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On the Vowel Augmentation of *Nigo-gana* in *Manyoshu*[1]

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1. Introduction

This study aims to explore the phonological grammar of Old Japanese around the 7th and 8th centuries—particularly the rules governing vowel augmentation in syllabification—by observing and analyzing the second vowel in *nigo-gana* found in the *waka* poems of *Manyoshu*, which was compiled during the Nara period. The second vowel in *nigo-gana* does not correspond to any sound in the original pronunciation of Chinese characters and is generally augmented when used to describe Japanese texts. However, this augmentation exhibits a noteworthy bias, which can plausibly be attributable to the influence of phonological grammar. This study analyzes this phenomenon based on the framework of Optimality Theory (OT; Prince & Smolensky 1993, McCarthy & Prince 1995) and argues that it offers significant insight into the phonological grammar of Japanese speakers during this period.

1.1 Overview of *Nigo-gana*

Nigo-gana is a specific type of *manyo-gana*, wherein a Chinese character with a closed syllable is used to indicate two open syllables by adding or augmenting a vowel after its final consonant. The following are examples of *nigo-gana* forms

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appearing in the text of *waka* poems in *Manyoshu*:

(1) Examples of *Nigo-gana* in *Manyoshu*

a. 塔：tap → tapu　*絶塔浪尓*　*たゆたふなみに*　"on swaying waves"　Vol. 7, No. 1089
b. 越：wot → woti　*越乞尓*　*をちこちに*　"here and there"　Vol. 6, No. 920
c. 極：kok → koko　*極太甚*　*ここだはなはだ*　"extremely badly"　Vol. 11, No. 2400
d. 南：nam → namu　*和加礼南*　*わかれなむ*　"will be separated"　Vol. 5, No. 891
e. 君：kun → kuni　*嶋栖名君*　*しまならなくに*　"be not an island"　Vol. 12, No. 3166
f. 鍾：siŋ → sigu　*鍾礼乃雨丹*　*しぐれのあめに*　"in a drizzle"　Vol. 12, No. 3213

For example, in the word 鍾礼 /sigure/ "drizzle" in (1f), which appears 13 times throughout *Manyoshu*, the reading of the first character 鍾 is /sigu/, but its second vowel /u/ does not have any correspondence in the original pronunciation in Middle-Old Chinese. Therefore, assumedly, the second vowel was augmented when this character was adopted or read as a description of the first two syllables.

　Nigo-gana accounts for only 0.24% of the total number of characters in the text of the *waka* poems in *Manyoshu*, rendering it an exceptional type of *manyo-gana*. Further, 76 different Chinese characters are identified, representing 316 occurrences. As Section 2 examines, a significant bias exists concerning the second vowel; specifically, the high vowels /i, u/ account for the majority, as highlighted in previous studies (Ohno 1962, Okimori 2000, Oyama 2007, 2019).

1.2 Phonological Analysis of *Nigo-gana* and its Difficulty
The bias of the second vowel of *nigo-gana* in *Manyoshu* should be interpreted as reflecting the pronunciation of Chinese characters by Japanese speakers during the compilation, suggesting the existence of a phonological grammar underlying these patterns. If the original sounds of the Chinese characters were the only significant phonological factor, and the second vowel's quality could be arbitrarily selected to align with the phonological structure of the poems, such a bias would likely not occur. However, considering the pronounced bias and whether it is attributable to phonological grammar, it can be reasonably assumed that a set of possible phonological patterns for Chinese characters,

regulated by the period's phonological grammar, existed before the application of *nigo-gana*. Within these patterns, *nigo-gana* was used to inscribe the text of the *waka* poems.

However, noteworthily, this study does not directly observe the phonological phenomena of Old Japanese during this period. Specifically, *nigo-gana* does not indicate "how Chinese characters were pronounced" but rather "which Chinese characters were acceptable as representations of the pronunciations of preexisting words." Thus, the extent to which phonological grammar was reflected in the vowel selection remains unclear. Additionally, *Manyoshu* as a textual corpus should be understood as a compilation of *waka* poems collected over an extended period and through various processes, reflecting a considerable range of styles and preferences of scribes and editors, as well as varying levels of knowledge regarding the Chinese language, characters, and their original pronunciations. Additionally, the accuracy of the interpretations of the poem representations used herein is not guaranteed.

Although such uncertainties indubitably exist across multiple dimensions, *Manyoshu* represents the most comprehensive resource available for exploring the phonological grammar of Old Japanese, characterized by its open syllable structure. To explore novel research possibilities, conducting an analysis to the extent possible within the available data's constraints is worthwhile.

