

Rendaku in Inflected Words

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1 Rendaku

The Japanese term *rendaku*, which Martin (1952:48) translates as ‘sequential voicing’, refers to a morphophonemic phenomenon found in compounds and in prefix+base combinations. A morpheme that shows rendaku has one allomorph beginning with a voiceless obstruent and another allomorph beginning with a voiced obstruent. The rendaku allomorph (i.e., the allomorph beginning with a voiced obstruent) of such a morpheme appears only when it is a non-initial morph in a word. The examples in (1) illustrate the pairs of phonemes that can alternate.

(1)	ALTERNATING PHONEMES	VOICELESS ALTERNANT		VOICED ALTERNANT	
	/f/~b/	/fune/	‘boat’	/kawa+bune/	‘river boat’
	/h/~b/	/hako/	‘case’	/haši+bako/	‘chopstick case’
	/t/~d/	/tama/	‘ball’	/me+dama/	‘eyeball’
	/k/~g/	/kami/	‘paper’	/kabe+gami/	‘wallpaper’
	/c/~z/	/cuka/	‘mound’	/ari+zuka/	‘anthill’
	/s/~z/	/sora/	‘sky’	/hoši+zora/	‘starry sky’
	/č/~j/	/či/	‘blood’	/hana+jī/	‘nosebleed’
	/š/~j/	/širuši/	‘symbol’	/ya+jiruši/	‘arrow symbol’

Because of well-known historical changes, some of the alternations in modern Japanese involve more than just a difference in voicing. Notice that /b/ alternates not with /p/ but with /f/ ([ɸ]), as in /fune/~bune/, and with /h/ ([h] or [ç]), as in /hako/~bako/.¹ Notice also that /z/ ([dz] or [z]) alternates both with /c/ ([ts]), as in /cuka/~zuka/, and with /s/, as in /sora/~zora/, and that /j/ ([ɟ]) alternates both with /č/ ([ç]), as in /či/~ji/, and with /s/ ([ç]), as in /širuši/~jiruši/.²

2 Historical development

The oldest substantial texts in Japanese date from the 8th century, and the language they represent presumably reflects a variety spoken by the aristocracy in the contemporary capital of Nara. There is general agreement that word-medial voiced obstruents were prenasalized in Old Japanese: [ʲg ʲdz ʲd ʲm] (Vance 1983:335-337). As Unger (1977:8-9) first pointed out, if we make the plausible assumption that such prenasalization was present in prehistoric Japanese as well, a satisfying explanation for the origin of sequential voicing is available. Hamada (1952:23) cites the examples in (2) to illustrate the historical process of interest in some items that developed after the 8th century.³

(2)	/sumi+sur-i/	> /suzuri/	‘ink’+‘scrapper’	> ‘inkstone’ ⁴
	/fumi+te/	> /fude/	‘letter’+‘hand’	> ‘writing brush’
	/ika ni ka/	> /ikaga/	INTERROG+ADV+’?’	> ‘how’

In each case, it looks as if a sequence of the form N (nasal consonant) + V (vowel) + O[-vce] (voiceless obstruent) was replaced by O[+vce], i.e., the voiced counterpart of the original obstruent. This replacement would have been a natural consequence of vowel syncope, given that word-medial voiced obstruents were prenasalized at the time. Vowel syncope alone would have yielded a phonotactically anomalous nasal+obstruent cluster in each case.⁵

It is a plausible inference that this process was involved in the origin of rendaku. As the example in (3) shows, this account requires us to posit an earlier syllable of the form NV between the two elements of a compound that showed rendaku in Old Japanese.⁶

(3) ^{POJ}/yama/ + ^{POJ}NV + ^{POJ}/ta/ > ^{OJ}/yama+da/ ‘mountain’+‘?’+‘paddy’ > ‘mountain paddy’

The obvious candidate for the mystery syllable is the genitive particle ^{POJ}/nö/, the ancestor of ^{OJ}/nö/ and modern /no/. Attested Old Japanese vocabulary items like those in (4) suggest why rendaku was irregular (as it continues to be in modern Japanese).⁷

