A quantitative study on the ’Phags-pa script*

Byun Hanyoung**, Choe Gyeyeong
Seoul National University, Korea

Kim Minkyu**
University of California at Irvine, USA

Yurn Gyudong***
Yonsei University, Korea

In this paper, we investigate the usage and distribution of letters in the ’Phags-pa script quantitatively. Originally invented by a Tibetan monk to write Middle Mongolian, the script shows several peculiarities as a writing system. An important point of this script is that it shows variation in usage since writers of the script might not have had a standard for usage, and it was used not only for Middle Mongolian, but also for Tibetan, Chinese and Sanskrit. Thus, the aim of the study is to clarify the tendencies regarding the writing of the script. After creating a corpus from over 70 materials written in the ’Phags-pa script, we examine the (i) frequency of each letter, (ii) syllabic structures expressed in the script, (iii) patterns of vowel harmony, and (iv) some idiosyncratic functions of certain letters. By doing so, the study allowed us to examine some rules and exceptions of the script. This not only highlights the phonological structure of Middle Mongolian reflected in the script, and but also offers a comprehensive view of the ’Phags-pa script.

Keywords: ’Phags-pa script, quantitative analysis, Middle Mongolian, vowel harmony, token frequency

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**Both authors contributed equally to this article and are presented in alphabetical order.
***Corresponding author

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1. Introduction

In this paper, we investigate the distribution and the usage of the 'Phags-pa script quantitatively. Despite its importance in the history of the Mongolian language and the history of writing systems, there have been few studies that examined the 'Phags-pa script using a large data set and provided a quantitative analysis of it. It is necessary to look into the 'Phags-pa script quantitatively since the script shows variation in usage. Although the 'Phags-pa script was invented primarily to write Middle Mongolian, languages that the script was used for were not limited to Middle Mongolian; Chinese, Tibetan and Sanskrit were also written using the script. These different domains of usage allowed the script to express various phonetic values with a single letter or led to different distributions or combinations of letters that would not emerge in Middle Mongolian. Moreover, variation exists within Mongolian since the writers of the script did not have standard rules for writing the script. Hence, the linguistic knowledge of Mongolian speakers may have been reflected in different variations of writing systems. By looking at quantitative data, we were able to figure out the phonological structure of Middle Mongolian, as well as the various usages and functions of the letters, distinguishing regular (frequently attested) usage of letters from exceptional (rarely attested) usage. The data we investigated is based on the transcription and transliteration of the Middle Mongolian monuments collected by Hugjiltu (2004) and Tumurtogoo (2010), which include over seventy written materials such as empirical edicts as well as religious monuments written in the 'Phags-pa script. We first cross-examined the written materials collected by Hugjiltu (2004) and Tumurtogoo (2010), for any difference in transliteration or transcription from the source material. Since there were several discrepancies or typographical errors in transliteration and transcription between the two sources, we checked and modified them, comparing with the actual images of such materials. After digitizing the written source with some modifications, more than 37,000 letters were analyzed. These constitute 6,426 words and 16,846 syllables in total.[1]

[1] In this study, repeating words in the corpus are included in the dataset and counted as a separate item. Thus, the statistics given in this paper are focused on the token frequencies of the letters in order to examine orthographic variation in the corpus. However, as pointed out by an anonymous reviewer, this method has limitations in that

One thing to note about the ’Phags-pa script before we begin our investigation of it, is that the script exhibits some modifications from the Tibetan script on which the script was modeled. It is based on the abugida system in that there is no apparent letter for ⟨a⟩[2]; /a/ is inherent within a basic unit of letters for spacing, which is a syllable, and is written without a vowel letter. For instance, ꡊ ꡘꡟ ꡂꡛ ⟨d-ru-qs⟩ “commanders,” should be transcribed and read as /daruqas/, the first and the third syllable including an inherent vowel /a/. However, there are also vowel letters ⟨o, u, e, ė, i⟩ which were written separately from the consonant letters. This characteristic of the script is different from the abugida system of the Tibetan script.

Throughout the paper, we followed a slightly modified version of the transcription and transliteration rules of Hugjiltu (2004). Although Hugjiltu classified different variants of a letter with different transliteration, here we classify them as a single grapheme, unless there is an apparent difference in distribution. The classification of letters based on their shape and usage has been suggested in Choe *et al.* (2017). In addition, another point that our transcription diverge from that of Hugjiltu is that ⟨yi⟩ and ⟨ė⟩ after a vowel were both transcribed as /y/ unless the word containing these letters is foreign. This transcription was based on our analysis of off-glides in Middle Mongolian; as claimed in Poppe (1957), ⟨i⟩ in ⟨yi⟩ and ⟨ė⟩ after a vowel does not represent a vowel, but a semivowel following a preceding vowel. Thus it is more straightforward to transcribe them as /y/ in order to denote them as semivowels. Below is the table of transcription and transliteration rules that were employed in this study. The ordering of letters follows that of the Unicode chart.

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statistics might be biased toward frequently occurring words or phrases in the corpus, since our corpus mainly consists of edicts which are organized in similar formats. Future research is required in order to compare the type frequency based results with the token frequency based ones that exclude repeating words.

[2] We employed ⟨ ⟩ for the transliteration of letters. / / is used to denote the transcription of the script. Also, ‘-’ is used to denote a syllabic boundary in the transliteration, which is marked by a space in the original script.