2．Biased Distribution of *Nigo-gana*

2.1 Biases in Augmented Vowels

This study analyzes and elucidates the bias in the second vowel of *nigo-gana* —caused by specific phonological conditions. In the subsequent analysis, the consonants and vowels comprising the phonological structure of *nigo-gana* (CVCV) are labeled as C1, V1, C2, and V2, respectively. In some cases, C1 is absent. As argued in 1.1, V2 does not correspond to the original phonological structure of Chinese characters but is, instead, an augmentation introduced in the *nigo-gana* form.[2]

Table (2) classifies the Chinese characters used as *nigo-gana* in the text of

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2) The distinctions between *ko-rui* and *otsu-rui* for /i/, /e/, and /o/ remain unclear, particularly regarding their phonetic characteristics and realizations in *nigo-gana* forms. Therefore, I exclude these distinctions from this study's scope of analysis.

the *waka* poems of *Manyoshu* according to the combinations of C2 and V2, as elucidated below.

(2)　*Nigo-gana* in *Manyoshu*: C2 ＼ V2

C2＼V2	i	e	a	o	u	# of characters	Total Occurance
p	(雑匝) 2/2				(颯塔騰) 3/3	5	5
m	南(瞻) 2/4				**兼南濫**甘監険三点覧(敢金今念藍廉) 15/106	17	110
t	**越**乞(壱) 3/15			越 1/3	蕎薩 2/5	6	23
n	**難**君万散遍干(漢丹弾粉丸) 11/57	(雲) 1/1	信 1/6		敏(讃珍) 3/6	16	70
r	群(信篇) 3/4				駿 1/6	4	10
k	式色伯(拭築) 5/9		(積楽) 2/2	極(徳) 2/3	**筑**各叔幕莫楽落(福目託憶作) 12/52	21	66
g	当 1/8		相 1/3	凝(極香) 3/5	**鍾**香 2/16	7	32
# of characters	27	1	4	6	38	76	
Total Occurance	99	1	11	11	194		316

The numbers in each cell indicate the number of distinct Chinese characters and their total occurrences. Bold font represents characters with a total occurrence of 10 or more, while those appearing only once are enclosed in parentheses. The red text highlights the instances wherein V1 and V2 are identical. Each cell's shading intensity corresponds to the total occurrences.

As mentioned earlier, the augmented V2 is predominantly the high vowel /i/ or /u/, and as Table (2) indicates, they account for approximately 86% and 93% of the characters and total occurrences, respectively, with /u/ being the more dominant of the two. As Okimori (2000) argues, these vowels follow the universal

tendency of being more likely to be selected as inserted vowels because of their relatively low sonority. While the phonetic and phonological reasons remain unclear, the low vowel /a/—exhibiting the highest sonority—is notably prevalent in the V1 position of *nigo-gana* forms, accounting for approximately 47% of both the number of characters and total occurrences. In this regard, the phonological structure of *nigo-gana* forms typically exhibits a significant difference in sonority between V1 and V2, thus rendering V2 less perceptible.

Concerning the relationship between C2 and V2 in Table (2), /u/ is frequently augmented after /m/ and /k/, while /i/ is overwhelmingly common after /n/. This tendency largely holds even when extended to labial (/p, m/), alveolar (/t, n, r/), and velar (/k, g, (ŋ)/) sounds, with approximately 64% and 80% of characters and total occurrences, respectively, following this pattern. This bias suggests underlying phonological rules, whereby the high back vowel/u/ is the default vowel for insertion, while the high front vowel /i/ is selected after the alveolar sounds owing to the place of articulation of the consonants.

11 characters (23 occurrences in total) have vowels other than the high vowels augmented as V2. Of these, 8 characters (15 occurrences in total) involve V1 and V2 being identical. Given the data imbalance, these cases can be considered copies of V1 rather than the insertion of a new vowel for re-syllabification that is coincidentally identical to V1. Structures wherein V1 is copied can be found for /i, u, a, o/ but, interestingly, not for /e/. Additionally, when C2 is /k/, most cases (7 characters and 11 occurrences in total) wherein a vowel other than /u/ is augmented involve V1 and V2 being identical, with only 2 characters (3 occurrences in total) deviating from this pattern. While this "V1 = V2" pattern could be interpreted as an instance of vowel harmony, no evidence suggests that it was actively employed in a manner that suppressed the augmentation of other vowels.

