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# On the Palatalization of [dz] and [s] in the Nambu Dialect*

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## 0. Introduction

This paper studies the palatalization of [dz] and [s] observed in the Nambu dialect, which is one of the dialects spoken in Aomori Prefecture. Several articles have pointed out that in the Nambu dialect, the consonants [dz] and [s] undergo palatalization. To my knowledge, however, no studies have ever discussed the relationship between [dz] and [s].[1] The purpose of this paper is to show that the two consonants basically exhibit parallel behavior with respect to palatalization, namely they are palatalized before the same types of vowels. We also propose phonological rules capturing the palatalization phenomenon that applies to the two consonants.

The organization of the present paper is as follows: in section 1, we review two previous studies on the palatalization of [dz] and [s], and point out some problems with them. Section 2 deals with the palatalization of [dz]. Sections 3 and 4 are devoted to the palatalization of [s]. Section 5 offers some concluding remarks.

## 1. Critique of Previous Studies

Koreshima (1968) and Sato and Kato (1974) discuss the palatalization of [dz] and [s] in the Nambu dialect. These works are at the level of observation and do not purport to offer any theoretical generalizations; however, they are a valuable introduction into the phenomenon of palatalization besides providing a considerable amount of data illustrating the relationship between [dz] and [s]. For this reason, let us summarize the previous studies.

### *1.1 Koreshima (1968)*

Koreshima points out that the consonants [s] and [dz] both undergo palatalization in the Nambu dialect. According to him, [s] is palatalized when it precedes the vowel [e], whereas [dz] is palatalized not only before

the vowel [e] but also before both [a] and [o]. This phenomenon is exemplified by the data below (the left column represents standard Japanese with English translations, while the right column represents their Nambu dialect counterparts with phonetic transcriptions).[2,3]

(1) Palatalization before the vowel [e]

a. [se] corresponds to [ɕe]

| | |
|---|---|
| *se*naka 'back' | *hye*naka [ɕenaka] |
| awa*se*ru 'put together' | awa*hye*ru [aɯaɕeɾɯ̈] |

b. [dze] corresponds to [dʑe]

| | |
|---|---|
| *ze*ni 'money' | *zye*ni [dʑenï] |
| kakima*ze*ru 'stir(*vt.*)' | kakima*zye*ru [kakïmadʑeɾɯ̈] |

(2) Palatalization before the vowels [a] and [o]

a. [dza] corresponds to [dʑa]

| | |
|---|---|
| a*za* 'birthmark' | a*zya* [adʑa] |
| ma*za*ru 'be mixed' | ma*zya*ru [madʑaɾɯ̈] |

b. [dzo] corresponds to [dʑo]

| | |
|---|---|
| na*zo*na*zo* 'riddle' | na*zyo*na*zyo* [nadʑonadʑo] |

(Phonetic transcriptions and italics are mine)

In (1a), the noun *senaka* and the verb *awaseru* both include the sequence *se*, represented by italics. This sequence corresponds to *hye* in both of the Nambu dialect counterparts. In (1b), on the other hand, the noun and the verb share the italicized sequence *ze*, and in both cases, this sequence corresponds to *zye* in the Nambu dialect. In a parallel way, the consonant [dz] included in the italicized sequences in (2) is modified in the Nambu dialect; consequently, the sequences *za* and *zo* in standard Japanese realize in the Nambu dialect, as *zya* and *zyo*, respectively.

*1.2 Sato and Kato (1974)*

Sato and Kato carry out their linguistic survey at several points in Aomori Prefecture (and Iwate Prefecture) where the Nambu dialect is spoken. According to their survey, the phonological changes cited in (3) is

observed at one of the selected points.[4,5]

(3) a. [se] corresponds to [ɕe] or [xe]

| | | | |
|---|---|---|---|
| a*se* | 'sweat' | a*he* | [axe] |
| *se*naka | 'back' | *he*naga | [xenaga] |
| *se*mi | 'cicada' | *he*mbi | [xe$^{m}$bï] |

b. [dze] corresponds to [dʑe]

| | | | |
|---|---|---|---|
| ka*ze* | 'wind' | kan*zye* | [ka$^{n}$dʑe] |
| *ze*ni | 'money' | *zye*ni | [dʑenï] |

Kato and Sato observe that when they precede the vowel [e], the consonants [dz] and [s] both undergo palatalization. Although Kato and Sato add that [se] may be changed either to [xe] or to [ɕe], their observations are basically the same as Koreshima's. Kato and Sato say nothing about the palatalization of [dz] and [s] before vowels other than [e].

*1.3 Problems with Previous Studies*

According to Koreshima's observations, [s] and [dz] differ in that the former is palatalized only before the vowel [e], whereas the latter is palatalized before the vowels [a], [o], and [e]. If his observation were correct, we would have to treat the consonant [s] differently from the consonant [dz] as far as palatalization is concerned.

From a theoretical point of view, the case can be made that the difference between the two consonants in question is attributable solely to the voice feature at the phonemic level: /s/ is the voiceless counterpart of /z/. The voice feature, then, may be the only factor to differentiate [s] from [dz] (see note 1). This is also true in the Nambu dialect. Consider the following examples:

(4) a. kan*za*rasi [kandzaɾasï̥] (or [kandʑaɾasï̥])
'grain exposed to the cold'

b. aon*zo*ra [ao$^{n}$dzoɾa] (or [ao$^{n}$dʑoɾa]) 'azure sky'

The above compounds both include two words: (4a) comprises *kan* 'the cold' and *sarasi* 'exposed,' and (4b) *ao* 'azure' and *sora* 'sky'. Notice that the

second word in these compounds has undergone a phonological change compared to the original form. In other words, "Rendaku" or sequential voicing applies to the word-initial consonants of *sasi* and *sora*, and they realize as [dz]. Since "Rendaku" is a phenomenon which changes a given consonant into its voiced counterpart under certain environments, the examples in (4) support the idea that [dz] is the voiced counterpart of [s].[6]

This seems to prove that on a theoretical point of view, the voice feature is the major difference between [dz] and [s]. The different behavior of [dz] and [s] in the applicability of palatalization, then, may be attributable to the voice feature. It should be noted, however, that the consonants [dz] and [s] share many features other than the voice feature. We then naturally predict that [dz] and [s] behave rather similarly with respect to palatalization, as far as the single voice feature does not determine the applicability of palatalization.