(1) Transliteration and transcription of the ’Phags-pa script

Letter	Translit.	Transcr.	Letter	Translit.	Transcr.
ꡀ	k	k	ꡆ	ts	ts
ꡁ	k‘	k‘	ꡇ	ts‘	ts‘
ꡂ	g	g	ꡈ	dz	dz
ꡃ	ŋ	ŋ	ꡉ	w	w
ꡄ	č	č	ꡊ	ž	ž
ꡅ	č‘	č‘	ꡋ	z	z
ꡌ	ǰ	ǰ	ꡐ	•	a / ◌̄ / •[3]
ꡍ	ň	ň	ꡑꡒ	y	y
ꡎꡏ	t	t	ꡓ ꡔ ꡕ	r	r
ꡐꡑ	t‘	t‘	ꡖ	l	l
ꡒꡓ	d	d	ꡗꡘ	š	š
ꡔꡕ	n	n	ꡙ	s	s
ꡖ	p	p	ꡚꡛ	h	h
ꡗ	b	b	ꡜꡝ	q	q
ꡘ	b‘	b‘	ꡞ	γ	γ
ꡙ	m	m	ꡟ	hv	f
ꡚ	’	a / ’[4]	ꡠ	v	v
ꡛ	i	i	ꡡ	j	j
ꡜ	u	u	ꡢꡣ	yi	y (Mongolian)
ꡝ	ė	ė / y (after a vowel)			
ꡞ	o	o			
ꡟ	e	e			
ꡠꡗ	eu	ü / eu (foreign)			
ꡞꡟ	eo	ö / eo (foreign)			

[3] ꡐ is transcribed as /a/ when there is no vowel in a syllable, as a macron (◌̄) over the succeeding vowel (e.g., /ā/, /ē/, /ū/) when the letter is placed after a consonant, and /•/ elsewhere. This distribution will further be discussed in Section 5.

[4] ꡚ is transcribed as /a/ when there is no apparent vowel in a syllable and as /’/ elsewhere.

Within this dataset, we surveyed the (i) frequency and distribution of each letter, (ii) syllabic structure of the script, (iii) distribution of dark vowels ⟨e, ė⟩, and the “light-dark” vowel harmony, (iv) usage of the so-called “null initial” ⟨’⟩ and the “glottal letter” ⟨•⟩.

2. Frequency and distribution of single segments

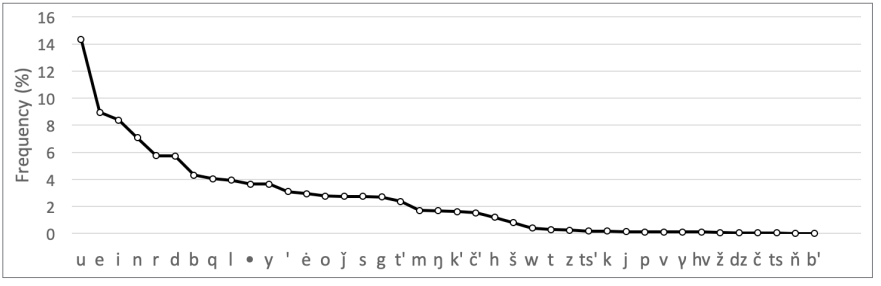
2.1. Consonant

Below is the table and the line graph of the number of occurrences and the frequency in which each ’Phags-pa letter is used in the corpus. In the table, the rows are sorted in descending order. Among consonants, letters that were used only in Middle Mongolian are as follows: ⟨b, m, d, t‘, s, n, r, l, ǰ, č‘, š, y, g, k‘, q, ŋ, h, •⟩ (Svantesson *et al.* 2005).

(2) Frequency of each letter

Rank	Letter	#	%	Rank	Letter	#	%
(1)	u	5,339	14.350	(21)	k‘	600	1.613
(2)	e	3,328	8.945	(22)	č‘	573	1.540
(3)	i	3,115	8.372	(23)	h	445	1.196
(4)	n	2,635	7.082	(24)	š	298	0.801
(5)	r	2,136	5.741	(25)	w	153	0.411
(6)	d	2,132	5.730	(26)	t	113	0.304
(7)	b	1,604	4.311	(27)	z	92	0.247
(8)	q	1,510	4.058	(28)	ts‘	69	0.185
(9)	l	1,468	3.946	(29)	k	68	0.182
(10)	•	1,360	3.655	(30)	j	49	0.132
(11)	y	1,357	3.647	(31)	p	47	0.126
(12)	’	1,155	3.104	(32)	v	47	0.126
(13)	ė	1,100	2.956	(33)	γ	47	0.126
(14)	o	1,032	2.774	(34)	hv	43	0.115
(15)	ǰ	1,024	2.752	(35)	ž	24	0.065

Rank	Letter	#	%	Rank	Letter	#	%
(16)	s	1,022	2.746	(36)	dz	21	0.056
(17)	g	1,007	2.706	(37)	č	20	0.054
(18)	t‘	884	2.375	(38)	ts	16	0.043
(19)	m	637	1.712	(39)	ň	4	0.010
(20)	ŋ	630	1.693	(40)	b‘	2	0.005
					Total	37,206	100



Next, we re-tabulated the frequency of letters by the place of articulation and the manner of articulation. We followed the consonantal classification of Poppe (1957). Since the manner of articulation for ⟨ɣ⟩ and ⟨•⟩ is unclear, we excluded them in (4).