(4) a. ^{OJ}/akî+nö+pa/ ‘autumn leaf’
 b. ^{OJ}/taka+pa/ ‘bamboo leaf’
 c. ^{OJ}/sasa+ba/ ‘bamboo-grass leaf’ < ^{POJ}/sasa nö pa/

As expected, lexicalized phrases that retained genitive ^{OJ}/nö/ (as in 4a), did not show rendaku.⁸ Noun+noun compounds could have originated either by simple juxtaposition, in which case rendaku did not occur (as in 4b), or by contraction of a phrase, in which case rendaku did occur (as in 4c).

3 Inflected words

Verb+verb compound verbs are abundant in Japanese, but they rarely show rendaku. An example is /kak-i+tor-u/ ‘write down’, which contains the roots of /kak-u/ ‘write’ and /tor-u/ ‘take’. The first component verb in such a compound is invariable; it must appear in its ‘continuative’ form.⁹ The second component verb bears whatever inflectional ending is required for the compound as a whole; the citation form of a verb is the nonpast indicative. The account in §2 of the origin of rendaku provides a natural explanation for the rarity of rendaku in compounds of this type (Vance 1983). There is no reason to suppose that the components of a verb+verb compound verb were ever connected by a genitive particle or any other NV syllable in earlier stages of Japanese.

The continuative of any verb is an inflectional form, and as a word on its own it functions to connect its clause to a following clause. The example in (5) illustrates with /hanaš-i/ (romanized *hanashi*), the continuative of /hanas-u/ ‘speak’.

(5) Tomodachi to hanashi, sore kara nemashita.
 friend with speak-CONT that from sleep-POLITE-PAST
 ‘(I) spoke with (my) friend, and after that (I) went to bed.’

According to the traditional Japanese analysis of verb morphology, almost all verbs fall into one of two regular conjugation classes.¹⁰ Assuming the widely adopted morphological segmentation

of verb forms proposed by Bloch (1946), every verb in the first of these two classes has at least one stem allomorph that ends in a consonant.¹¹ The verb meaning ‘speak’ in the first clause in (5) is an example of such a consonant-stem verb: the stem allomorph in the citation form /hanas-u/ ends in /s/, and the stem allomorph in the continuative /hanaš-i/ ends in /š/.¹² The continuative of every consonant-stem verb has the inflectional ending /i/. Every verb in the other regular conjugation class has an invariant stem ending in a vowel (either /i/ or /e/). An example of such a vowel-stem verb is /tabe-ru/ ‘eat’, with the nonpast indicative marked by /ru/ rather than by the /u/ of consonant-stem verbs. The continuative of this verb is /tabe/, with no inflectional ending, since the continuative of every vowel-stem verb is identical to its stem.¹³ Many verbs have a corresponding deverbal noun that is segmentally identical to the continuative, although it may be accented on a different syllable (Martin 1952:34). The examples in (6) illustrate, pressing English gerunds into service as translations of the continuative forms.

- | | | | | |
|-----|------------|----------------------|------------|-----------------|
| (6) | /yasu↓m-u/ | ‘rest’ ¹⁴ | /kikoe-ru/ | ‘be audible’ |
| | /yasu↓m-i/ | ‘resting’ | /kikoe/ | ‘being audible’ |
| | /yasum-i↓/ | ‘vacation, break’ | /kikoe/ | ‘sound’ |

Okumura (1955) claims that rendaku does not occur in compounds of inflected word plus inflected word.¹⁵ In fact, we do find examples of rendaku in such compounds, but as mentioned above, rendaku is rare in verb+verb compound verbs. Okumura’s illustrative examples actually suggest a more interesting generalization. Two of those examples appear in (7).