In fact, closer observations in the following sections lead us to conclude that [s] behaves rather similarly to [dz] with respect to palatalization. At least, the two consonants share the types of vowels which trigger palatalization. Then, we do not need to treat the consonant [s] separately from the consonant [dz], which is theoretically preferable in the sense that the two consonants have more features in common than are unique to either of them.

There is another problem with previous studies. They simply show the correspondence between standard Japanese and the Nambu dialect. Since they do not consider phonological changes *within* the Nambu dialect, what they can do is at best to predict the environments in which palatalized consonants occur in the Nambu dialect. This is, however, possible only when the Nambu dialect has lexical items that can be easily connected to their standard Japanese counterparts. Put it another way, in case a given word belongs to vocabulary peculiar to the Nambu dialect, previous studies have nothing to say about the possibility of palatalization applying to the respective item. To overcome this problem, we focus in this paper on phonological changes within the Nambu dialect instead of simply comparing standard Japanese and the Nambu dialect.

In this section we have reviewed and criticized previous studies.

According to previous studies, [dz] and [s] do not exhibit a parallel behavior (though they share some properties such that they may be palatalized before the vowel [e]). The environments in which [dz] is palatalized appear to be clearly wider than the ones in which [s] is palatalized. This is, however, contrary to the theoretical prediction that the two consonants exhibit a parallel behavior with respect to palatalization. So, in what follows, we will first scrutinize related data concerning [dz] and [s], and examine whether the two consonants truly behave contrary to the prediction. We will then attempt to offer descriptive generalizations about the palatalization phenomenon as it affects the two consonants.

## 2. Palatalization of [dz]

This section specifies the environments in which [dz] may be palatalized. Palatalization applies to [dz] more productively than it does to [s], as will be shown in the subsequent two sections. To begin with, we shall verify which of the five vowels allow the consonant [dz] preceding them to undergo palatalization. Let us start with the high vowels.

### *2.1. High Vowels ([ï] and [ü])*

When occurring before the high vowels, [dz] does not undergo palatalization in the Nambu dialect

(5) a. idan*zu*ra [ïdaⁿdzüɾa] 'mischief'
b. kadan*zu*geru [kadaⁿdzügeɾü] 'put in order'
c. sun*zu*me [sün̈ⁿdzüme] 'sparrow'
d. min*zu*ambi [mïⁿdzüaᵐbï] 'bathing'

(6) a. usuan*zi* [üsu̟aⁿdzï] 'flat-tasting'
b. han*zi*maru [xaⁿdzïmaɾü] 'start(*vi.*)'

In these examples, the italicized sequences include the consonant [dz] preceding the vowel [ü] (as in (5)) and the vowel [ï] (as in (6)). Thus, we conclude that in the Nambu dialect, [dz] does not undergo palatalization when it precedes high vowels.[7]

It can be argued that the inability of [dz] to undergo palatalization is

attributable to the properties of the high vowels in the Nambu dialect. Unlike standard Japanese, the two high vowels in the Nambu dialect are both centralized, and can be represented as [ɨ] and [ʉ].[8] Given that the high vowels are both centralized in the Nambu dialect, we expect that these vowels as such do not allow any elements immediately preceding them to undergo palatalization. This is because the tongue is already positioned near the hard palate when the centralized high vowels are pronounced. Consequently, palatalization, which is the phenomenon observed when the front of the tongue moves close to the hard palate, cannot apply to elements immediately preceding centralized vowels.

*2.2 Low and Mid Vowels ([a], [e], and [o])*

The consonant [dz] may be altered to [dʑ] in the Nambu dialect when it occurs before the low and mid vowels. This palatalization phenomenon is captured by the following rule:

(7) [dz] → [dʑ]/ ___ [a,e,o]

Let us begin with the palatalization of [dza]. The following data show that [dza] may undergo palatalization in various contexts such as nouns (e.g., (a)-(j)), verbs (e.g., (k)-(l)), adjective adverbs (e.g., (m)-(o)), an adjective (e.g., (p)), and adverbs (e.g., (q)-(s))) (the words on the left of the arrows represent underlying forms, while the words on the right of the arrows represent derived forms):[9,10]

(8) a. an*za* [aⁿdza] 'birthmark' → an*zya* [aⁿdʑa]

b. kan*za*guruma [kaⁿdzagɯrɯma] 'pinwheel'
→ kan*zya*guruma [kaⁿdʑagɯrɯma]

c. kan*za*si [kandzasɨ̥] 'ornamental hairpin'
→ kan*zya*si [kandʑasɨ̥]

d. kan*za*rasi [kandzaɾasɨ̥] 'grain exposed to the cold'
→ kan*zya*rasi [kandʑaɾasɨ̥] (=(4a))

e. kan*za*ri[kaⁿdzaɾɨ] 'ornament'
→ kan*zya*ri [kaⁿdʑaɾɨ]

f. hin*za*kambu [çiⁿdzakaᵐbɯ̈] 'kneecap'
→ hin*zya*kambu [çiⁿdʑakaᵐbɯ̈]

g. *za*igo [dzaïgo] 'a rural district'
→ *zya*igo [dʑaïgo] (or [dʑeᴺgo])

h. *za*sigi [dzasïgï] 'room floored with tatami mats'
→ *zya*sigi [dʑasïgï]

i. *za*budon [dzabɯ̈don] 'cushion' → *zya*budon [dʑabɯ̈don]

j. *za*rigani [dzaɾïganï] 'crawfish'
→ *zya*rigani [dʑaɾïganï]

k. fun*za*geru [ɸɯ̈ⁿdzageɾɯ̈] 'joke(*vi.*)'
→ fun*zya*geru [ɸɯ̈ⁿdʑageɾɯ̈]

l. man*za*ru [maⁿdzaɾɯ̈] 'be mixed'
→ man*zya*ru [maⁿdʑaɾɯ̈]

m. in*za*ma(da) [ïⁿdzama] 'no good' → in*zya*ma [ïⁿdʑama]

n. saman*za*ma(da) [samaⁿdzama] 'various'
→ saman*zya*ma [samaⁿdʑama]

o. men*za*wari(da) [meⁿdzaɯaɾï] 'eyesore'
→ men*zya*wari [meⁿdʑaɯaɾï]

p. kon*za*gasi [koⁿdzagasi̤ï] 'a little wise'
→ kon*zya*gasi [koⁿdʑagasi̤ï]

q. bun*za*mani [bɯ̈ⁿdzamanï] 'unsightly'
→ bun*zya*mani [bɯ̈ⁿdʑamanï]

r. wan*za*do [ɯaⁿdzado] 'intentionally'
→ wan*zya*do [ɯaⁿdʑado]

s. *za*bunto [dzabɯ̈nto] 'splash (onomatopoeia)'
→ *zya*bunto [dʑabɯ̈nto]