Overall, the vowels augmented in *nigo-gana* forms should be regarded as being governed by a clear phonological grammar for vowel insertion. As observed, the augmented vowels are predominantly the high vowels /i, u/, or vowels identical to V1, both of which are phonologically motivated. Additionally, the choice between /i/ and /u/ is influenced by the preceding consonant's place of articulation. Throughout *Manyoshu*, cases deviating from

these patterns are limited to 3 of 76 characters— 信 /sina/, 雲 /une/, and 香 /kago/—appearing a total of 8 times. Among these, only 信 /sina/ occurs multiple times, all as the first character of the place name 信濃 /sinano, sinanu/, which appears 6 times. Moreover, the other 2 characters appear in place names, suggesting that such atypical structures were more likely acceptable in the context of proper nouns.[3]

2.2 *Nigo-gana* in Each Volume of *Manyoshu*

This subsection examines the appearance of *nigo-gana* in each volume of *Manyoshu*. The tables below present the number of occurrences of *nigo-gana* in each volume categorized by the part of speech of the word containing *nigo-gana* and the quality of V2. The blue cells represent the volumes wherein the text of the *waka* poems is predominantly written using Japanese readings of Chinese characters, while the green cells indicate those primarily written using *manyo-gana*.

(3) *Nigo-gana* in each Volume

a. Categorized by the part of speech

Part of Sp.\Vol.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
Noun/Pronoun	0	3	4	2	0	2	5	9	0	6	3	3	13	0	0	1	0	0	0	0	51
Proper Noun	0	6	19	5	2	12	7	5	8	1	5	4	3	14	3	4	1	1	3	6	109
Verb/Adj./Adv.	1	0	4	0	0	1	5	0	0	1	11	1	4	0	0	0	0	0	0	0	28
Particle/Aux.	2	2	4	7	5	5	14	3	12	19	29	16	7	0	0	3	0	0	0	0	128
Total	3	11	31	14	7	20	31	17	20	27	48	24	27	14	3	8	1	1	3	6	316

b. Categorized by the quality of V2

V2\Vol.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Total
i	0	4	6	5	1	13	13	3	1	6	16	9	9	0	1	5	0	1	1	5	99
e	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
a	0	2	2	0	0	0	0	0	0	0	1	0	0	5	0	0	1	0	0	0	11
o	1	1	3	0	0	0	1	1	0	0	2	0	2	0	0	0	0	0	0	0	11
u	2	4	20	9	6	7	16	13	19	21	29	15	16	9	2	3	0	0	2	1	194
Total	3	11	31	14	7	20	31	17	20	27	48	24	27	14	3	8	1	1	3	6	316

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3) However, compared to *nigo-gana* forms in place names Motoori Norinaga analyzed in *Chimei Jion Tenyorei* (Diversion of Chinese Sounds in Place Names, Okimori 2007), those in *Manyoshu* exhibit phonologically natural structure overall. Whether this tendency arises from the text's poetic nature or is influenced by other factors including historical changes remains unclear.

These aggregations indicate that *nigo-gana* is primarily used in proper nouns and auxiliaries and that its occurrence varies significantly across volumes. Furthermore, in Vol. 14 and beyond (excluding Vol. 16), wherein the writing style of *Manyoshu* shifted significantly to a predominantly kana-based notation, *nigo-gana* was no longer used, except in proper nouns. The fact that V2 is primarily /i/ or /u/ remains unchanged, but examples wherein other vowels are augmented suggest that /o/ is not present at all and that /a/ is largely concentrated in Vol. 14—a collection of *Azumauta* (Eastern Songs).

These observations imply that by the time *Manyoshu* was ultimately compiled, *nigo-gana* had ceased to play a productive role as a writing style. However, it was still recognized as a valid form of notation within the text of *waka* poems. With time, only a limited number of words, such as some proper nouns, remained in a somewhat "fossilized" state, containing *nigo-gana*. Whether these changes were related to the phonological grammar of Japanese at the time is uncertain; however, the need to augment second vowels, with a certain degree of flexibility in choice, could be an undesirable structural feature in the records of literary works.

3. Vowel Augmentation by Constraint Interaction and Reranking

This section analyzes the augmentation of the second vowel in *nigo-gana*, as observed thus far, within a theoretical framework. Specifically, it demonstrates that the two vowel augmentation patterns previously discussed—namely, the augmentation of close vowels or that of vowels identical to V1—are closely related.