- | | | | |
|-----|----|-----------------|-------------------------------------|
| (7) | a. | /wakač-i+kak-u/ | ‘write with spaces between words’ |
| | b. | /wakač-i+gak-i/ | ‘writing with spaces between words’ |

Both examples in (7) derive from the verbs /wakac-u/ ‘divide’ and /kak-u/ ‘write’, and the former, like all non-final verbal elements in compounds, appears in its continuative form /wakač-i/. The verb /wakač-i+kak-u/ (7a: $V_1+V_2=V$) is given in its citation form, with the second element bearing the nonpast affirmative ending /u/. The noun /wakač-i+gak-i/ (7b: $V_1+V_2=N$), on the other hand, does not inflect; the second element is fixed in form. Okumura’s precise claim thus appears to be that rendaku will not occur in a compound which consists of two inflected words and is itself an inflected word. At the same time, the second example suggests that we should expect rendaku in a compound that consists of two verb stems but is itself a noun.

The examples just considered involve verbs. The other major class of inflected words in Japanese is adjectives.¹⁶ Just as in the case of a verb, the citation form of an adjective is the nonpast indicative. The adjectival nonpast indicative suffix has the invariant form /i/. The continuative form of an adjective is always marked by the suffix /ku/ and is never identical to the stem. When a compound contains an adjective as its initial element, the adjective always appears as a bare stem. The examples in (8) illustrate.

- (8) /omo-i/ 'heavy'
 /omo-ku/ 'being heavy'
 /omo+kuruši-i/ 'oppressive' (cf. /kuruši-i/ 'strained')
- /haya-i/ 'early'
 /haya-ku/ 'being early'
 /haya+oki/ 'early rising' (cf. /oki-ru/ 'get up')

Some adjective stems can be used as nouns (Martin 1975:399), as the examples in (9) show.

- (9) /maru-i/ 'round' /ča+iro-i/ 'brown' (literally 'tea-colored')
 /maru/ 'circle' /ča+iro/ 'brown' (literally 'tea-color')

4 Verb+verb compounds

A set of verb+verb compounds was collected to assess the notion that rendaku does not occur in a compound that consists of two inflected words and is itself an inflected word. The first step in the collection procedure was to make a list of all the non-compound verbs beginning with a voiceless obstruent that appear in Kazama (1979), a reverse dictionary that has a separate section for each part of speech. There is no point in considering verbs that do not begin with a voiceless obstruent, since rendaku cannot affect a vowel (as in /oboe-ru/ 'remember'), a sonorant (as in /nom-u/ 'drink'), or an obstruent that is already voiced (as in /de-ru/ 'leave'). In order to limit the investigation to words in common use in modern Japanese, each verb on the list was checked in a medium-size Japanese-English dictionary (Hasegawa et al. 1986). Every verb on the list that does not appear as a headword in this dictionary was eliminated from further consideration. Also eliminated was every verb that contains a medial voiced obstruent (e.g., /sage-ru/ 'lower'). A compound containing such a second element is subject to a well-known constraint on rendaku called Lyman's Law (Vance 1987:136-139): rendaku almost never affects an initial obstruent of an element that already contains a voiced obstruent. Consequently, it would not be appropriate to cite a verb+verb compound verb such as /hik-i+sage-ru/ 'pull down' as support for the claim that compounds of this form resist rendaku.

The next step in the data collection process was to find compounds of the form $V_1+V_2=V$ or $V_1+V_2=N$ in which V_2 is one of the verbs remaining on the list described in the preceding paragraph. The original intent was to select every compound of the appropriate form that appears in either or both of two reverse dictionaries (Kitahara 1990 and Iwanami Shoten Henshūbu 1992). However, this step in the process turned out to be tremendously time-consuming, and it was completed only for items in which V_2 is a consonant-stem verb.¹⁷ Each compound was then checked in an unabridged dictionary produced by a major Japanese publisher (Matsumura 1988). To avoid missing any relevant items, even if, for a particular V_1 and a particular V_2 , only one of $V_1+V_2=V$ and $V_1+V_2=N$ was found in the reverse dictionaries, both were checked in the unabridged dictionary. Those compounds that appear in the unabridged dictionary were retained for further consideration.¹⁸