In these examples, the italicized sequence *za* in the underlying forms includes [dz], and this consonant may be palatalized and realize as [dʑ]. The above examples thus indicate that (1) [dz] is palatalized regardless of

the categorial status of the words in which it occurs; (2) the position of [dz] does not affect the applicability of palatalization: [dz] may occur word-initially as in (g)-(j), or it may occur word-internally or word-finally in the rest of the examples.[11]

Let us move on to the palatalization of [dz] before the vowel [e]. Just as in the case of [dza], [dze] may also be palatalized in the Nambu dialect.

(9) a. kitaka*ze* [kʲ̥itakaⁿdze] 'north wind'
→ kitakan*zye* [kʲ̥itakaⁿdʑe]

b. tan*ze*n [tandzen] 'padded kimono'
→ tan*zye*n [tandʑen]

c. *ze*itagu [dzeʲitagɯ̈] 'extravagant'
→ *zye*itagu [dʑeʲitagɯ̈]

d. *ze*mme [dzemme] 'flowering fern'
→ *zye*mme [dʑemme]

The examples above show that palatalization may occur regardless of the position of *ze:* in (a) and (b), the word-internal and word-final *ze* undergoes palatalization, while in (c) and (d), the word-initial *ze* does.

Let us finally consider cases in which [dz] occurs before the vowel [o].

(10) a. aon*zo*ra [aⁿdzoɾa] 'azure sky'
→ aon*zyo*ra [aⁿdʑoɾa] (=(4b))

b. kawan*zo*go [kaɰaⁿdzogo] 'riverbed'
→ kawan*zyo*go [kaɰaⁿdʑogo]

c. zin*zo* [dzʲⁿdzo] 'guardian deity of children'
→ zin*zyo* [dzʲⁿdʑo]

d. sen*zo* [sendzo] 'ancestor' → sen*zyo* [sendʑo]

e. nan*zo*nan*zo* [naⁿdzonaⁿdzo] 'riddle(*n.*)'
→ nan*zyo*nan*zyo* [naⁿdʑonaⁿdʑo]

f. man*zo*gu [mandzogɯ̈] 'satisfaction'
→ man*zyo*gu [mandʑogɯ̈]

g. min*zo* [mïⁿdzo] 'groove' → min*zyo* [mïⁿdʑo]

h. kan*zo*eru [kaⁿdzoeɾü] 'count(*vt.*)'
→ kan*zyo*eru [kaⁿdʑoeɾü][12]

i. fun*zo*rikeru [ɸünndzoɾïkerü] 'swagger(*vi.*)'
→ fun*zyo*rikeru [ɸünndʑoɾïkerü]

j. *zo*gibayasi [dzogïbajasi̥] 'growth of miscellaneous trees'
→ *zyo*gibayasi [dʑogïbajasi̥]

k. *zoo*gin [dzo:gïn] 'floorcloth' → *zyoo*gin [dʑo:gïn]

l. *zoo*sui [dzo:süïï] 'porridge of rice and vegetables'
→ *zyoo*sui [dʑo:süïï]

m. *zoo*ni[dzo:nï] 'rice cakes boiled with vegetables'
→ *zyoo*ni [dʑo:nï]

n. *zoo*ri 'Japanese sandals' [dzo:ɾï] → *zyoo*ri [dʑo:ɾï]

o. *zoo*sane [dzo:sane] 'easy' → *zyoo*sane [dʑo:sane]

p. *zoro*n*zoro* [dzoroⁿdzoro] 'in droves'
→ *zyoro*n*zyoro* [dʑoroⁿdʑoro]

The above examples vary in categorial status: examples (a)-(g) and (j)-(n) are nouns, (h)-(i) are verbs, (o) is an adjective, and (p) is an adverb. Again, palatalization can apply to [dzo] regardless of the categorial status of the word in which it occurs and also regardless of its position within that word ((a)-(i) are cases in which [dzo] appears word-internally or word-finally, while (j)-(p) are cases in which [dzo] appears word-initially).

We have considered the palatalization of the consonant [dz] in this section. We have observed that as captured by previous studies, [dz] may undergo palatalization in the Nambu dialect when it occurs before the low and mid vowels. As long as [dz] precedes the low and mid vowels, neither its position inside the word nor the categorial status of the word in which it occurs affect the applicability of palatalization. We have also examined the palatalization of [dz] before the high vowels, and have concluded that [dz] is not palatalized in this environment. The following section deals with the palatalization of [s] (i.e., the voiceless counterpart of [dz]).

## 3. Palatalization of [s]

As we have already seen in section 1, previous studies have observed that [s] undergoes palatalization when it appears before the vowel [e]. However, nothing has been said about cases in which [s] precedes the other vowels, [a], [ï], [ü], and [o]. Given the observation of the palatalized [dz] in the previous section, we naturally predict that [s], which is the voiceless counterpart of [dz], may be palatalized in the Nambu dialect at least when it occurs before the vowels [a] and [o] in addition to [e]. Thus, this section first offers additional examples of the palatalization of [se], then examines the prediction that [s] may be palatalized before vowels other than [e].