(3) Frequency of consonants classified by the place of articulation

Class	Letter	#	%	Ratio among the class (%)	Sum	
Labial	b	1,604	7.246	63.324	2,533	6.808%
	b‘	2	0.009	0.079		
	p	47	0.212	1.856		
	m	637	2.877	25.148		
	w	153	0.691	6.040		
	v	47	0.212	1.856		
	hv	43	0.194	1.698		

Class	Letter	#	%	Ratio among the class (%)	Sum	
Alveolar	d	2,132	9.631	20.136	10,588	28.458%
	t‘	884	3.993	8.349		
	t	113	0.510	1.067		
	dz	21	0.095	0.198		
	ts‘	69	0.312	0.652		
	ts	16	0.072	0.151		
	s	1,022	4.617	9.652		
	z	92	0.415	0.869		
	n	2,635	11.903	24.858		
	r	2,136	9.649	20.174		
	l	1,468	6.631	13.865		
Palatal	ǰ	1,024	4.626	30.576	3,349	9.001%
	č‘	573	2.588	17.110		
	č	20	0.090	0.597		
	š	298	1.346	8.898		
	ž	24	0.108	0.717		
	ň	4	0.018	0.119		
	y	1,357	6.130	40.520		
	j	49	0.221	1.463		
Velar	g	1,007	4.549	26.075	3,862	10.380%
	k‘	600	2.710	15.536		
	k	68	0.307	1.761		
	q	1,510	6.821	39.099		
	γ	47	0.212	1.217		
	ŋ	630	2.846	16.309		
Glottal	h	445	2.010	24.654	1,805	4.851%
	•	1,360	6.144	75.346		
Total					22,137	100%

(4) Frequency of consonants classified by the manner of articulation

Class	Letter	#	%	Ratio among the class (%)	Sum	
Stop	b	1,604	7.738	20.133	7,967	39.482%
	b‘	2	0.010	0.025		
	p	47	0.227	0.590		
	d	2,132	10.285	26.760		
	t‘	884	4.264	11.096		
	t	113	0.545	0.142		
	g	1,007	4.858	12.640		
	k‘	600	2.894	7.531		
	k	68	0.328	0.085		
	q	1,510	7.284	18.953		
Fricative	hv	43	0.207	0.873	1,924	9.535%
	s	1,022	4.930	53.119		
	z	92	0.444	4.782		
	š	298	1.438	15.489		
	ž	24	0.116	1.247		
	h	445	2.147	23.129		
Affricate	dz	21	0.101	1.161	1,723	8.539%
	ts‘	69	0.332	4.005		
	ts	16	0.077	0.927		
	ǰ	1,024	4.940	59.431		
	č‘	573	2.764	33.256		
	č	20	0.096	1.237		
Nasal	m	637	3.073	16.308	3,906	19.357%
	n	2,635	12.711	67.460		
	ň	4	0.019	0.102		
	ŋ	630	3.039	16.129		
Liquid	r	2,136	10.303	59.267	3,604	17.860%
	l	1,468	7.081	40.733		

Class	Letter	#	%	Ratio among the class (%)	Sum	
Approximant	y	1,357	6.546	84.496	1,606	7.959%
	w	153	0.738	9.526		
	j	49	0.236	3.051		
	v	47	0.227	2.927		
Total					20,179	100

Let us discuss several tendencies found in (2), (3) and (4). For the consonants, the alveolar class makes up the greatest portion of them, and the glottal class the smallest. The labial class makes up relatively a small portion among the major place classes and it lacks the aspiration contrast[5] which is present in the other place classes (alveolar, palatoalveolar, and velar).[6] Concerning the manner of articulation, stops make up the largest group, followed by nasals, liquids, fricatives, affricates, and approximants. The following consonants are ones in which the frequency is less than 1% of all occurrences: p, w, v, hv, t, dz, ts‘, ts, z, č, ž, š, ň, j, k, γ. According to Tumurtogoo (2010), all of these letters, except for ⟨š⟩, are used to express foreign sounds, which explains their low frequency.

Previous studies (Svantesson *et al.* 2005, among others) suggest that the contrast of aspiration in obstruents was present in Middle Mongolian. This is well reflected in the script. Letters ⟨d⟩-⟨t‘⟩, ⟨ǰ⟩-⟨č‘⟩, ⟨g⟩-⟨k‘⟩ contrast with each other, the former being unaspirated and the latter being aspirated. Furthermore, given that the frequency of the aspirated obstruents is lower than the aspirated one, we can suggest that the aspirated obstruents in Middle Mongolian are more marked than the unaspirated ones. In other words, the laryngeal specification of aspiration is marked in Middle Mongolian. In order to better show this contrast, the frequency among stop consonants is presented below. The stop letters are classified by their position; word-initial, syllable-initial (non-word-initial), and syllable-final.

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[5] ⟨t‘, č‘, k‘, ts‘⟩ represent aspirated consonants (Poppe 1965, Hugjiltu 2004).

[6] Letter 𐡂 ⟨b‘⟩ appears to be an allograph of 𐡁 ⟨b⟩; Hugjiltu (2004) classifies them as different graphemes, but studies such as Tumurtogoo (2010) consider them a variant form of a single grapheme.

(5) Frequency among stop consonants

(i) Alveolar

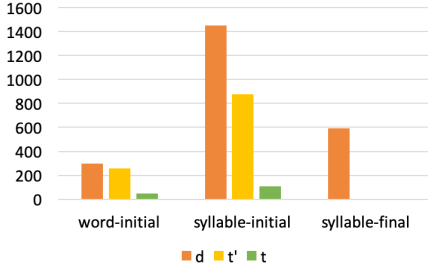
	d		t‘		t		Sum
word-initial	296	(49.2%)	257	(42.7%)	49	(8.1%)	602 (100%)
syllable-initial	1,451	(59.6%)	877	(36.0%)	107	(4.4%)	2,435 (100%)
syllable-final	593	(49.2%)	4	(0.67%)	0	(0.0%)	597 (100%)