As discussed in 1.2, while *nigo-gana* itself cannot be directly considered a phonological phenomenon, the existence of clear phonological biases suggests that these biases must have arisen from factors within the phonological grammar of Japanese speakers during that era. Plausibly, *nigo-gana* closely corresponded to or was derived from the pronunciations of Chinese characters as interpreted by Japanese speakers. Thus, in the phonological system of Japanese during its open-syllable period, Chinese characters ending in consonants could not be pronounced as they were, necessitating some form of phonological adjustment. One such adjustment was the insertion of a vowel after the final consonant. As the inserted vowel did not correspond to any segment in the original Chinese pronunciation, it must have been determined

in principle by Japanese phonological grammar. These modified pronunciations, adjusted to fit the open-syllable structure, were likely repurposed as *nigo-gana* to describe Japanese sounds. This section examines the phonological grammar of Japanese at the time, which is believed to have influenced the development of *nigo-gana*.

3.1 Phonological Constraints and their Ranking

Within the framework of Optimality Theory (OT; Prince & Smolensky 1993, McCarthy & Prince 1995), which regards linguistic output structures as the result of interactions among universal constraints, accounting for the vowel augmentation phenomena underpinning the patterns exhibited by most *nigo-gana* in *Manyoshu* is straightforward.

The use of vowel augmentation to achieve open syllables indicates that the constraints prohibiting syllable-final consonants or their deletion assume precedence over those prohibiting the augmentation of vowels or specific vowel structures. Within the OT framework, such differences in constraint priorities are represented by rankings. Furthermore, the preference for the close vowels /i/ and /u/ as inserted vowels is attributable to the universal markedness constraint hierarchy based on sonority. The selection of close vowels, which are low in sonority and considered the least marked, aligns with universal tendencies in natural languages.

Vowel augmentation attained by copying V1 entails a violation of the faithfulness constraint that prohibits a one-to-many relationship between the input and output. When explaining this phenomenon similar to vowel harmony, assuming markedness constraints that require such harmonic structures is unnecessary. Instead, it can be explained solely through the dominance relations among the faithfulness constraints. An overview of the relevant constraints is provided below.

(4) Constraints

    a. NoCoda: Codas are prohibited (syllables are open).

    b. *LowVowel: Low vowels are prohibited.

    c. *MidVowel: Mid vowels are prohibited.

    d. *HighVowel: High vowels are prohibited.

    e. MAXIMALITY-IO(C): Every vowel in the input has a correspondent in the output (no consonant deletion).

    f. DEPENDENCY-IO(V): Every vowel in the output has a correspondent in the input (no vowel insertion).

    g. INTEGRITY-IO(V): No vowel in the input has multiple correspondents in the output (no vowel copy).

  (4a–d) are markedness constraints, which affect only the output structure. As Old Japanese during the period was an open-syllable language and did not allow the pronunciation of closed syllables as they were, NoCODA can be understood as inviolable. *LowVowel, *MidVowel, and *HighVowel are markedness constraints concerning the presence of vowels, with different constraints applied according to the vowel height. Cross-linguistically, vowels with greater openness and sonority are considered more marked, which can be explained by assuming that these constraints' ranking is universally fixed per the vowel heights.

  (4e–g) are faithfulness constraints, which prohibit differences between the corresponding structures at two distinct levels; this analysis examines structural changes from input to output. MAXIMALITY-IO(C) prohibits the deletion of consonants, and it can be considered inviolable, as argued above.[4] INTEGRITY-IO(V) and DEPENDENCY-IO(V) are faithfulness constraints, which prohibit structural mismatches of vowels between the input and output. Which of these constraints is violated determines which of the two vowel augmentation patterns will occur.

  This study posits that these constraints had the following ranking within Japanese grammar during the period when *nigo-gana* was used in *Manyoshu*.

 (5) Constraint Ranking

NoCODA, MAXIMALITY-IO(C) >> INTEGRITY-IO(V), DEPENDENCY-IO(V) >>

                                      *LowVowel >> *MidVowel >> *HighVowel

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  4) *Ryakuon-gana*, another type of *manyo-gana* contrasted with *nigo-gana*, can be regarded as creating an open-syllable structure through consonant deletion. However, unlike *nigo-gana*, the formation of *ryakuon-gana* assumedly has a weaker connection to phonological grammar (Nishimura 2024a, cf. Oyama 2007).

By assuming that the hierarchy between INTEGRITY-IO(V) and DEPENDENCY-IO(V) is undecided, as in (5), the two patterns of V2 augmentation in *nigo-gana* can be accurately predicted and licensed.