### *3.1 Mid Front Vowel ([e])*

The sequence [se] is observed in Sato and Kato (1974) to change either to [xe] or to [ɕe] via palatalization (my informants prefer [xe] to [ɕe]). The following data provide additional examples of palatalized [se]:

(11) a. awa*se*ru [aɯasɛɾɯ̈] 'put together'
→ awa*he*ru [aɯaxɛɾɯ̈] or awa*hye*ru [aɯaɕɛɾɯ̈]

b. mi*se*ru [mïsɛɾɯ̈] 'show(*v.*)' → m{i/e}*he*ru [m{ï/e}xɛɾɯ̈] or m{i/e}*hye*ru [m{ï/e}ɕɛɾɯ̈] (See also note 8)

c. hana*se*ru [xanasɛɾɯ̈] 'be able to talk'
→ hana*he*ru [xanaxɛɾɯ̈] or hana*hye*ru [xanaɕɛɾɯ̈]

d. *se*mi [semï] 'cicada' → *he*mi [xemï] or *hye*mi [ɕemï]

e. *se*mbe [sembe] 'rice cracker'
→ *he*mbe [xembe] or *hye*mbe [ɕembe]

f. *se*ttin [settɕïn] 'rest room'
→ *he*ttin [xettɕïn] or *hye*ttin [ɕettɕïn]

g. *se*me [seme] 'narrow' → *he*me [xeme] or *hye*me [ɕeme]

h. *se*wasi [seɯasï] 'noisy'
→ *he*wasi [xeɯasï] or *hye*wasi [ɕeɯasï]

The italicized sequences of the above underlying forms may be palatalized and realize either as [xe] or as [ɕe]. Palatalization applies both to the

word-internal [s] (as in (a)-(c)) and to the word-initial [s] (as in (d)-(h)). Again, the categorial status of words that include [s] does not affect the applicability of palatalization: the examples in (a)-(c) are verbs, those in (d)-(f) nouns, and those of (g)-(h) adjectives.

It should be added that observing the Tsugaru dialect, another dialect spoken in Aomori Prefecture, Kobayashi (1988) claims that palatalization does not apply to the sequence *se* in words derived from Chinese or in other words of foreign origin. In fact, his claim also holds for the Nambu dialect: [s] cannot undergo palatalization when included in Chinese-derived words (e.g., (12a) and (12b)) or in words of foreign origin (e.g., (12c) and (12d)).

(12) a. *se*isin [seïsïn] 'spirit'
→ **he*isin[xeïsïn] or **hye*isin [çeïsïn]

b. *se*nkyo [seŋkjo] 'election'
→ **he*nkyo [xeŋkjo] or **hye*nkyo [çeŋkjo]

c. *se*etaa [se:ta:] 'sweater'
→ **he*etaa [xe:ta:] or **hye*etaa [çe:ta:]

d. aku*se*ru [akɯ̈seɾɯ̈] 'accelerator'
→ *aku*he*ru [akɯxëɾɯ̈] or *aku*hye*ru [akɯçeɾɯ̈]

The italicized sequences in the above examples are not allowed to realize as a palatalized consonant, [xe] or [çe], in the Nambu dialect.

Kobayashi introduces a feature called [+/-Native] to capture the fact that in the Tsugaru dialect, [se] is not palatalized in non-native Japanese words. He claims that to undergo palatalization, [s] needs to occur in words with the feature [+Native]. Given this claim, the situation in (12) automatically follows because *se* occurs in words with the feature [-Native]. As Kobayashi himself notices, however, the acceptability of certain Sino-Japanese words with the palatalized [se] varies among informants. For instance, some informants of the Tsugaru dialect accept the following data:

(13) a. *sen*sei [senseï] 'teacher'
→ *syen*syei [ɕenɕeï] or *hen*hei [xenxeï]

b. *sen* [sen] 'line' → *syen* [ɕen]

As a result of palatalization, the italicized sequence in these words may realize as [ɕe] or [xe].

Again, this also holds true for the Nambu dialect.[13] To deal with the above data, we follow Kobayashi in using the [+/-Native] feature. It should be noted, however, that we regard the feature as a relativized one rather than an absolute one.[14] Accordingly, if a particular Sino-Japanese word is used often in a given speaker's daily life, that speaker may classify it as a native Japanese word; in such cases, the consonant [s] may be palatalized as in a truly native Japanese word, as long as it precedes the appropriate vowels. On the other hand, if a speaker classifies a Chinese-delivered word as one which he/she sometimes hears but never uses, then that speaker will continue to regard the word as "non-native" and will refrain from palatalizing [s] within it.[15]

*3.2 High Vowels ([ɨ] and [ʉ])*

We have observed in section 2.1 that in the Nambu dialect, the high central vowels do not allow the consonant [dz] immediately preceding them to undergo palatalization. This is also true in the case of [s].

(14) a. *si*dzimikai [sɨⁿdzʉmɨke] 'corbicula'
b. *si*mbun [sɨmbʉn] 'newspaper'
c. *su*zu [sʉⁿdzʉ] 'bell'
d. *su*so [sʉso] 'edge'

The above italicized sequences, *si* and *su*, are not palatalized in the Nambu dialect; accordingly, they realize as [sɨ] and [sʉ], respectively.

*3.3 Mid Back Vowel and Low Vowel ([o] and [a])*

If [s] behaves like [dz] with respect to palatalization, we predict that both mid and low vowels will allow the immediately preceding consonant [s] to undergo palatalization. In cases in which [s] precedes the vowel [o], palatalization is allowed to occur, as is demonstrated by the following data:

(15) a. *so*go [sogo] 'there' → *ho*go [xogo]

b. *so*ttan{i/e} [sottan{ï/e}] 'that much'
→ *ho*ttan{i/e} [xottan{ï/e}]

c. *so*ndara [so$^{n}$daɾa] 'then' → *ho*ndara [xo$^{n}$daɾa]

The above italicized sequences undergo palatalization and realize as [xo] in the Nambu dialect. As for the sequence *se*, we have observed in the previous subsection that it may realize both as [xe] and as [ɕe/ɸe]. The sequence *so* in (15) is, on the other hand, changed to [xo] but not to [ɕo]. One possible reason for this fact may be the [+back] feature of the vowel [o]. Besides, for reasons unknown to us, the number of examples like (15) is lexically limited, compared to that of examples of palatalized *se*. Space prevents us from pursuing these issues in this paper.

As for the consonant [s] preceding the vowel [a], palatalization also applies to it. As in the case of the palatalized *so*, however, the number of examples is lexically limited. Palatalization of the sequence *sa* is observed in the following lexical items native to the Nambu dialect:

(16) a. wara*sa(n)*do [ɯaɾasando] 'children'
→ wara*ha*(n)do [ɯaɾaxa($^{n}$)do]

b. mera*sa(n)*do [meɾasando] 'girls'
→ mera*ha*(n)do [meɾaxa($^{n}$)do]

The italicized sequence *ha* is considered to realize as a result of palatalization of *sa*. Besides, the palatalized *sa* realizes as [xa] but not as [ɕa]. In this respect, the palatalization of *sa* and *so* exhibit parallel properties, and these differ from *se*, which may change either to [xe] or to [ɕe] via palatalization.