The next step in the process was to eliminate compounds that probably should not be analyzed as containing two verbs in modern standard Japanese. For some of these excluded items, the reason is simply that the entry in the unabridged dictionary identifies them as obsolete or dialectal. In other cases, the unabridged dictionary does not list V_1 as an independent verb in

the modern language. In still other cases, a compound contains an etymological verb form that seems to have lost its verb-form status. Examples of this last type include /tatami+kae/ ‘replacing mats’, in which the etymological continuative /tatam-i/ seems to be functioning as a simple noun meaning ‘mat’ with no connection to the verb /tatam-u/ ‘fold’. Another example is /kumor-i+gači/ ‘tending toward overcast’, in which /gači/ is etymologically the rendaku allomorph of the continuative of /kac-u/ ‘win’. In modern Japanese, /gači/ is simply a derivational suffix that derives nouns from verbs and no longer has any connection to the verb meaning ‘win’.¹⁹

Next, coordinate compounds such as /yom-i+kak-i/ ‘reading and writing’ were eliminated, since it is well known that rendaku generally does not occur in coordinate compounds (Vance 1987:144-145). It would not be appropriate to cite /yom-i+kak-i/ as evidence against that verb+verb compound nouns do not show rendaku.

The last step in the process was to search the remaining examples for pairs in which a verb+verb compound verb ($V_1+V_2=V$) and a verb+verb compound noun ($V_1+V_2=N$) both involve the same two verbs in the same order. The final data set consists of every such pair and the pronunciation(s) given in the unabridged dictionary for each paired word.

The data set includes some pairs that exemplify the pattern described in §3, including (10). Notice that the verb does not show rendaku while the noun does.

- (10) $V_1+V_2=V$ [-rendaku] : /toor-i+kakar-u/ ‘pass by’
 $V_1+V_2=N$ [+rendaku] : /toor-i+gakar-i/ ‘passing by’

But there are also pairs in which both the verb and the noun show rendaku and other pairs in which neither shows rendaku. The examples in (11) illustrate.

- (11) a. $V_1+V_2=V$ [+rendaku] : /kaer-i+zak-u/ ‘bloom again’
 $V_1+V_2=N$ [+rendaku] : /kaer-i+zak-i/ ‘second blooming’
 b. $V_1+V_2=V$ [-rendaku] : /mi+toos-u/ ‘foresee’
 $V_1+V_2=N$ [-rendaku] : /mi+tooš-i/ ‘prospect’

In some pairs, the pronunciation of one or both members has the mora obstruent /Q/ following the continuative form of V_1 , as in (12a), or in place of the last syllable of the continuative form of V_1 , as in (12b).

- (12) a. $V_1+V_2=V$ [-rendaku]: /hane+kaer-u/ ‘rebound’
 $V_1+V_2=N$ [-rendaku]~[mora obstruent]: /hane+kaer-i/~hane-Q+kaer-i/ ‘rebound’
 b. $V_1+V_2=V$ [mora obstruent]: /yoQ+para-u/ ‘get drunk’
 $V_1+V_2=N$ [mora obstruent]: /yoQ+para-i/ ‘drunken person’

The continuative form of /yo-u/ ‘get drunk’ (V_1 in 12b) is /yo-i/. Since the mora obstruent preempts rendaku (Vance 1987:148), if the unabridged dictionary gives a pronunciation with /Q/ as the only pronunciation of either member of a pair, that pair was excluded from the statistics reported below. In other pairs, the pronunciation of one or both members has the mora nasal /N/ in place of the last syllable of the continuative form of V_1 , as in (13).

- (13) $V_1+V_2=V$ [mora nasal]: /fuN+gir-u/ ‘take decisive action’
 $V_1+V_2=N$ [mora nasal]: /fuN+gir-i/ ‘taking decisive action’

The continuative form of /fum-u/ ‘step’ (V_1 in these examples) is /fum-i/. Since the mora nasal seems to induce rendaku in compounds of this kind, if the unabridged dictionary gives a pronunciation with /N/ as the only pronunciation of either member of a pair, that pair was excluded from the statistics reported below.