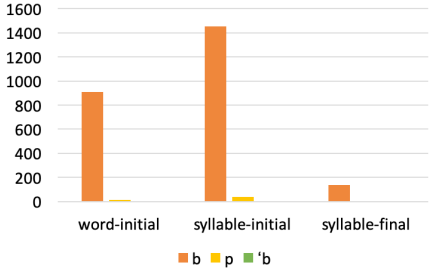
(ii) Labial

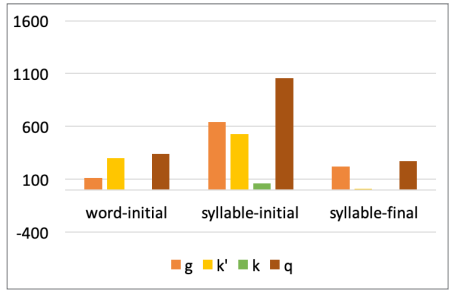
	b		p		b‘		Sum
word-initial	907	(98.8%)	11	(1.2%)	0	(0.0%)	918 (100%)
syllable-initial	1,451	(97.3%)	39	(2.6%)	2	(0.1%)	1,492 (100%)
syllable-final	139	(99.3%)	1	(0.7%)	0	(0.0%)	140 (100%)

(iii) Velar

	g		k‘		k		q		Sum
word-initial	116	(15.2%)	299	(39.2%)	6	(0.8%)	342	(44.8%)	763 (100%)
syllable-initial	641	(28.0%)	526	(23.0%)	62	(2.7%)	1,058	(46.3%)	2,287 (100%)
syllable-final	224	(44.2%)	13	(2.5%)	0	(0.0%)	270	(53.3%)	507 (100%)







In (5), the frequency of ⟨p⟩, ⟨t⟩, ⟨č⟩, ⟨k⟩ is much lower than their homorganic counterparts. This is due to the fact that these letters were not in contrast with other obstruents in Middle Mongolian, but were used to write foreign sounds, such as Tibetan, Sanskrit, or Chinese. Based on the description of *Menggu Ziyun*, these letters are assumed to express voiced obstruents, such as the onsets of 定 or 燈 in Middle Chinese, which do not exist in Middle Mongolian. Moreover, the position of aspirated consonants is more limited than their lenis counterparts. In the syllable-final position, aspirated consonants hardly occur. This might suggest a neutralization process of aspiration in this position.

Moreover, the labial set seems to lack its aspirated consonant. Neither ⟨p⟩ nor ⟨b‘⟩ make up more than 10% of occurrences and this makes it difficult for us to postulate a labial aspirated consonant that contrasts with ⟨b⟩. This observation supports previous studies (Svantesson *et al.* 2005, Poppe 1965) that suggest Mongolian lost the aspirated labial through history. Therefore, usage of ⟨p⟩ and ⟨b‘⟩ are restricted to foreign words.

One more thing to note from (5) is the characteristics of ⟨g⟩, ⟨k‘⟩ and ⟨q⟩. The relatively high frequency of these letters might make us assume that the velar class has a three-way contrast, namely, ⟨g⟩-⟨k‘⟩-⟨q⟩. However, note that in the syllable-final position ⟨g⟩ and ⟨q⟩ frequently occur. As mentioned earlier, aspirated consonants rarely occur in syllable-final position. This makes us assume that ⟨q⟩ might not be specified for aspiration. In fact, they differ in concord with the “light/dark” contrast of the vowels. Studies such as Svantesson *et al.* (2005) have suggested Middle Mongolian had seven vowels /a, o, u, e, ö, ü, i/. In 'Phags-pa script, /ö/ and /ü/ are expressed by combining ⟨e⟩ before ⟨o⟩ and ⟨u⟩, thus ⟨eo⟩ and ⟨eu⟩ respectively. /a, o, u/ are traditionally known as “light” (or masculine) while /e, ö, ü/ are “dark” (or feminine) vowels, with the exact

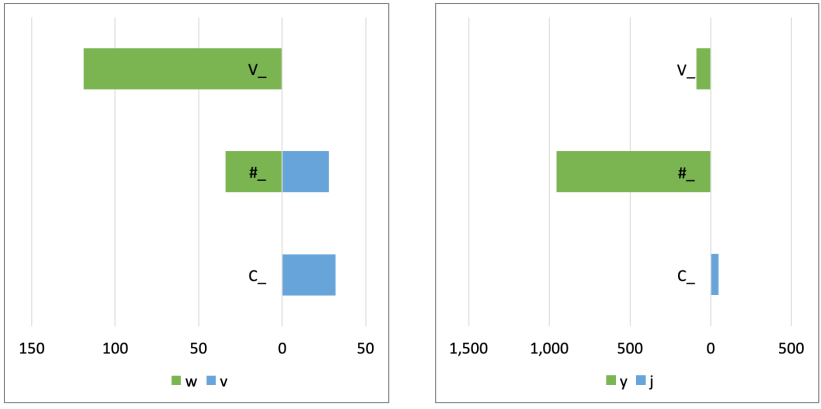
phonological features of these vowels remaining controversial.[7] However, arguing the phonological features of Middle Mongolian is beyond the scope of this study. We adopt the theory-neutral term, "dark-light" contrast, in this paper. Velar consonant letters show a different distribution according to this vowel system. Namely, ⟨q⟩ is placed only before or after light vowels /a, o, u/, and ⟨g⟩, ⟨k‘⟩ are only used before or after dark vowels /e, ö, ü/ in Mongolian. A detailed description will be given in Section 3.4.

Finally, there are some pairs of letters that have a similar phonetic value but differ in their usage between Mongolian and foreign words. ⟨w⟩-⟨v⟩ and ⟨y⟩-⟨j⟩ are all semivowels, but ⟨w⟩ and ⟨y⟩ are used for both Mongolian and foreign languages whereas ⟨v⟩ and ⟨j⟩ are used only for foreign languages. Plus, ⟨v⟩ and ⟨j⟩ are only used in the syllable-initial position (before a vowel) of a consonant cluster, while ⟨w⟩ and ⟨y⟩ can be used in both the syllable-initial and in the syllable-final position. This is shown in (6). We can see that ⟨w, y⟩ are more frequently used than ⟨v, j⟩. This leads us to suggest that this asymmetry of frequency between these letters is due to their domains of usage.