To sum up, the above data concerning palatalization of [s] are captured by the following phonological rules:

(17) a. [s] → [x]/ ___ [a,e,o]

b. [s] → [ɕ]/ ___ [e]

As mentioned above, the examples of palatalized [sa] and [so] are numerically more limited compare to those of palatalized [se]. It is not clear why there is such a limitation. It is attested, however, that [s] may

undergo palatalization not only before the vowel [e], as claimed in previous studies, but also before the vowel [a] and [o].

*3.4 Comparison of the Phonological Change of [s] with that of [dz]*

To describe the palatalization of [s] and [dz], we have so far proposed several rules: (17) for [s] and (7), repeated here as (18), for [dz].

(18) [dz] → [dʑ]/ ___ [a,e,o]

Given these rules, we can summarize the environments in which [s] and [dz] undergo palatalization, as follows:

(19)

| | [dz] → [dʑ] | [s] → [x/ç] |
|---|---|---|
| [ɨ/ɯ] | no change | no change |
| [e] | [dʑe] | [xe/çe] |
| [o] | [dʑo] | [xo] |
| [a] | [dʑa] | [xa] |

As for the palatalization of [s], [se] differs from [so] and [sa] in that the former may realize both as [xe] and [çe], while the latter only as [xo] and [xa], respectively. It should also be recalled that compared with the palatalization of [se], the palatalization of [so] and [sa] is observed in a lexically more limited number of words. Apart from this, the consonant [s] behaves just like the consonant [dz]: [s] changes to realize as [x] before the vowels [e], [o], and [a], just as [dz] is palatalized to realize as [dʑ] before the same vowels. In other words, [s] and [dz] share palatalization environment. Consequently, this validates our prediction that [dz] and its voiceless counterpart [s] behave similarly with respect to palatalization.

There is one important thing to be noticed, however. That is, what we have so far regarded as the palatalization of [s] is not a phonological change which is, strictly speaking, paralleled to that which [dz] undergoes in the Nambu dialect. More specifically, the phonological change [s] → [x/ç] is not parallel to the phonological change [dz] → [dʑ]. This is because the relevant phonological change of [s] is actually velarization rather than palatalization. What, then, is the phonological change of [s]

which is parallel to the palatalization of [dz]? The phonological change [s] → [tɕ] is parallel to the palatalization of [dz].[16] Let us discuss the *true* palatalization of [s] in the next section.

## 4. *True* Palatalization of [s][17]

The Nambu dialect exhibits the true palatalization of [s] ([s] → [tɕ]) just as it contains the change [dz] → [dʑ]. The phonological change of [s] can be reduced to the following phonological rules:

(20) a. *t-insertion rule:* Ø → [t]/ ___ [s]

b. *Palatalization rule:* [s] → [tɕ]/ t ___ [a,e,o]

To see how these rules work, we apply them to relevant data in the following sections. Let us start with the case in which [s] precedes the vowel [a].

### *4.1 Low Vowel ([a])*

The italicized sequence *sa* in the following underlying forms may undergo palatalization and realizes as [tɕa].

(21) a. matuka*sa* [matsɯ̈kasa] 'pinecone'
→ matskat*tya* [matsɯ̈kattɕa]

b. gi*sa*tto [gïsatto] 'thuck (onomatopoeia)'
→ git*tya*do [gïttɕado]

c. *sa*mbusi [sᵐbüsï] 'dreary'
→ kot*tya*busi [kottɕaᵐbüsï]

Let us now consider how the rules in (20) account for the palatalization of [s] in (21). We assume that the two rules in (20) do not apply independently of each other, and that (20a) is ordered before (20b).[18] Under this assumption, the *t*-insertion rule in (20a) applies to the underlying forms, so that the resulting forms are:[19]

(22) a. matukat*sa*

b. git*sa*tto

c. kot*sa*mbusi

These forms satisfy the conditions for the application of (20b). Consequently, *sa* is altered to *tya*, yielding the correct derived forms.[20]

It is worth noting that the palatalized consonants in (21) are all preceded by geminates. If we regard this fact as a reflection of the properties of the palatalized [s] (i.e., [tɕ]), then we can explain the unacceptability of the following data:

(23) a. *sa*si [sasï] 'ruler' → *t*tya*si [ttɕasï]
b. *sa*ga [saga] 'slope' → *t*tya*ga [ttɕaga]
c. *sa*gu [sagɯ̈] 'bloom(*vi.*)' → *t*tya*gu [ttɕagɯ̈]

In these examples, the two rules in (20) apply to the initial sequence *sa*, overgenerating the derived forms.[21] The unacceptability of the above derived forms thus seems to pose a problem to the rules in (20). We claim, however, that the derived forms are filtered out by the general condition that an initial geminate is not permitted in the Japanese language including the Nambu dialect.

There is another potential problem with the rules in (20) although they appropriately account for the phonological change in (21). The following unacceptable examples cast doubt on the rules in (20):

(24) a. iku*sa* [ïkɯ̟sa] 'war' → *ikut*tya* [ïkɯ̟ttɕa]
b. ka*sa* [kasa] 'umbrella' → *kat*tya* [kattɕa]
c. *sasa* [sasa] 'bamboo grass' → *sat*tya* [sattɕa]

The rules apply to the sequence *sa* in these examples, and predict that they are acceptable, contrary to the fact.[22] Interestingly enough, although *kasa* in (24b) and *matukasa* in (21a) share the sequence *kasa*, only the latter is allowed to undergo palatalization. It seems, then, that only a lexically-limited number of words may occur with geminates, whereby satisfying the condition that the palatalized [s] must be preceded by geminates. Put it another way, the *t*-insertion rule in (20a) can apply only to a lexically-limited number of words; therefore, the palatalized [sa] occurs only in such words.

*4.2 Mid Vowels ([e] and [o])*

This subsection considers the cases in which [s] precedes the mid vowels. Let us start with the case of *se*. As in the case of *sa*, the sequence *se* undergoes palatalization when it is preceded by a geminate.