The unabridged dictionary gives alternative pronunciations for several of the words in the data set. The three examples in (14) illustrate.

- (14) a. $V_1+V_2=V$ [-rendaku]~[+rendaku]: /ši+kum-u/~ši+gum-u/ ‘set up’
 b. $V_1+V_2=N$ [-rendaku]~[+rendaku]: /ne+kom-i/~ne+gom-i/ ‘(time of) sound sleep’
 c. $V_1+V_2=V$ [-rendaku]~[mora obstruent]: /saš-i+hik-u/~saQ+pik-u/ ‘deduct’

In the statistics reported below, if a verb+verb compound verb has one pronunciation with rendaku and another pronunciation without rendaku, the pronunciation without rendaku was counted. For example, (14a) was counted simply as not showing rendaku. On the other hand, if a verb+verb compound noun has one pronunciation with rendaku and another pronunciation without rendaku, the pronunciation with rendaku was counted. Consequently, (14b) was counted simply as showing rendaku. Treating verbs and nouns differently in this way biases the statistics in favor of the putative pattern described in §3, i.e., that rendaku does not occur in verb+verb compound verbs but does occur in verb+verb compound nouns. Since the statistics reported below will be used to deny the existence of this pattern, the deliberate bias in counting will strengthen the argument. As for items having one pronunciation with /Q/ or /N/ and another pronunciation without, the pronunciation without a mora consonant was counted. For example, (14c) was counted simply as not showing rendaku.

A few pairs in the data set were particularly problematic, including the two examples shown in (15).

- (15) a. $V_1+V_2=V$ [-rendaku]: /mi+tor-u/ ‘comprehend by looking at’
 $V_1+V_2=N$ [-rendaku]: /mi+tor-i/ ‘comprehending by looking at’
 $V_1+V_2=N$ [+rendaku]: /mi+dor-i/ ‘looking over and selecting’
 b. $V_1+V_2=V$ [+rendaku]~[-rendaku]~[extra mora obstruent]:
 /de+bar-u/~de+har-u/~deQ+par-u/ ‘protrude’
 $V_1+V_2=V$ [+rendaku]~[-rendaku]~[extra mora obstruent]:
 /de+bar-i/~de+har-i/~deQ+par-i/ ‘protruding; protrusion’

Corresponding to the verb in (15a), the unabridged dictionary has two separate noun entries, one with rendaku and another without, and the definitions for these two entries are different. Although the noun without rendaku matches the verb semantically, in keeping with the deliberate bias explained just above, (15a) was counted as a verb not showing rendaku and a noun showing rendaku. The unabridged dictionary gives three pronunciations each for the verb and noun in (15b). Maintaining the bias again, (15b) was counted as a verb not showing rendaku and a noun showing rendaku.

The data set contains a total of 234 verb/noun pairs, and the table in (16) shows how these pairs pattern in terms of rendaku.

(16)

		V + V = V	
		+rendaku	-rendaku
V + V = N	+rendaku	10	22
	-rendaku	0	202

As the lower right cell in (16) shows, in the great majority of the pairs (202/234=86%), neither the verb nor the noun shows rendaku. In other words, pairs like /mi+toos-u/ ‘foresee’ and /mi+tooš-i/ ‘prospect’ (11b) are the norm. By comparison, despite the deliberately biased counting described above, only a small fraction of the pairs in the data set (22/234=9%) exhibit the behavior that Okumura (1955) suggests is typical. This means that pairs like /toor-i+kakar-u/ ‘pass by’ and /toor-i+gakar-i/ ‘passing by’ (10) are actually quite unusual.

Needless to say, a data set consisting of entries in an unabridged dictionary certainly will not match the relevant portion of a representative native speaker’s actual vocabulary. To get some idea of how serious this shortcoming might be, a well-educated native speaker went through the 234 verb/noun pairs in the data set, discarded those that were unfamiliar to her, and noted pronunciations (with or without rendaku) that differed from her own.²¹ Applying the same counting bias as above to this revised data set, the pairs in this speaker’s vocabulary pattern as in (17).