(6) Distribution of semivowels
(C_: after a consonant, #_: word-initial, V_: after a vowel)

	w	v	y	j
C_	0	32	0	49
#_	34	28	957	0
V_	119	0	89	0
total	153	60	1,046	49

[7] It has been suggested that /a, o, u/ are [-front] whereas /e, ö, ü/ are [+front], as many modern dialects of Mongolian have this feature (Svantesson *et al.* 2005, Poppe 1965). On the other hand, some recent studies (Ko 2018, Vaux 2009) suggest these phonemes contrast in terms of [RTR] feature, so /a, o, u/ are [+RTR] and /e, ö, ü/ are [–RTR].



2.2. Vowel

As for vowels, (2) shows that ⟨e⟩, ⟨o⟩, ⟨u⟩ are frequently used in the ’Phags-pa script. We should not, however, conclude that these vowels are actually the most frequent vowels in Middle Mongolian. Note that the vowel /a/ is not represented with any explicit vowel grapheme in a syllable and vowels /ö/ and /ü/ are expressed by combining two letters, ⟨eo⟩ and ⟨eu⟩ respectively.

In order to investigate a comprehensive distribution of vowels, we re-tabulate the vowels including the number of syllables without an apparent vowel (which denotes the inherent vowel /a/) and the number of occurrences of ⟨eo⟩ and ⟨eu⟩.[8] Plus, diphthongs are also included in the table. In Mongolian written in the ’Phags-pa script, falling diphthongs are expressed by vowel+⟨ė⟩ or vowel+⟨yi⟩ (Poppe 1957).

(7) Frequency of vowel letters

Transliteration	Transcription	#	%
u	u	4,549	27.003
∅	a	4,400	26.119
i	i	2,797	16.603

[8] There are a few cases where ⟨eo⟩ and ⟨eu⟩ are transcribed as /eo/ and /eu/, respectively. These cases relate to foreign words, in which /eo/ or /eu/ express diphthongs that do not exist in Middle Mongolian.

Transliteration	Transcription	#	%
e	e	2,143	12.721
o	o	697	4.137
ė	ė	608	3.609
eu	ü	417	2.475
eo	ö	330	1.959
yi	ay	289	1.716
eė	ey	212	1.258
uė	uy	175	1.039
euė	üy	105	0.623
eu	eu	93	0.552
ei	ei	19	0.113
eyi	ey	7	0.042
oyi	oy	3	0.018
eo	eo	2	0.012
Total		16,846	100

Let us discuss some notable facts observed in (7). First, /u/ still has the highest frequency among vowel letters. Second, the inherent vowel /a/ has the second highest frequency, which is not apparent in (2). Third, although it is debatable whether ⟨e⟩ and ⟨ė⟩ are allographs of a single phoneme, the lower frequency of ⟨ė⟩ compared to ⟨e⟩ implies that the usage of ⟨ė⟩ is more restricted than ⟨e⟩. As will be shown in Section 4, these two letters show a nearly complementary distribution, which may suggest that these are two different letters of a phonologically single phoneme /e/. Third, as for the "light-dark" contrast, the dark vowels /e, ö, ü/ appear more marked than the light ones /a, o, u/. The sum of frequencies of the light vowels is 57.259%, whereas that of the dark vowels is 20.764% (among the monophthong letters). Fourth, the lower frequency of diphthongs ⟨ayi, eė, uė, üė, ei, eu, ei, eyi, oyi, eo⟩ shows that their occurrences are lower than those of the monophthongs. Among them, ⟨yi, eyi, oyi, uė, eė, üė⟩ were used for both Mongolian and Chinese, whereas ⟨ei⟩ is used only for Chinese and Tibetan. Also, ⟨eu⟩ and ⟨eo⟩, transcribed as /eu/ and /eo/ respectively, are assumed to be different vocalic nuclei

used for Chinese. Finally, in Mongolian, only /yi/ was used to express ⟨ay⟩. On the other hand, in order to express /ey/, ⟨eė⟩ is preferred to ⟨eyi⟩. /oy/ is only expressed by ⟨oyi⟩, and /uy/ and /üy/ are only expressed by ⟨uė⟩ and ⟨euė⟩, respectively.

3. Syllabic structure of the ’Phags-pa script

The syllabic structure of Middle Mongolian is (C)V(C) (Svantesson *et al.* 2005). That is, there can be maximally one consonant in the onset or the coda position. Below is the frequency of each syllabic structure in the ’Phags-pa script. In classifying consonants and vowels, only ⟨o, u, i, e, ė⟩ are encoded as vowels while the rest of the letters are encoded as consonants.

(8) Syllabic structures of the ’Phags-pa script

Rank	Structure	#	%	Rank	Structure	#	%
(1)	CV	6,060	35.973	(11)	VC	134	0.795
(2)	CVC	3,738	22.189	(12)	CVVV	105	0.623
(3)	C	2,627	15.594	(13)	CVCV	10	0.059
(4)	CC	1,574	9.343	(14)	CCCC	9	0.053
(5)	CVV	1,046	6.209	(15)	CVCC	2	0.012
(6)	CCV	539	3.200	(16)	CCCVC	2	0.012
(7)	V	377	2.238	(17)	CCCV	1	0.006
(8)	CCVC	229	1.359	(18)	CVVCC	1	0.006
(9)	CVVC	201	1.193	(19)	VCC	1	0.006
(10)	CCC	145	0.861				
					Total	16,846	100

Contrary to our expectation of the maximal syllabic structure of CVC, there were many more patterns in our corpus. Let us discuss this distribution. First, a syllable with only one consonant ⟨C⟩ denotes an inherent vowel /a/. In a ⟨CC⟩ structure, usually the first consonant is parsed as an onset, and the last is parsed as a coda. However, in foreign

words, both consonants are parsed into an onset position, as in ⟨lh-rǰė⟩ /lharǰė/ "the prince's name for Tibet."

