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Rendaku in place names across Japanese dialects

Akiko Takemura* Thomas Pellard† Hyun Kyung Hwang‡ Timothy J. Vance§

Abstract

The rendaku morphophonological alternation between voiceless and voiced obstruents in compounds is largely irregular, but it is observed in all Japanese dialects. However, whether dialectal differences in frequency of rendaku has received little attention hitherto. As a first step toward elucidating dialectal differences in the occurrence of rendaku, we examined the rendaku rate of six morphemes in place names from all Japan. The results of our exploratory study indicate that there is no clear geographical pattern in the differences in rendaku frequency, and that it varies between morphemes.

1 Introduction

Rendaku ('sequential voicing') is a morphophonological alternation observed in Japanese compounds, where the initial voiceless obstruent of a word becomes voiced when in second position in a compound (1).[1]

(1) a. *umi* + *kame* → *umi**g**ame*
'sea' 'turtle' 'sea turtle'

b. *neko* + *se* → *neko**z**e*
'cat' 'back' 'stoop'

c. *ami* + *to* → *ami**d**o*
'net' 'door' 'window screen'

Rendaku is largely unpredictable, though several factors are known to influence the application of rendaku (Vance et al. 2017): (a) phonotactics (whether or not the second morpheme already contains a voiced obstruent, Lyman 1894), (b) length of morphemes (Rosen 2003), (c) part of speech (Okumura 1955; Vance 2005), (d) structure (coordinate vs subordinate structure, Okumura 1955; right-branch structure, Otsu 1980), (e) lexical stratum (Martin 1952; Takayama 2005).

Rendaku is observed in all Japanese dialects, but since it is irregular, we can make the hypothesis that it might differ between dialects. For example, the realization of rendaku is not the same in the Tōhoku dialects as in Tokyo Japanese (Miyashita et al. 2016). So far, little research has been conducted about dialectal differences in frequency of rendaku.[2] Surveying and quantifying the frequency of rendaku in dialects throughout all Japan would be a daunting task. Instead, as a first step toward an account of rendaku dialectal variation, we propose to measure the frequency of rendaku in place names and to examine whether it varies between prefectures.

2 Material

The material used in this research is the list of 123,750 Japanese postal codes provided by the Japan Post Holdings, as of September 2014. The list is freely available online (`https://www.post.japanpost.jp/zipcode/download.html`). Each entry consists of a postal code, the corresponding place name in Chinese characters together with its reading in *kana*, and the prefecture of the location. Place names from 46 prefectures were included, but we discarded those from Okinawa prefecture and the Amami islands of Kagoshima since these are traditionally Ryukyuan-speaking areas with peculiar place names.

We selected the six morphemes listed in Table 1 and extracted all place names containing any of these in non-initial position. These morphemes are commonly used in place names across Japan, and none already contains a voiced obstruent, which would prevent the application of rendaku. None of them is known to be immune to rendaku, and all undergo rendaku in at least some compounds.

Table 1: Morphemes investigated

form	Chinese character(s)	meaning
hara ~ bara	原	'plain'
kawa ~ gawa	川, 河	'river'
ki ~ gi	木, 樹	'tree'
saki ~ zaki	崎, 埼, 嵜, 先	'cape'
sawa ~ zawa	沢, 澤	'marsh'
tani ~ dani	谷	'valley'

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1. The fricative /h/ alternates with /b/ in rendaku because it comes historically from an earlier **p*.
2. See however Irwin & Vance (2015).

The extraction of all place names containing any of the six morphemes in non-initial position as well as the detection of the presence or absence of rendaku were done automatically with regular expressions. The data were then checked manually for errors. Duplicates and problematic cases were filtered out. We excluded data containing a genitive marker, e.g. *ga* in *X ga sawa* (〜ケ沢) or *no* in *X no sawa* (〜ノ沢), since it prevents rendaku from applying.

For each morpheme, the rendaku rate for each prefecture was calculated as the percentage of voiced occurrences in all place names containing the morpheme under study. A two-tailed binominal test of statistical significance with probability .5 was then applied in each case. When the result was non-significant at the .05 level, we concluded that the observed rendaku rate potentially reflects random variation and is not significantly higher or lower than 50%. In such cases, we thus considered the rendaku rate to be 50%.

The rendaku rate for each region was then plotted on a map of Japan with a gradient color. A lighter color indicates a higher rate of rendaku, and a darker color a lower one. White color indicates the absence of data, i.e. no place name containing the morpheme under study was found in the prefecture.