(17)

		V + V = V	
		+rendaku	-rendaku
V + V = N	+rendaku	7	13
	-rendaku	0	188

The total number of pairs in this revised data set is 208, and their distribution in the four cells of the table in (17) differs very little from the distribution of the pairs in (16). Here again, in most of the pairs (188/208=90%), neither the verb nor the noun shows rendaku, and only a small fraction of the pairs (13/208=6%) show rendaku in the noun but not in the verb. In short, the revised data set suggests that simply relying on the dictionary entries does not lead us astray.

Consequently, no attempt was made to go beyond dictionary entries for the counts reported below in §5.

5 Compounds involving adjectives

As Kikuda (1971) notes, adjectival elements in compounds actually pattern very differently from verbal elements. Compounds of four additional types will be considered in this section: adjective+adjective compound adjectives (A+A=A), verb+adjective compound adjectives (V+A=A), adjective+verb compound verbs (A+V=V), and adjective+verb compound nouns (A+V=N). Although some adjective stems can be used as nouns, as noted in §3, compound nouns ending with an adjectival element (A+A=N or V+A=N) are very rare and will not be considered further.

A set of relevant compounds involving adjectival elements was collected by following a procedure parallel to the one described in §4 for verb+verb compounds. In this case, of course, the first step was to make a list of all the non-compound adjectives (rather than verbs) beginning with a voiceless obstruent that appear as headwords in the medium-size Japanese-English dictionary (Hasegawa et al. 1986). The result of the collection procedure was a data set consisting of compounds that appear in the unabridged dictionary (Matsumura 1988). The verbal elements in items of the form A+V=V or A+V=N were restricted to consonant-stem verbs, since these items were collected in tandem with verb+verb compounds. As explained above in §3, this part of the process was so time-consuming that it was completed only for examples ending in a consonant-stem verbal element.

The number of adjective+adjective compound adjectives in the data set is small, but almost half (8/10=44%) show rendaku, as in (18).

- (18) V+A=A [+rendaku]: /usu+gura-i/ 'suspicious'
Cf. /usu-i/ 'thin', /kura-i/ 'dark'

Rendaku also appears in nearly all verb+adjective compound adjectives (17/20=85%) and in all adjective+verb compound verbs (7/7=100%), as in (19).

- (19) V+A=A [+rendaku]: /utaga-i+buka-i/ 'dim'
Cf. /utaga-u/ 'doubt', /fuka-i/ 'deep'
A+V=A [+rendaku]: /naga+bik-u/ 'be prolonged'
Cf. /naga-i/ 'long', /hik-u/ 'pull'

Most adjective+verb compound nouns in the data set also show rendaku (43/47=91%), as in (20). Just like the second element in a verb+verb compound noun, the verbal element in an adjective+verb compound noun appears in its continuative form.

- (20) A+V=N [+rendaku]: /waka+gaer-i/ 'rejuvenation'
Cf. /waka-i/ 'young', /kaer-u/ 'return'

The table in (21) summarizes the data collected for the six categories of two-element compounds in which both elements are verbal or adjectival.

(21)	V+V=V	V+V=N	A+V=V	A+V=N	A+A=A	V+A=A
+rendaku	16	211	7	43	8	17
-rendaku	716	258	0	4	10	3
rendaku %	2%	45%	100%	91%	44%	85%

Unlike the table in (16), the table in (21) includes unpaired items in the two V+V categories. Of the 732 (16+716) V+V=V items tabulated in (21), only 234 are those tabulated in (16). The remaining 498 are V+V=V compounds for which no corresponding V+V=N compound is listed as a headword in the unabridged dictionary. For example, the verb /okur-i+kaes-u/ ‘send back’ (cf. /okur-u/ ‘send’ and /kaes-u/ ‘return’) is listed, but there is no entry for a corresponding noun (which would be either /okur-i+kaeš-i/ or /okur-i+gaeš-i/). Similarly, of the 469 (211+258) V+V=N items tabulated in (21), 235 are V+V=N compounds for which no corresponding V+V=V compound is listed as a headword in the unabridged dictionary. For example, the noun /oboe+gak-i/ ‘memo’ (cf. /oboe-ru/ ‘remember’ and /kak-u/ ‘write’) is listed, but there is no entry for a corresponding verb (which would be either /oboe+kak-u/ or /oboe+gak-u/).

