Leveling among Patterns of Prosodic Structures of Paradigms for Affix Allomorphy

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This paper addresses the nonpast affix allomorphy of the Ariake Saga dialect of Japanese, spoken in the area near the coast of the Ariake Sea, and proposes an account using the framework of Optimality Theory by adopting Zodak and Bat-El's (2015) proposal of similarity in leveling. The account predicts and explains leveling and affix allomorphy, that is, the restriction of morphologically well-formed forms to prosodically well-formed ones.

1 Data

There are three nonpast affix allomorphs; two are the default and one is the alternative. There are four verb stem types, and the question is which allomorph pairs with which stem:

(1) Affix allomorphs and stem types
   a. Nonpast affix allomorphs; *-(r)u* (default), *-uru* (alternative) (Koga, 2023)
   b. Verb stem types: C-final (e.g., *tor* 'take', *kir* 'cut', *kaer* 'go home', *sur* 'rub')
      (X)*e*/(X) (e.g., *tabe/tab* 'eat', *kae/ka* 'change')
      V-final (e.g., *oki* 'get up', *ki* 'wear')
      C/CV (*k/ko* 'come', *s/se* 'do')

2 Relevant Accounts

Tableau 1: Predictions

		AffSub	PM	UE	DomAlt
/{C, CV} + {u, ru, uru}/$_{Nonpast}$					
☞	a. Curu				
	b. Cu		*!		
	c. CVru	*!		*	
/...C + {u, ru, uru}/$_{nonpast}$					
☞	a. ...Cu				
	b. ...Curu				*!
/{(X)*e*,(X)} + {u, ru, uru}/$_{nonpast}$					
☞	a. (X)u			*	
	b. (X)uru			*	*!
	c. (X)eru	*!			

The constraints of prosodic minimality (PM), McCarthy and Prince's (1993:117) stem domain of alternative allomorphs (DomAlt), and the affix subcategorization (AffSub) with the ranking of {AffSub ≫ PM} and DomAlt along with Stump's (2016:77) stem function can explain some of the data, as in Tableau 1. PM, which prohibits words *smaller* than one binary moraic foot, explains the pairing of *k* + *uru* 'come + nonpast' over **k* + *u* (the upper part of the tableau). The subcategorization constraint states that the shorter stem alternant is selected by the nonpast affix. The domain constraint states that the prosodic stem domain of the alternative is the complement of that of the default. In effect, the alternative /-uru/ parses the stem prosodically if and only if the default /-(r)u/ cannot do so, which explains the pairing of *kak* + *u* 'write + nonpast' over **kak* + *uru* (the middle part). In contrast, the nonpast forms of the (X)*e*/(X) stem verbs, as in the paradigm <tabe$_{adverbial}$, tab + uru$_{nonpast}$/**tab* + *u*, tabe + ta$_{past}$, tabe + N/tabe + raN$_{negative}$>, cannot be explained even by adding such an existing constraint among the stems or affix' of the forms of paradigms as Uniform Exponence (UE) as in the

ranking of {PM ≫ UE} in Tableau 1. The candidate /taburu/ violates the constraint DomAlt whichever the default or basic stem is assumed to be between /tab/ and /tabe/. For example, if /tabe/ is the default stem or the uniform exponence of the stem of the lexeme, the candidates /tabu/ and /taburu/ equally violate UE, as in the lower part of the tableau. The candidate /taburu/ violates DomAlt because the affix alternative is not motivated for the nonpast form of /tab(e)/ because the candidate /tabu/ is not less optimal than /taburu/ except for the computation of the constraint DomAlt. This problem motivates leveling among paradigmatic patterns (or inflectional classes) (Garrett, 2008). Zodak and Bat-El's (2015) theory of leveling among inflectional classes of the Hebrew verb system incorrectly predicts the affix allomorphy of the Japanese dialect. This is because the directionality of leveling is determined by the numbers of the members (the lexical frequencies) of the inflectional classes in their theory. The number of the C-final stem verbs is 56% of the total in the Tokyo dialect in Japanese textbooks, that of V(e)-final stem verbs is 19%, that of the *s/si* stem verbs is 19%, that of the V(i)-final stem verbs is 0.04%, and that of the *k/ko* stem verbs is 0.02%.[1] According to Zodak and Bat-El's (2015) directionality analysis, if the paradigmatic patterns of the (X)*e*/(X) stem and V-final stem verbs are similar, as researchers will claim below, the directionality of leveling should be from the (X)*e*/(X) stem verbs to the V-final stem verbs. If this were the case, the paradigmatic pattern of the V-final stem verbs would become as complicated as that of the (X)*e*/(X) stem verbs, as derived in (2c) from (2a) and (2b). In fact, this is not the case.