(25) a. *se*wasi [seɰasï] 'noisy' → kot*tye*wasi [kottɕeɰasï]
b. ti*se* [tsi̤se] 'small' → tit*tye* [tsi̤ttɕe]

Without the prefix *ko*, (25a) would not satisfy the condition for the palatalization of [s] since the underlying form would otherwise result in a word-initial geminate, which is not licensed in Japanese. The prefix, however, changes the otherwise word-initial geminate to a non-word-initial one; consequently, the italicized sequence of (25a) can undergo palatalization.

Let us now see how the correct derived forms in (25) are generated via the rules in (20). The *t*-insertion rule in (20a) first applies to the underlying forms. The resulting forms then are:[23]

(25) a'. kot*se*wasi
b'. tsit*se*

These forms satisfy the condition for the palatalization rule in (20b). Consequently, the palatalization rule changes the italicized *se* in (25) to *tye*. As a result, we obtain the correct derived forms.

Let us move on to the case of *so*. Before the mid back vowel [o], [s] is also palatalized when preceded by geminates, as the following data indicate:

(26) a. he*so* [xeso] 'navel' → het*tyo* [xettɕo]
b. nagibe*so* [nagïbeso] 'the state of being close to tears'
→ nagibet*tyo* [nagïbettɕo]
c. *so*rotte [sorotte] 'gathering together'
→ kit*tyo*sotte [ki̤ttɕorotte]

Again, the two rules in (20) can adequately account for the above data. First, the *t*-insertion rule applies to the underlying forms. The resulting forms are:

(26) a'. het*so*

b'. nagibet*so*

c'. kit*so*rotte

Then, the palatalization rule in (20b) applies to the sequence *so* in these forms, so that it realizes as *tyo*. We thus obtain the correct derived forms.

In the examples we have dealt with so far, the palatalized [s] is appropriately preceded by a geminate. As is the case of *sa*, however, the rules in (20) do not apply to the word-initial sequences *se* and *so* in the following examples:

(27) a. *se*mi [semï] 'cicada' → *t*tye*mi [ttɕemï]

b. *se*nko [seŋko] 'incense stick' → *t*tye*nko [ttɕeŋko]

c. *so*go [sogo] 'bottom' → *t*tyo*go [ttɕogo]

d. *so*ri [soɾï] 'sled' → *t*tyo*ri [ttɕoɾï]

The same explanation as in the case of *sa* can be provided with this fact. That is, we reduce the illicitness of (27) to a violation of the general condition that the word-initial geminate is not allowed in Japanese.

The number of words to which the rules in (20) apply is also lexically limited, as is the case of *sa*. Consider the following data:

(28) a. yama*se* [yamase] 'dry wind blowing down a mountain'
→ *yamat*tye* [yamattɕe]

b. ka*se*gu [kasegü] 'earn' → *kat*tye*gu [kattɕegü]

c. mi*so* [mïso] 'fermented soybean paste'
→ *mit*tyo* [mïttɕo]

d. si*so* [sïso] 'perilla (a type of plant)'
→ *sit*tyo* [sïttɕo]

These examples do not violate any condition; thus, the rules in (20) erroneously predict that the derived forms are acceptable.[24] The illicitness of (28) then indicates that the *t*-insertion rule can apply only to lexically-limited number of words.

In this section, we have discussed the palatalization of [s]. Given the description in this section and in previous sections, the environments for the phonological changes that [s] and [dz] may undergo in the Nambu dialect can be summarized as follows:

(29)

| | Palatalization of [dz] | Palatalization of [s] | Velarization of [s] |
|---|---|---|---|
| [ɨ/ɯ̈] | no change | no change | no change |
| [e] | [dʑe] | [tɕe] | [xe/ɕe] |
| [o] | [dʑo] | [tɕo] | [xo] |
| [a] | [dʑa] | [tɕa] | [xa] |

This table clearly shows that [dz] and [s] exhibit exactly parallel behaviors: both of the consonants may be palatalized before the vowels [a], [e], and [o]. Thus, we reach the conclusion that [dz] and [s] undergo palatalization (and for [s], velarization, too) in parallel environments. Of course, the environments are not completely the same: the palatalized [dz] must follow a nasal, whereas the palatalized [s] must follow a geminate. It should be also mentioned that the behavior of these two consonants is not completely parallel in that [s] has two types of palatalization (i.e., the true palatalization and velarization) and its palatalization is restricted to a lexically-limited number of words.

## 5. Concluding Remarks

We have discussed the phonological changes undergone by [s] and [dz] in the Nambu dialect. Previous studies have not paid attention to the relation between [dz] and [s]. In fact, the phonological change of [s] that has been observed is not the exact counterpart of that of [dz]. The change of [s] to either [xe] or [ɕe/ɕe] is an instance of velarization rather than of palatalization.

Comparing the *true* palatalization of [s] with that of [dz], we have reached the conclusion that [s] and [dz] basically parallel although they must meet a distinctive requirement, respectively: geminates should immediately precede the palatalized [s] (i.e., [tɕ]), whereas nasals should

immediately precede the palatalized [dz] (i.e., [dʑ]). From a theoretical point of view, the parallel behavior is naturally predicted from the relationship between [s] and [dz] because [s] is the voiceless counterpart of [dz] (see note 1).

Let us finally list the rules we have proposed in this paper in order to deal with the phonological changes that [s] and [dz] undergo in the Nambu dialect.

(30) a. *Palatalization of [dz]:* [dz] → [dʑ]/ ___ [a,e,o]

b. *Palatalization of [s]:* (i) Ø → [t]/ ___ [s]

(ii) [s] → [tɕ]/ t ___ [a,e,o]

c. *Velarization of [s]:* [s] → [x]/ ___ [a,e,o]

[s] → [ç]/ ___ [e]

## Appendix

In the main text, we have proposed the following rules to account for the *true* palatalization of [s], namely [s] → [tɕ]:

(31) a. *t-insertion rule:* Ø → [t]/ ___ [s]

b. *Palatalization rule:* [s] → [tɕ]/ t ___ [a,e,o]

There are data that pose a problem for these rules, however. Consider the following demonstrative pronouns with the case particle *sa* denoting goal or direction (cf. Sato (1961) and Morishita (1982)):