3 Results

An overview of our results can be found in Tables 2 and 3, and in Figures 1 to 7. A detailed summary of the results and high resolution color maps are available at https://doi.org/10.5281/zenodo.1653325.

The two extremes of overall rendaku rate are Hokkaidō (28.9%) and Yamagata (64.6%) prefectures, but the overall rendaku rate for most prefectures is around 50% (mean: 49.11%).

The pattern observed for *tani ~ dani* 'valley' (Figure 7) is peculiar: the morpheme itself is absent from most prefectures along the Pacific Coast of Eastern Japan, but in Fukushima prefecture only, its rendaku rate is particularly low (8.3%). The rendaku rate for *hara ~ bara* 'plain' differs from that of other items, with many prefectures exhibiting a lower rate than for other morphemes (Figure 2).

4 Discussion

No clear pattern emerges from our results. Most prefectures have a rendaku rate around 50% for most morphemes, with sometimes a few outliers in either direction forming a patchy distribution, but which varies between morphemes.

Table 2: Number of observations and mean rendaku rate by morpheme

morpheme	n	%
hara ~ bara	1682	49.1
kawa ~ gawa	1827	50.7
ki ~ gi	930	51.3
saki ~ zaki	869	50.4
sawa ~ zawa	1495	50.0
tani ~ dani	931	51.9
Total	7734	50.4

Table 3: Total number of observations and mean rendaku rate by prefecture

prefecture	n	%	prefecture	n	%
Aichi	159	50.0	Miyagi	323	41.8
Akita	236	40.7	Miyazaki	31	50.0
Aomori	248	50.0	Nagano	135	50.0
Chiba	260	50.0	Nagasaki	28	50.0
Ehime	149	50.0	Nara	126	50.0
Fukui	142	50.0	Niigata	484	50.0
Fukuoka	176	50.0	Ōita	108	50.0
Fukushima	378	50.0	Okayama	216	50.0
Gifu	142	50.0	Osaka	103	50.0
Gunma	115	60.9	Saga	56	50.0
Hiroshima	157	50.0	Saitama	222	38.3
Hokkaidō	211	28.9	Shiga	110	50.0
Hyogo	336	44.3	Shimane	115	50.0
Ibaraki	232	50.0	Shizuoka	209	50.0
Ishikawa	79	50.0	Tochigi	125	50.0
Iwate	180	50.0	Tokushima	110	50.0
Kagawa	27	50.0	Tokyo	119	50.0
Kagoshima	66	50.0	Tottori	174	60.9
Kanagawa	130	38.5	Toyama	241	40.2
Kochi	191	50.0	Wakayama	224	50.0
Kumamoto	121	50.0	Yamagata	240	64.6
Kyoto	173	50.0	Yamaguchi	87	50.0
Mie	111	50.0	Yamanashi	129	50.0