(2) a. PP_V: <(X)V, (X)Vru, (X)Vsasuru, (X)Vta, XVraN/(X)VN>, e.g., <oki, oki + ru, oki + ta, oki + N/oki + raN>

b. $PP_{Xe/X}$: <(X)V, (X)uru, (X)Vsasuru, (X)Vta, (X)VraN/(X)VN>

c. $PP_{V-by-Xe/X}$: *<(X)V, *(X)uru, (X)Vsasuru, (X)Vta, XVraN/(X)VN>, e.g., *<oki, *ok + uru, oki + ta, oki + N/oki + raN>

3 Proposal

The author's proposal of directionality and similarity scale is detailed below.

(3) a. The directionality of leveling is from a paradigmatic pattern without stem alternation to one with stem alternations.

b. 'The more similar the inflectional classes [or paradigmatic patterns] are, the more likely they are to interact in inter-paradigm leveling' [brackets are mine]. (Zodak and Bat-El, 2015: 275)

c. The ranking for directionality is Stem Alternation constraint (3a) ≫ Similarity constraint (3b) ≫ Zodak and Bat-El's (2015) Lexical Frequency constraint.

d. The degree of similarity between the candidate paradigmatic pattern in question, PP_Q, and a leveling pattern, PP_L, is indicated by the sum of the differences between each leveled form of the leveled pattern by the leveling one PP_{Q-by-L} and its corresponding candidate form of the candidate pattern PP_Q.

The constraint (3a) confirms Albright's (2005) finding that a pattern of non-alternation is extended in leveling. For the computation of the degree of similarity between two paradigmatic patterns, the four-place analogy is applied to Albright's (2005) derivation of forms from base forms in the clause (3b): 1) identify a derivational rule that derives a form of a morpho-syntactic property from the base form of the leveling paradigmatic pattern and 2) apply the rule to the

[1] The author assumes that the lexical frequencies of the stem type verbs in Japanese textbooks may not be vastly different from the type and token frequencies of the verbs of the four classes in daily conversations.

base form of the paradigmatic pattern in question to derive the counterpart form. It does not matter which verb forms are assumed to be the base forms, as will be discussed later. The difference between an actual 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. Predictions of Which Paradigmatic Pattern Levels Another: By Stem Alternation constraint (3a), the leveling paradigmatic pattern of that of the (X)*e*/(X) stem verbs is either that of the V-final stem verbs or the C-final stem verbs because only the V-final and C-final stem verbs have no stem alternation among the four types, as can be seen in stem patterns given for each in (1). Employing Zodak and Bat-El's (2015: 275) similarity analysis, the paradigmatic pattern PP_L to level a pattern in question PP_Q is the one in which the sum of the differences between (each leveled form of) the leveled pattern by the leveling one PP_{Q-by-L} and (its corresponding candidate form of) the candidate pattern PP_Q is the least. The paradigmatic pattern PP_V (2a) is preferred to pattern PP_C <XCi, XCu, XCasuru, XC(i)ta, XCaN> for the leveling pattern of $PP_{Xe/X}$ (2b). PP_V, of which the nonpast forms are not considered, is more similar to or precisely the same as $PP_{Xe/X}$ than PP_C is. As the form patterns of $PP_{Xe/X}$ and the corresponding form patterns of PP_V are the same, the sum of the differences of the forms in $PP_{Xe/X-by-V}$ from their counterparts in $PP_{Xe/X}$ is computed as 0/0. Conversely, the sum of the differences of the forms of $PP_{Xe/X-by-C}$ (4a) from the corresponding forms of $PP_{Xe/X}$ is computed as 8/6, as below and the differences computed in (4b).

(4) a. If PP_C leveled $PP_{Xe/X}$, the leveled paradigmatic pattern$_{Xe/X-by-C}$ would be <(X)V, -, (X)asuru, (X)(V)ta, (X)aN>.

b. The differences of $PP_{Xe/X-by-C}$ from $PP_{Xe/X}$ are <(X)V - (X)V, -, (X)asuru - (X)Vsasuru, X(V)ta - (X)Vta, (X)aN - (X)VraN/(X)eN >, i.e., <0, -, 3, 2, 3/1>