(32) a. atti-*sa* [attsɨ̥-sa] 'to there' → at*tya* [attɕa]

b. kotti-*sa* [kottsɨ̥-sa] 'to here' → kot*tya* [kottɕa]

c. sotti-*sa* [sottsɨ̥-sa] 'to there' → sot*tya* [sottɕa]

d. dotti-*sa* [dottsɨ̥-sa] 'to where' → dot*tya* [dottɕa]

In the above data, the case particle *sa* in the underlying forms may undergo palatalization and realize as *tya*. Let us apply the rules in (31) to (32) and examine whether the rules in can sufficiently account for this phonological

change. First, the *t*-insertion rule applies to the underlying forms, and then the consonant [s] intervening between the inserted [t] and the vowel [a] is changed to [tɸ]. Thus, the rules will derive the following forms:

(33) a. *attit*tya* [attsɨ̥ttɸa]
b. *kottit*tya* [kottsɨ̥ttɸa]
c. *sottit*tya* [sottsɨ̥ttɸa]
d. *dottit*tya* [dottsɨ̥ttɸa]

These resulting forms are, however, not permitted in the Nambu dialect. We thus conclude that the rules in (31) as such cannot adequately deal with the phonological change in (32).

To overcome this problem, we claim that the data in (32) should be treated differently from the rest of the data accounted for in the main text by the rules in (31). Taking into consideration the fact that the sequence *tis* shared by the data in (32), we propose an analysis that deals with (32) without recourse to the rules in (31). This analysis assumes the following rules:

(34) a. *palatalization rule:* [ts] → [tɸ] / ___ [ɨ̥]
b. *i-deletion rule:* [ɨ̥] → Ø / tɸ ___
c. *s-deletion rule:* [s] → Ø / ɸ ___

The rules in (34a) and (34b) show that when preceding [ɨ̥], [ts] changes to realize as [tɸ] and the vowel is deleted, while the rule in (34c) shows that the consonant [s] following [ɸ] is deleted.

Take (32a) for instance, and consider how the above rules lead to the correct derived forms in (31). The rule in (34a) applies to the underlying form *atti-sa* since it includes the sequence transcribed as [tsɨ̥s], satisfying the condition for (34a). As a result, [ts] is changed to [tɸ], and then the vowel is deleted by the rule in (34b). The resulting form [attɸsa] has the sequence [ɸs], satisfying the condition for the rule in (34c). The consonant [s] is thus deleted, and we reach the correct derived form [attɸa]. Parallel explanations hold for the remainders in (31).

Furthermore, the rules also accommodate the following data:

(35) a. got*iso* [gotsɨ̥so] 'treat' → got*tyo*

b. buti+*sa*gu [sagɯ̈] 'tear(*vt.*)' → but*tya*gu [bɯ̈ttɕagɯ̈]

c. buti+*sa*geru [sageɾɯ̈] 'tear(*vi.*)'

→ but*tya*geru [bɯ̈ttɕageɾɯ̈]

The italicized sequences in the above underlying forms may undergo palatalization. In the case of (35a), the palatalization rule in (34a) and the *i*-deletion rule in (34b) apply to the underlying form in turn, so that the resulting form can be transcribed as [gotɕso]. Because this form includes the sequence represented by [ɕs], [s] is deleted by the *s*-deletion rule in (34c). After undergoing the three rules, the underlying form of (35a) becomes [gotɕo]. This form is, however, not the correct derived form [gottɕo].

To obtain the right result, the consonant [t] needs to be inserted between the former [o] and [tɕ]. We stipulate that the *t*-insertion is required to retain the number of morae of the word. More specifically, since the rules in (34) change the two-mora sequence *tiso* to the one-mora sequence *tyo*, the t-insertion applies to the form derived by (34) to compensate the mora deleted by the application of (34).

Let us now consider (35b) and (35c). We can offer the same explanation as (35a) to these examples if we make the general assumption that the prefix *bu* in these examples stands for *buti* ('hitting'). We stipulate under this assumption that the underlying forms of (35b) and (35c) are *buti-sagu* and *buti-sageru*, respectively (although they cannot realize as surface forms without undergoing the phonological change mentioned below). Since these underlying forms include the sequence *tis* represented by [tsɨ̥s], the rules in (34a) and (34b) apply to them. The resulting forms are then [bɯ̈tɕsagɯ̈] and [bɯ̈tɕageɾɯ̈], satisfying the environment for the rule in (34c); thus, [s] is deleted. Finally, [t] is inserted between the first [ɯ̈] and [tɕ] to retain the number of morae. Consequently, we obtain the correct derived forms of (35b) and (35c): [bɯ̈ttɕagɯ̈] and [bɯ̈ttɕageɾɯ̈].

## Notes

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[1]There is still controversy concerning the phonetic status of the consonant [dz] in Japanese. Based on the widely-accepted assumption that /z/ is the voiced counterpart of /s/, we stipulate in this paper that [dz] is the voiced counterpart of [s]. This stipulation crucially relies on the idea that /z/ realizes as [dz].

[2]In this paper, we add narrow transcriptions to words in the Nambu dialect although the transcriptions are not necessarily indispensable for our discussion. This is because registering the accurate pronunciation of words in the Nambu dialect is also the purpose of this paper. Besides, for the purpose of accuracy, we use the more appropriate symbols ("ʑ" and "ɕ") than the symbols ("ʒ" and "ʃ") for alveolo-palatal fricatives .

[3]Abbreviations, *v(i/t).* standing for an (intransitive/transitive) verb or *n.* standing for a noun, may be added to translations in order to disambiguate their categorial statuses.

[4]Sato and Kato point out that the palatalization phenomenon in (3) is observed in Takko Town but not in the rest of the territory (Takko Town is located in the southern district of Aomori Prefecture). This fact then indicates that the Nambu dialect has at least two variants with respect to palatalization, out of which only one allows the process. Since our purpose

is to study the palatalization phenomenon, we choose as the subject of our study the variant which allows palatalization as in (3) (and also (1) and (2)).

[5]Sato and Kato's original phonetic transcriptions for *hembi* 'cicada' and *kanzye* 'wind' are [xẽbɨ] and [kãdʒe], respectively. To transcribe these pronunciation, we follow the conventions in the literature in using the symbol "ⁿ" instead of the symbol "~" (by the symbol "ⁿ", we mean that it is not moraic). Consequently, we assign the transcriptions [xeᵐbɨ] and [kaⁿdʑe] to these words.

[6]I thank Masao Okazaki and Hideki Zamma for suggesting this point to me.