In a ⟨CVV⟩ structure, there are two attested syllabic structures. First, the two vowels are ⟨eo⟩ or ⟨eu⟩, so that phonologically they are one vowel /ö/ or /ü/, respectively. Second, the second vowel is a semivowel, so that phonologically, two vowels denote a diphthong.

In a ⟨CCV⟩ structure, there are four attested syllabic structures. First, in foreign words, both consonants belong to onset position, as in ⟨lėm-hvŋ-shi⟩ /lėmfaŋshi/ "a title for public officers in the Yuan dynasty." Second, the second consonant is the glottal letter ⟨•⟩ so the vowel is transcribed as a long vowel, as in ⟨q•n⟩ /qān/ "Emperor." This structure is possible in Mongolian. Third, the second consonant is ⟨y⟩ and the following vowel is ⟨i⟩, so that ⟨Cyi⟩ denotes a diphthong /Cay/, as in ⟨bos-q-byi⟩ /bosqabay/ "(he) built." This structure is also possible in Mongolian. Finally, the first consonant letter can be ⟨'⟩ or ⟨•⟩, used both in Mongolian and foreign languages, as in ⟨'yi-mq⟩ /ayimaq/ "provinces," ⟨bom-•bore⟩ /bom•bore/ "name of a region in Tibet."

In a ⟨CVVV⟩ structure, only ⟨'euė⟩ is attested and it is transcribed as /üy/, which is a single diphthong.

In a ⟨CCVC⟩ structure, the first two consonants can be parsed in the same way that a ⟨CCV⟩ structure can be parsed.

In a ⟨CVCV⟩ structure, the last ⟨CV⟩ is ⟨yi⟩, as in ⟨mo-qoyi⟩ /moqoy/ "serpent," so that phonologically ⟨yi⟩ is a single semivowel /y/. It is noteworthy that ⟨yi⟩ is usually written separately from the syllable to which it belongs when it is word-medial, but written joined to the syllable to which it belongs when it is word-final (Poppe 1957). Hence, in ⟨qo-yi-n⟩ /qoyna/ "rear," there is a space between ⟨qo⟩ and ⟨yi⟩ but in ⟨mo-qoyi⟩, ⟨qo⟩ and ⟨yi⟩ is written without a space. When ⟨yi⟩ is the accusative suffix, it is written separately even if it is word-final, so as in ⟨t'u-s-yi⟩ /t'usayi/ "benefit-acc.," word-final ⟨yi⟩ is written with a space before it.

⟨CCC⟩ or ⟨CCCC⟩ structures are rather complex, in that they are only used for foreign words and the syllabification of this structure requires knowledge of foreign languages. A vowel can be inserted either between the second and the third consonant or between the first and the second consonant. ⟨CCCV⟩, ⟨CCCVC⟩, ⟨CVVCC⟩, ⟨VCC⟩ structures are only used for foreign words.

To sum up, there are various syllabic structures expressed in the 'Phags-

pa script, but phonologically, only the maximal CVC structure is allowed in Mongolian.

3.1. Syllable-initial consonant

In this section, we will first look into the frequency of syllable-initial consonants. We call this position "syllable-initial," not "onset," in order to look into every possible consonant letter that occurs before a vowel (including the inherent vowel /a/[9]) in a syllable. Hence, sequences like ⟨q•⟩, ⟨k‘•⟩ were included in this position. Below is the table and the line graph of frequency in the syllable-initial position. "∅" denotes syllables with no consonant in this position. Also, consonants occurring less than 10 times in the corpus are not included in the table and listed separately.

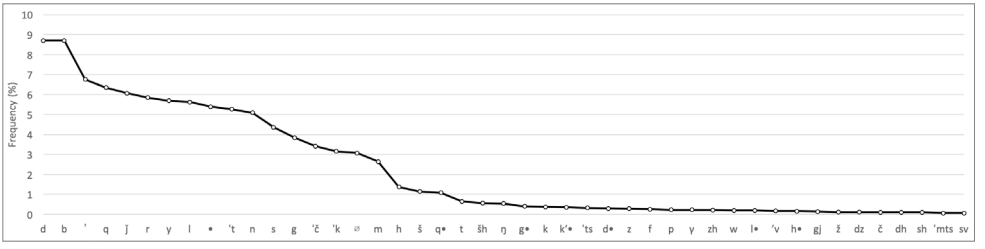
(9) Frequency of syllable-initial consonants

Rank	Letter	#	%	Rank	Letter	#	%
(1)	d	1,451	8.613	(24)	g•	68	0.404
(2)	b	1,451	8.613	(25)	k	62	0.368
(3)	’	1,126	6.684	(26)	k‘•	60	0.356
(4)	q	1,058	6.280	(27)	ts‘	55	0.326
(5)	ǰ	1,012	6.007	(28)	d•	49	0.291
(6)	r	975	5.788	(29)	z	48	0.285
(7)	y	948	5.627	(30)	f	43	0.255
(8)	l	937	5.562	(31)	p	39	0.232
(9)	•	899	5.337	(32)	γ	38	0.226
(10)	t‘	877	5.206	(33)	zh	36	0.214
(11)	n	849	5.040	(34)	w	34	0.202
(12)	s	728	4.322	(35)	l•	33	0.196
(13)	g	641	3.805	(36)	’v	28	0.166
(14)	č‘	570	3.384	(37)	h•	27	0.160
(15)	k‘	526	3.122	(38)	gj	23	0.137

[9] The position of the inherent vowel /a/ could be detected based on transcription.