Including such unpaired items makes it clear that V+V=N compounds are much more likely to show rendaku than V+V=V compounds. Nonetheless, this difference is just a strong statistical tendency, not an inviolable principle. Furthermore, the fact that compounds containing adjectival elements are so likely to show rendaku means that only verbal elements exhibit this tendency. It is not a generalization that applies to all inflected-word elements. Incidentally, if rendaku originated as described in §2 above, the behavior of adjectival elements is a mystery, since there is no reason to suppose that the two elements in a compound containing an adjectival element were linked by a syllable of the form NV at some time in the past.

Notes

- ¹ Many linguists prefer to analyze [h], [ç], and [ɸ] as allophones of a single phoneme except in borrowings. I am assuming a uniform phonemic inventory for all vocabulary strata and a split that has resulted in a contrast between [ɸ] and [h]/[ç] (with [h] appearing before /e/, /a/, or /o/ and [ç] appearing before /i/ or /y/). Either way, the rendaku alternation is not simply a matter of voicing. The ancestor of modern /h/ and /f/ was pronounced [p], although there is some controversy about how long the [p] pronunciation persisted in the central dialects (Kiyose 1985).
- ² In Vance (1987:24), I said that the two allophones of /z/, [dz], and [z], are distributed as follows: [dz] word-initially or immediately following the mora nasal /N/ and [z] elsewhere. The actual distribution is certainly not this clean, but there is no contrast, and the two are unquestionably allophones of a single phoneme. The modern rendaku pairing of /z/ with /c/ and /s/ reflects the historical merger of a voiced affricate and a voiced fricative, and so does the pairing of /j/ with /č/ and /š/.
- ³ The etymologies in (2) are reasonably secure and are given in Nihon Daijiten Kankōkai 1972-76, although Miller (1967:213-14) is dubious about this etymology for /fude/. The earliest attestations for the shortened forms range from ca. 900 for /ikaga/ to ca. 1000 for /fude/. Although the earliest attestation for /sumi+suri/ is from the tenth century, the other two long forms are attested from the eighth century.