[7]In standard Japanese, on the other hand, the consonants [dz] and [s] are palatalized before the high front vowel [i] and realize as [dʑ] and [ɕ], respectively.

[8]In fact, these two vowels in the Nambu dialect are phonetically close, as shown by the interchangeability of the vowels [ɨ] and [ʉ] in the following examples:

(i) a. sin*zi*mike [sɨⁿdzɨmɨke] 'corbicula (a type of fresh-water clams)' → sunzumike [sʉⁿdzʉmɨke]

b. *zi*sama [dzɨsama] 'old man' → zusama [dzʉsama]

In these examples, the italicized sequence *zi* in the underlying forms can be altered to *zu*.

As for the low and mid vowels (i.e., [a], [e] and [o]), they do not exhibit interchangeability as [i] and [ɯ] do; however, as we will see below in the text, the centralized [i] is sometimes altered to [e].

[9]We regard the forms closer to the standard Japanese counterparts as the underlying forms although it may be also possible to assume more abstract base forms for what we call underlying and derived forms.

[10]Nasals before the voiced stops are transcribed in this paper either as the ordinary symbols (e.g., [n][m][ŋ]) or as the superscript symbols (e.g., [ⁿ][ᵐ][ᵑ]). The former are used to transcribe words containing a moraic nasal and parallel standard Japanese orthography. The superscript symbols for nasals, as mentioned in note 5, indicate that the nasals are not

moraic. The ordinary symbols, on the other hand, indicate that they are moraic. It should be noted that a word with a moraic nasal (represented by an ordinary symbol) may also have an alternative phonetic transcription with a non-moraic nasal (represented by its superscript counterpart). The opposite is not true, however: a word with a non-moraic nasal does not have an alternative transcription with a moraic nasal. Take for instance *anza* and *kanzarasi* in (8a) and (8d) whose phonetic transcriptions are [aⁿdza] and [kandzaɾasï̤], respectively. The latter has an additional phonetic transcription, namely [kaⁿdzaɾasï̤], but the former does not.

[11]It is worth mentioning that nasals always precede [dʑa] except for the case in which it occurs word-initially. The same holds for the cases of [dʑe] and [dʑo], as we will see below in the text. This fact is also pointed out by Sato (1966) and Sato and Kato (1974).

[12]This example illustrates the case in which the vowels [e] and [ï̤] are interchanged. See also note 8.

[13]It should be noted, however, that for reasons unknown to us, the phonological change [s] → [ɕ] is attested only in a few examples as in (i) irrespective of whether they are Sino-Japanese or not.

(i) a. *sa*gan 'plasterer' → *sya*gan [ɕagan]
b. ba*so*ri 'sleigh' → ba*syo*ri [baɕoɾï̤]

[14]I thank Prof. Shosuke Haraguchi and Takeshi Shimada for bringing this point to my attention.

[15]The argument here also carries over to the case of [dz].

[16]In note 1, we have assumed that the voiceless counterpart of [dz] is [s]. Under this assumption, it is naturally expected that the voiceless counterpart of [dʑ] is [ɕ] rather than [tɕ]. Consequently, the phonological change of [s] which is *completely* parallel to that of [dz] is [s] → [ɕ]. However, this change is rather rarely observed in the Nambu dialect (see note 13). Of course, it is theoretically possible to assume an abstract derivation in which /s/ is first palatalized and thus becomes [ɕ], and then this is obligatorily changed to [tɕ]. The purpose of this paper is, however, to offer descriptive generalizations rather than theoretical analyses;

therefore, regarding the above examples as exceptions, we deal with the phonological change [s] → [tɕ] which is more productive (although it is not completely parallel to the change [dz] → [dʑ]).

[17]At the end of the previous section, we have introduced the term "true palatalization" to disambiguate velarization and palatalization. For the sake of brevity, however, we use the term "palatalization" in this section to refer to the true palatalization.

[18]Under this assumption, the *t*-insertion rule first changes the consonant [s] to the affricate [ts], and then the palatalization rule applies only to a part of the affricate (i.e., *s*). One may claim that this partial application of the palatalization rule is intuitively rather unnatural. Masao Okazaki, however, suggested to me that Sagey (1986) claims that a rule may apply to only one of the contour-segments. Then, our claim for the partial application of rules is not unprecedented.

[19]One may claim that in addition to the first [s], (21c) has another [s] to which the *t*-insertion rule may apply. If this claim were correct, we would have *kotsambutsi* as the resulting form. Of the two [s]'s in this form, however, only the first satisfies the condition for the palatalization rule in (20b); therefore, the second remains unpalatalized. The rules in (20) thus overgenerate the incorrect surface form *kottyabutsi*.

To rule out this form, we stipulate that the *t*-insertion rule should parse from the left to the right of words and it is limited to a single application. This stipulation enables us to account for the illicitness of *kottyabutsi*. Since the *t*-insertion rule applies to the leftmost [s], it cannot apply to the second [s] of the underlying form *kosambusi;* consequently, the derived form *kottyabutsi*, whose second [s] also undergoes the *t*-insertion rule, is illegitimate. I thank Masao Okazaki for suggesting this point to me.

[20]After *sa* undergoes the rule in (20a), the pre-palatalized form *gitsatto* loses [t] in its geminate [tt] and realizes as *gittyado* with the remaining [t] voiced. This phenomenon may be attributable to the assumption that a single word cannot include two geminates.

[21]The example in (23a) has two [s]'s both of which seemingly satisfy

the condition for the *t*-insertion rule. Under the stipulation suggested in note 19, however, we can rule out the unacceptable surface form *satsi*. This is because parsing from the left to the right of the underlying form, the rule applies to the first [s] and consequently cannot apply any longer to the second [s].

[22]The stipulation suggested in note 19 enables us to rule out the example in (24c). Since the *t*-insertion rule should apply to the first *sa* rather than the second *sa*, the resulting form is *ttyasa;* however, this form includes a word-initial geminate that is not licensed Japanese.

[23]As is the case of *sambusi* in (21c), the second [s] in (25a) is not eligible for *t*-insertion. This is because the *t*-insertion rule should apply to the first (i.e., leftmost) [s]. See also note 19.

[24]Given the stipulation mentioned in note 19, we can rule out (28d) since in this case, the *t*-insertion rule applies not to the first [s] but to the second [s].

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