Rank	Letter	#	%	Rank	Letter	#	%
(16)	∅	512	3.039	(39)	ž	19	0.113
(17)	m	440	2.612	(40)	dz	19	0.113
(18)	h	229	1.359	(41)	č	18	0.107
(19)	š	190	1.128	(42)	dh	18	0.107
(20)	q•	181	1.074	(43)	sh	17	0.101
(21)	t	107	0.635	(44)	mts‘	11	0.065
(22)	šh	93	0.552	(45)	sv	11	0.065
(23)	ŋ	90	0.534	…*	…	…	…
					Total	16,846	100

*items occurring less than 10 times: ts, γv, sg, r•, rg, zj, rgj, md, y•, gv, lh, dp, tsv, gr, ǰh, hj, th, gž, ň, •b, kj, rts‘, dr, dzh, gh, t‘h, sk, b‘, mŋ, mč‘, gy, sm, st, ǰ•, db, bč‘, k‘rh, t‘•, kž, yv, tsh, lj, čh, gts, dw, gs, rb, bj, md•, bs, dg•, bz, br, qr, •br, yŋ, sn, brg, sr, pj, ǰj, ’ŋ, s•, b•, s•.



From (9), we can see that aspirated stops have a lower frequency than their non-aspirated counterparts, as the frequency of single segments has. In addition, the least frequent syllable-initial consonant is ⟨ŋ⟩, which appears 90 times and makes up 0.671% of occurrences. According to Svantesson *et al.* (2005), /ŋ/ is not a separate phoneme in Middle Mongolian. It is used only as an allophone of a nasal consonant before a velar, or for foreign words (See Section 3.3.). In addition, most of the consonant clusters, except for ⟨consonant⟩ + ⟨•⟩, were used for foreign languages.[10]

Now, syllable-initial consonants are classified by the place and manner of articulation. Items containing only a single letter are calculated. This is

[10] Coblin (2007) suggests that ⟨h⟩ in the second part of a consonant cluster, as in ⟨zh⟩ or ⟨sh⟩, denotes the apical vowel with the following vowel ⟨i⟩.

shown in (10) and (11).

(10) Frequency of syllable-initial consonants classified by the place of articulation

	#	%
Labial	2,007	14.000
Alveolar	6,076	42.383
Palatal	2,722	18.987
Velar	2,377	16.581
Glottal	1,154	8.050
Total	14,336	100

(11) Frequency of syllable-initial consonants classified by the manner of articulation

	#	%
Stop	6,212	46.528
Fricative	1,266	9.482
Affricate	1,600	11.984
Nasal	1,379	10.329
Liquid	1,912	14.321
Approximant	982	7.355
Total	13,351	100

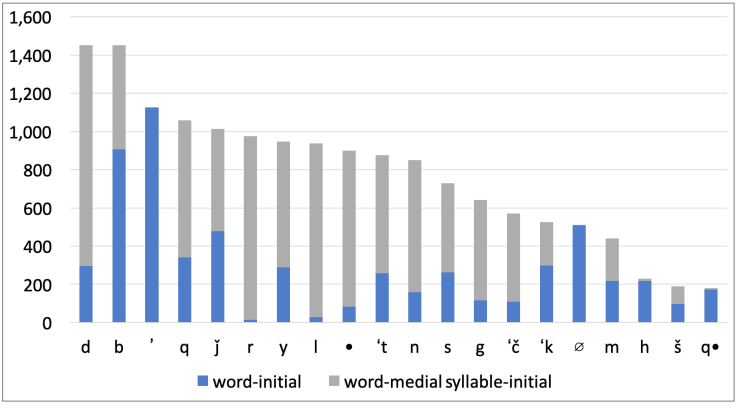
We can see that the alveolar class makes up the largest percentage in this position. The glottal class takes up the least. Concerning the manner of articulation, stops make up the largest number, fricatives the smallest.

When we look into word-initial consonants, a slightly different distribution emerges. This is shown in (12). A comparison between word-initial and syllable-initial position is made in the line graph. "∅" denotes syllables with no consonant in this position. Consonants occurring less than 10 times in the corpus are not included in the table and listed separately.

(12) Frequency of word-initial consonants

Rank	Letter	#	%	Rank	Letter	#	%
(1)	’	1,124	17.491	(17)	š	98	1.525
(2)	b	907	14.115	(18)	•	83	1.292
(3)	∅	508	7.905	(19)	k‘•	60	0.934
(4)	ǰ	479	7.454	(20)	g•	59	0.918
(5)	q	342	5.322	(21)	t	49	0.763
(6)	k‘	299	4.653	(22)	ts‘	44	0.685
(7)	d	296	4.606	(23)	z	43	0.669
(8)	y	288	4.482	(24)	d•	40	0.622
(9)	s	262	4.077	(25)	l	28	0.436
(10)	t‘	257	3.999	(26)	r	14	0.218
(11)	m	218	3.392	(27)	hv	13	0.202
(12)	h	217	3.377	(28)	p	11	0.171
(13)	q•	173	2.692	(29)	gj	10	0.156
(14)	n	159	2.474	(30)	’v	10	0.156
(15)	g	116	1.805	(30)	sv	10	0.156
(16)	č‘	108	1.681	…*	…	…	…
					Total	6,426	100

*items occurring less than 10 times: ɣ, w, lh, č, k, md, gv, ts, dh, gr, dz, ǰh, gž, ň, t‘h, ɣv, rts‘, sg, dr, sk, k‘rh, kž, zj, hj, th, šh, kj, gts, rb, bj, mts‘, gy, bs, br, sh, rg, yŋ, sn, brg, pj, ’ŋ, ǰ•.