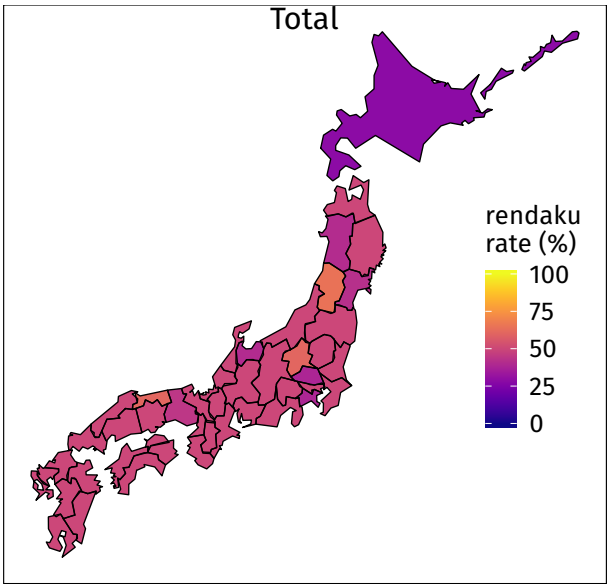

Figure 1: Overall rendaku rate for all morphemes considered

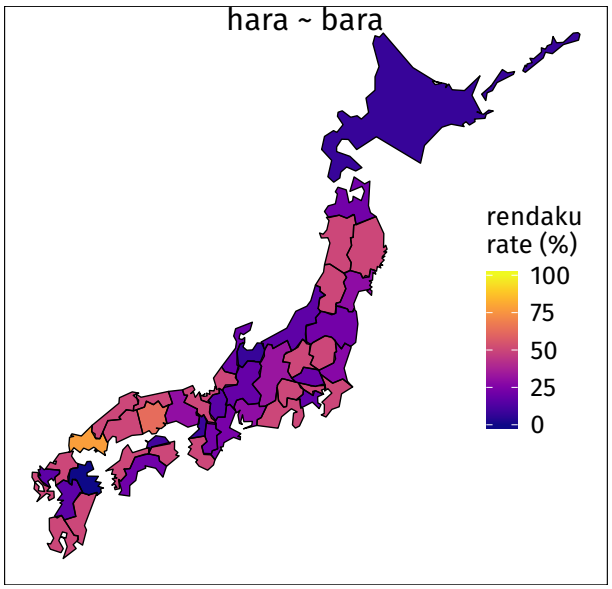

Figure 2: Rendaku rate for *hara ~ bara* (原) 'plain'

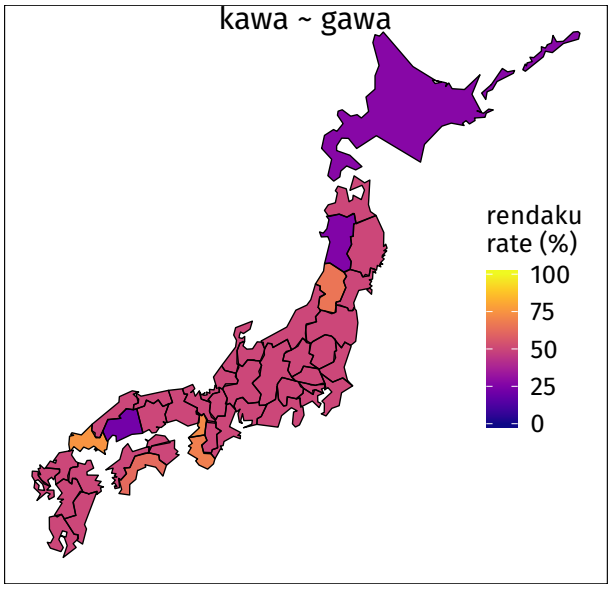

Figure 3: Rendaku rate for *kawa ~ gawa* (川, 河) 'river'

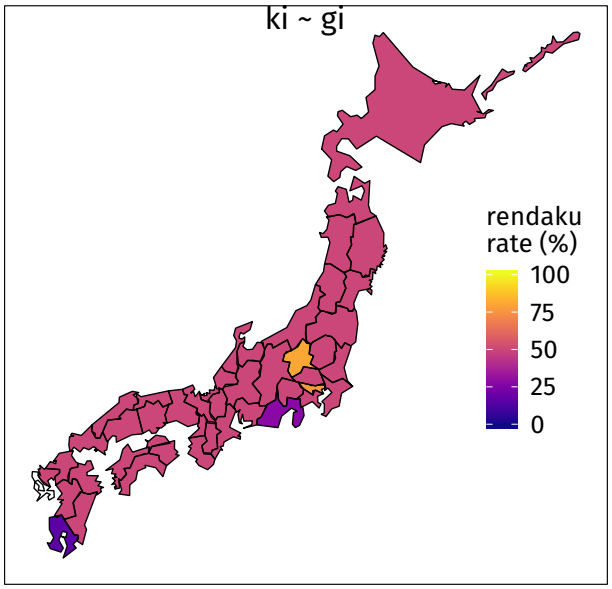

Figure 4: Rendaku rate for *ki ~ gi* (木, 樹) 'tree'

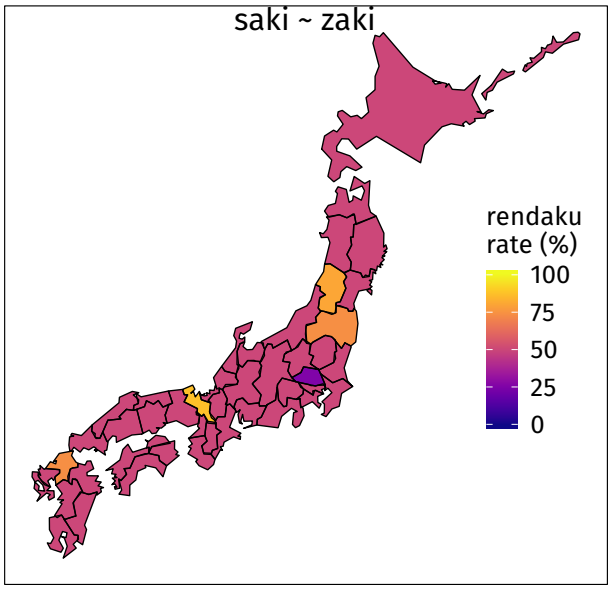

Figure 5: Rendaku rate for *saki ~ zaki* (崎, 埼, 嵜, 先) 'cape'