3.2 High-Vowel Insertion

High vowels are frequently augmented as the second vowel in *nigo-gana*, indicating that the insertion of an entirely new vowel into the original closed-syllable structure of Chinese characters was grammatical. Tableau (6) demonstrates that such output forms are selected as grammatical structures.

(6) High-Vowel Insertion: 南 nam → namu

/nam/	NoCoda	Max-IO(C)	Intg-IO(V)	Dep-IO(V)	*LV	*MV	*HV
a.　nam	*!				*		
b.　na		*!			*		
c.→namu				*	*		*
d.　namo				*	*	*!	
e.　nama			*!		**		

In a ranking where MAXIMALITY-IO(C) is placed at a high position, inserting a vowel in some form is necessary to achieve the syllabification for a CVC structure. In (5), wherein the relationship between INTEGRITY-IO(V) and DEPENDENCY-IO(V) is undecided, if the former dominates the latter, the violation of DEPENDENCY-IO(V) is evaluated as having the lowest cost, and inserting a vowel not present in the input structure is permitted. The inserted vowel —independent of the input structure—is not influenced by faithfulness constraints. Therefore, because of the universal ranking of markedness constraints concerning vowels, the candidate with the high vowel inserted (6c) is selected as the optimal output form.[5] Additionally, if the hierarchy between the two faithfulness constraints remains undecided, the inserted vowel's quality becomes the decisive factor. However, the result remains unchanged, with the

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5) The choice between the high vowels /i/ or /u/ can also be explained by assuming markedness constraints concerning the phonological sequence, which involve distinguishing the evaluation of C2V2 sequences. However, owing to the lack of clarity regarding the precise details of the individual segmental sounds, this paper refrains from providing specific explanations.

high vowel—the least marked—being chosen.

3.3 Copy of V1

The pattern wherein the augmented vowel is identical to V1 can be explained by assuming that in the ranking of the constraints in (5), Dependency-IO(V) dominates Integrity-IO(V). The selection of the output form is performed as indicated in Tableau (7) below.

(7) Copy of V1: 極 kok → koko

/kok/	NoCoda	Max-IO(C)	Dep-IO(V)	Intg-IO(V)	*LV	*MV	*HV
a.　kok	*!					*	
b.　ko		*!				*	
c.　koku			*!			*	*
d.　koka			*!		*	*	
e.→koko				*		**	

In this case as well, some form of vowel augmentation is required for optimal syllabification. Further, (7e), wherein V1 from the input structure is copied into the second syllable, is rated higher than (7c, d), wherein entirely new vowels are inserted. Consequently, (7e) is selected as the optimal output.

3.4 Infixed Ranking of Constraints and Vowel Selection

As demonstrated above, the two vowel augmentation patterns can be theoretically supported depending on the hierarchical relationship between the two faithfulness constraints—namely, Integrity-IO(V) and Dependency-IO(V) — which determine how the necessary vowel for syllabification is supplied. For the licensing of V1 copying, Dependency-IO(V) must clearly dominate Integrity-IO(V). However, in the case of high-vowel insertion, the former need not dominate the latter, and a lack of dominance between them is sufficient. The ranking of the remaining constraints is consistent across both patterns, suggesting that these two patterns are theoretically closely interconnected.

Whether what happened with these two patterns was a diachronic change, synchronic variation, or a combination of both remains unclear. However, such changes in the phonological grammar plausibly occurred during the composition stage of *Manyoshu*. Assuming a diachronic change, the insertion of

high vowels being overwhelmingly more frequent suggests that the copying of V1 represents the older form, and it is reasonable to believe that this pattern of *nigo-gana* survived as a vestige in later periods. While inserting high vowels functioned as a productive phenomenon, the copying of V1 was likely permitted and accepted only in forms that had already been lexicalized.

4．Concluding Notes

As demonstrated in this study, a significant bias exists in the augmented vowels in *nigo-gana* of *Manyoshu*, which likely reflects the phonological grammar of its compilation period. The two primary patterns accounting for most of these augmentations—namely, the insertion of high vowels and copying of the first vowel—are both natural as synchronic phonological phenomena. Based on the theoretical framework, these patterns have been demonstrated to result from the interaction of phonological constraints and be closely related. This work's findings provide important insights into the phonological grammar of the time and its evolution. The fact that *Manyoshu*—as a collection of *waka* poems, conveys not only the emotions of Japanese speakers of that era but also aspects of their linguistic competence—continues to be highly impressive.

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