The leveled causative form of the (X)*e*/(X) stem verbs, for example, is X*asuru* using a four (*4*)-place analogy for the C-final stem verbs and the (X)*e*/(X) stem verbs, for Z, (X)V : (X)*asuru* = (X)V : Z because the causative form is derived by concatenating /asuru/ at the end of the adverbial form with the last vowel absent. The difference of the leveled form from the actual form, for example, is (X)V*sasuru* minus (X)*asuru*, or V*s*, or a vowel and a consonant, or $2+1 = 3$. The sum of the differences of the leveled forms from the actual counterparts is $3+2+3/1 = 8/6$. If the base forms are assumed to be causative forms, for example, the prediction holds true that PP_V is more similar than or precisely the same as $PP_{Xe/X}$ than PP_C is. The leveled paradigmatic pattern$_{Xe/X-by-C}$ will be <(X)Vsi, -, (X)Vsasuru, (X)Vs(i)ta, (X)VsaN>. Even with this assumption, because the form patterns of $PP_{Xe/X}$ and corresponding form patterns of PP_V are the same, the sum of the differences of the forms in $PP_{Xe/X-by-V}$ from their counterparts in $PP_{Xe/X}$ is computed as 0/0. The differences of the forms of $PP_{Xe/X-by-C}$ from those of $PP_{Xe/X}$ are <(X)Vsi - (X)V, -, (X)Vsasuru - (X)Vsasuru, XVs(i)ta - (X)Vta, (X)VsaN - (X)VraN/(X)eN >, <0, -, 3, 3, 3/0>; the sum is 9/6. Predictions of What is the Leveled Form: Because PP_V levels $PP_{Xe/X}$, the leveled nonpast form of the (X)*e*/(X) stem verbs is computed as Z by the analogy (X)V : (X)Vru = (X)V : Z, or (X)V*ru*. The leveled paradigm is <(X)V, (X)Vru, (X)Vsasuru, (X)Vta, (X)VraN/(X)VN>, for example, <tabe, taberu, tabesasuru, tabeta, taberaN/tabeN>. If vowel quality is abstracted or the leveling is only of prosodic structure, the prosodic-structure (PS)-leveled paradigm pattern will be <(X)V_1, (X)V_2ru, (X)V_1sasuru, (X)V_1ta, (X)V_1raN/(X)eN>. By leveling between paradigmatic patterns, an abstract paradigmatic pattern is created to subsume the previous two similar but parallel and independent paradigmatic patterns.

Leveling Constraint and Predictions: More than one form pattern may be morphologically well-formed in some cell of a paradigmatic pattern with stem alternation. The constraint (5a) (PS-L) excludes this type of paradigmatic pattern with stem alternation if it is not prosodically leveled by another paradigmatic pattern, specifically one without stem alternation.

(5) a. Leveling in Prosodic Structure (PS-L): Assign one violation mark to a paradigmatic pattern PP_Q if one form pattern of the paradigmatic pattern PP_Q differs from the counterpart of its leveled paradigmatic pattern by another paradigmatic pattern PP_L, PP_{Q-by-L}.

b. {AffSub ≫ PM ≫ PS-L ≫ UE}, DomAlt

Tableau 2: Predictions

		AffSub	PM	PS-L	UE	DomAlt
/(X)(e) + {u, ru, uru}/$_{nonpast}$						
☞	a. (X)uru				*	
	b. (X)u			*!	*	
	c. (X)eru	*!				
/{C, CV} + {u, ru, uru}/$_{nonpast}$						
☞	a. Curu			*		
	b. Cu		*!			
	c. CVru	*!		*	*	

If constraint PS-L is added to the plausible existing constraints with the ranking of the constraint between PM and UE as in (5b), they will make correct predictions for all affixal phenomena, for example, the nonpast forms of the (X)*e*/(X) stem verbs and those of the C/CV stem verbs, as in the upper and lower parts of Tableau 2. The candidate nonpast form (X)*eru* violates the subcategorization of the nonpast affix (AffSub) because the nonpast affix selects shorter stem alternants, or (X), but not (X)*e*. The candidate (X)*u* does not follow the pattern (X)V_2*ru*, thereby violating the PS-L constraint, whereas the candidate (X)*uru* follows the pattern. Therefore, the candidate (X)*uru* is optimal. The paradigmatic pattern with the nonpast form pattern, <(X)V_1, (X)V_2ru, (X)V_1sasuru, (X)V_1ta, (X)V_1raN/(X)eN>, is optimal. For example, the paradigm <tabe, taburu, tabesasuru, tabeta, tabeN/taberaN> is optimal. The leveling constraint PS-L is not crucial for the prediction of the optimal nonpast forms for the C/CV stem verb. In OT, all constraints are violable, and for any constraint, the higher it is ranked, the larger is its effect. Because the minimality constraint PM outranks the leveling constraint PS-L, the effect of the minimality constraint, *Curu* and **Cu*, has a higher priority than that of the leveling constraint, *Cu* and **Curu* does. Thus, the constraints and ranking with the leveling constraint make the same prediction as those without the leveling constraint in the case of the C/CV stem verbs, such as in the upper part of the tableau.

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