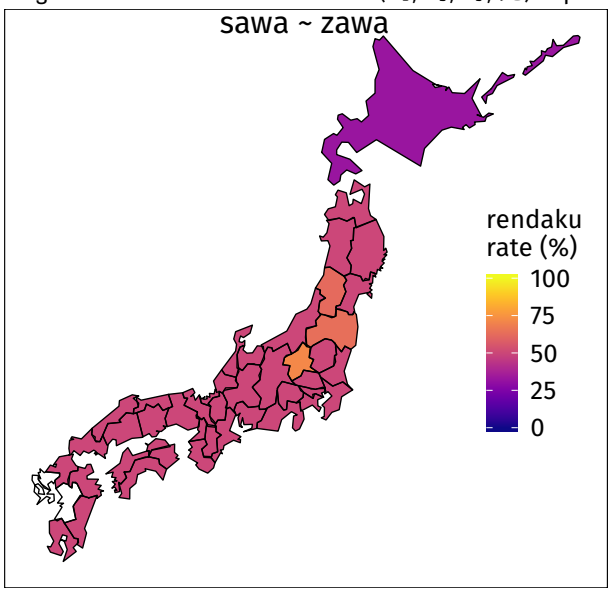

Figure 6: Rendaku rate for *sawa ~ zawa* (沢, 澤) 'marsh'

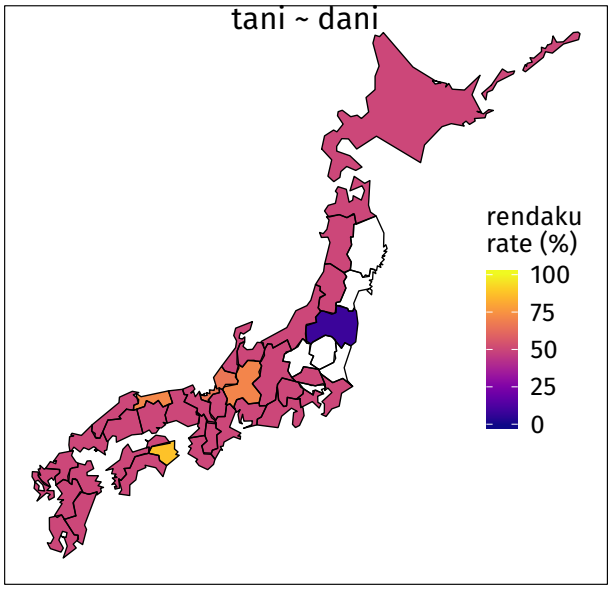

Figure 7: Rendaku rate for *tani ~ dani* (谷) 'valley'

No geographically coherent pattern is observed: the prefectures with the lowest overall rendaku rates (Hokkaidō, Saitama, Kanagawa) do not belong to the same region, and neither do the prefectures with the highest overall rendaku rates (Gunma, Tottori, Yamagata). For instance, though they both belong to the Tōhoku region and though their dialects are relatively close, Yamagata prefecture (64.6%) and Akita prefecture (40.7%) exhibit an opposite trend. The same is true for Gunma (60.9%) and Saitama prefectures (38.3%).

5 Conclusions

Our exploratory study finds no support for a geographical pattern in the variation of rendaku frequency in place names. Though based on six morphemes only, we observed that the rendaku rate can greatly vary in some morphemes, i.e. *hara* ~ *bara* 'plain' here.

Interestingly, Hokkaidō exhibits the lowest rendaku rate in place names in all Japan. Further research is needed in order to explain this fact, but we can already suggest two points worth taking into consideration. First, Japanese speakers settled on Hokkaidō only recently, and the settlers were from different regions of Japan. Second, Hokkaidō was originally an Ainu-speaking area, and many place names have an Ainu origin.

Future research will also need to take into account the various constraints affecting rendaku, such as Rosen's Rule (condition on morpheme length) and the strong version of Lyman's Law (no rendaku if the first member of a compound contains a voiced obstruent). Restricting the data to those place names attested in all Japan might be an alternative method. Also, there might be discrepancies between the official name of a location and its actual vernacular pronunciation, which might distort the results. In any case, careful consideration is required in cross-dialectal research.

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