $P_{C/CV}$.
- Then, the nonpast form of the leveled paradigmatic prosodic pattern of the C/CV stem verbs would be /Cu/ or μ, as computed below.

(14) a. ...Ci : ...Cu (of P_C) = ...Ci : Z (of $P_{C/CV}$)

b. Z = C*u*

c. The leveled paradigmatic prosodic pattern $P_{C/CV-by-C}$ is <Ci, C<u>u</u>, Casuru, CVta, CaN>, for example, <ki, k<u>u</u>, kasuru, kita, kaN>

d. The prosodically abstracted leveled paradigmatic prosodic pattern $P_{C/CV-by-C}$ is $< \mu, \mu, \mu\mu\mu, \mu\mu, \mu\mu >$.

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