- ⁴ The hyphen /sur-i/ separates what are commonly analyzed as a verb stem and an inflectional ending. See the discussion below in §3 for details.
- ⁵ The mora nasal /N/, which occurs syllable-finally in modern Japanese, is a later development (Hamada 1955; Vance 1987:56-57).
- ⁶ All Old Japanese examples are marked with a superscript OJ. The transcription conventions follow Miller's (1986:198) slightly modified version of the system first adopted by Mathias (1973) and endorsed by Martin (1987:50). The transcription reflects the fact that many modern standard syllables with one of the vowels /i e o/ correspond to two distinct eighth-century syllables. (For details, see Lange 1973 and Shibatani 1990:125-139). For each such eighth-century pair, it is standard practice to label one syllable type A (*kô-rui*) and the other type B (*otsu-rui*), following Hashimoto (1917:173-186). Some researchers construe the phonological differences between the type-A and type-B syllables as vowel-quality distinctions; others construe them as distinctions between syllables with and without a glide: CV vs. CGV. In any case, the transcription adopted here represents type-A syllables with a circumflex over the vowel /î ê ô/, type-B syllables with a diaeresis over the vowel /ï ë ö/, and syllables for which there was no A/B distinction with no diacritic /i e o/. A capitalized vowel /I E O/ indicates a syllable for which there was an A/B distinction but for which the category is unknown. The source for all Old Japanese forms is the *Jôdaigo Jiten Henshû* Iinkai 1967, the definitive dictionary of Old Japanese. Hypothetical pre-Old Japanese forms are marked with a superscript POJ.
- ⁷ On the fundamental irregularity of rendaku, see Vance (1987:146-148) and Ohno (2000).
- ⁸ On the other hand, there are puzzling examples of rendaku in phrasal items of this form, including ^{OJ}/ama+nö+gapa/ 'Milky Way' (cf. ^{OJ}/kapa/ 'river'), with genitive ^{OJ}/nö/, and ^{OJ}/ma+tu+gë/ 'eyelash' (cf. ^{OJ}/kë/ 'hair'), with genitive ^{OJ}/tu/ (which has not survived into modern Japanese).
- ⁹ The term 'continuative' is Kuno's (1973:195). The traditional term in Japanese grammar *ren'yôkei* 'adverbial form', and Bloch (1946:6) calls it the 'infinitive' form.
- ¹⁰ The two classes are called *godan-kastuyô-dôshi* 'five-row inflection verbs' and *ichidan-kastuyô-dôshi* 'one-row inflection verbs'. For details, see Vance (1987:178-184).
- ¹¹ This rather clumsy characterization is necessary because of verbs such as /ka-u/ 'buy', which has a consonant-final allomorph only before /a/, as in the negative /kaw-ana-i/. The Old Japanese citation form of this verb was ^{OJ}/kap-u/, and the modern forms reflect a well-known sequence of historical changes. The standard account is that, in word-medial position, [p]>[ɸ]>[w], and then [w]>∅ except before /a/. I use Bloch's (1946) morphological segmentations as a convenience, not as an endorsement of the analysis behind them.
- ¹² Many linguists prefer not to analyze [s] and [ç] as contrastive, treating [ç] before /i/ as a realization of /s/ and [ç] before by any other vowel as a realization of /sy/.

- ¹³ Parallelism with consonant-stem verbs would dictate a zero morph ‘marking’ the continuative of a vowel-stem verb (as in /tabe+ \emptyset), but I will not clutter the transcriptions in this paper with zero morphs. For an argument that the very notion of a zero morph is incoherent, see Matthews (1974:117).
- ¹⁴ The distinctive part of the pitch-accent pattern on a Japanese word is a fall from high pitch to low pitch. I mark the location of a fall with a downward-pointing arrow (\downarrow). Some words are unaccented, i.e., contain no pitch fall, and no arrow appears in the transcription of an unaccented word. Standard references on Japanese accent include McCawley (1977), Haraguchi (1977), and Pierrehumbert and Beckman (1988). Aside from these examples in (5), I have not bothered to mark accent in this paper, since accent does not figure in the discussion.
- ¹⁵ Sakurai (1966:41) makes a similar claim about compounds of inflected word plus inflected word, but he qualifies it by saying that if the first element is used as a noun, sequential voicing can occur. However, since the first element must appear in its stem form, it is not clear how to determine whether it is being used as a noun (Vance 1987:143).
- ¹⁶ The other class of inflected words in Japanese contains only a single member: the copula (Bloch 1946:21-24). We will not consider it here, since even if it occurred in forms that could be construed as compounds, its citation form /da/ and most of its other forms begin with the voiced obstruent /d/, making rendaku inapplicable.
- ¹⁷ I have no reason to think that examples containing vowel-stem verbal elements would significantly change the overall picture that emerges. I could be wrong, of course.
- ¹⁸ A compound could appear either as a headword itself or as a subentry under its first element.
- ¹⁹ To be more precise, the continuative of a verb followed by /gači/ is either an adjectival noun (*keiyôdôshi*) or what Martin (1975:179) calls a precopular noun. See Martin (1975:418-419) for discussion and examples.
- ²⁰ For details on the mora obstruent in compounds like (12b), see Vance (2002).
- ²¹ I am grateful to my research assistant, Mieko Kawai, for her painstaking work.

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