In (12), it is shown that ⟨’⟩ makes up the largest percentage in this position and is never used in the (non-word-initial) syllable initial position. As will be discussed more in Section 5, ⟨’⟩ was mainly used for the word-initial /a/ or before the dark vowel /ö, ü/. Also, we can see that ⟨d, b, q⟩ are still favored in the word-initial position, although the frequency of ⟨d⟩ decreased to a relative degree in the word-initial position. As one of many characteristics of so-called “Altaic” languages (Poppe 1965, among others), liquids such as ⟨r⟩, ⟨l⟩, are avoided in the word-initial position. It is shown that ⟨r⟩ is the sixth most frequent consonant (5.788%) in the syllable-initial position, whereas it is the twenty-sixth most frequent (0.218%) in the word- initial position. Similarly, ⟨l⟩ is the eighth most frequent (5.562%) in the syllable-initial position, but it is twenty-fifth most frequent (0.436%) in the word-initial position. There are no words starting with ⟨ŋ⟩, compared to the syllable-initial position in which ⟨ŋ⟩ is used in 90 items. This would indicate no language including Middle Mongolian written in the ’Phags-pa script allows /ŋ/ in the word-initial position. Syllables with no apparent consonant account for 512 items in the syllable-initial count but 508 items in the word-initial count. The 4 items in which there is no consonant syllable-initially but not word-initially are of foreign words. Examples include ⟨ty-šhi-u-ǰi-tsven⟩ /tay-šhi-u-ǰi-tsven/ “name of a monk,” and ⟨ts‘-oŋs-ge-bun⟩ /ts‘aoŋsgebun/ “name of a region in Tibet.”

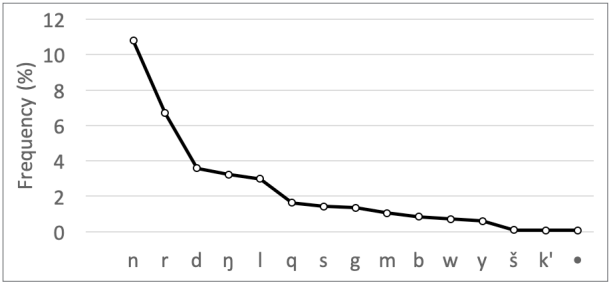
3.2. Syllable-final consonant

Let us examine consonants in the syllable-final position in ’Phags-pa script. As explained in Section 3.1, we hesitate to call this position “coda,” in order to look into every possible consonant letter that occurs after a vowel in a syllable. For instance, it is beyond the scope of this study to argue whether ⟨ew⟩ expresses a diphthong (nucleus) or a vowel and a semivowel (nucleus and coda). All letters following a vowel (including the inherent /a/) were counted. “∅” denotes syllables with no consonant in this position. Consonants occurring less than 10 times in the corpus are not included in the table and are listed separately.

(13) Frequency of syllable-final consonants

Rank	Letter	#	%	Rank	Letter	#	%
(1)	∅	11022	65.428	(9)	g	224	1.330
(2)	n	1785	10.596	(10)	m	172	1.021
(3)	r	1107	6.571	(11)	b	139	0.825
(4)	d	593	3.520	(12)	w	118	0.700
(5)	ŋ	532	3.158	(13)	y	99	0.588
(6)	l	491	2.915	(14)	š	15	0.089
(7)	q	270	1.603	(15)	k‘	13	0.077
(8)	s	235	1.395	(16)	•	13	0.077
				…*	…	…	…
					Total	16,846	100

* items occurring less than 10 times: rs, t‘, ŋs, gs, p, sr, rg, č, rd.



(14) Frequency of syllable-final consonants classified by the place of articulation

	#	%
Labial	429	7.386
Alveolar	4,212	72.521
Palatal	114	1.963
Velar	1,040	17.906
Glottal	13	0.224
Total	5,808	100

(15) Frequency of syllable-final consonants classified by the manner of articulation

	#	%
Stop	1,239	21.381
Fricative	250	4.314
Affricate	0	0.000
Nasal	2,490	42.968
Liquid	1,599	27.593
Approximant	217	3.745
Total	5,795	100

In the syllable-final position, it is shown that the alveolar class makes up the largest percentage. Concerning the manner of articulation, the nasal class makes up the largest percentage, followed by the liquid class. Moreover, the syllable-final position is more restricted than the syllable-initial position in two points: (i) affricates ⟨č', ǰ⟩ are never allowed. (ii) aspirated consonants ⟨k', t', č', h⟩ are never or hardly allowed. Finally, examples of syllable-final ⟨•⟩ include ⟨y-bu•-su⟩ /yabu•asu/ "if they go" and /h-rn-lu•/ /haranlu•a/ "with people." Interestingly, in all items containing ⟨•⟩ in the syllable-final position, the vowel preceding ⟨•⟩ is ⟨u⟩.

3.3. Consonantal sequence

Now, we will investigate patterns of intervocalic consonantal sequences in the script. As presented in the account for patterns in (8), Middle Mongolian does not allow a consonantal sequence in onset or coda position. That is, consonantal sequences in this language can only be attested in the intervocalic position, i.e. a syllable-final consonant of a preceding syllable plus a syllable-initial consonant of a following syllable. We listed these consonantal sequences in (16).

(16) Frequency of word-medial consonantal sequences

	CC sq.	#		CC sq.	#		CC sq.	#
(1)	r-l	214	(21)	r-č‘	39	(41)	w-d	14
(2)	l-b	160	(22)	m-q	39	(42)	q-s	14
(3)	d-d	145	(23)	q-t‘	39	(43)	n-t‘	14
(4)	n-d	111	(24)	g-b	37	(44)	ŋ-y	13
(5)	ŋ-r	109	(25)	q-d	34	(45)	m-d	13
(6)	s-d	83	(26)	r-m	30	(46)	l-g	13
(7)	b-č‘	82	(27)	l-d	30	(47)	n-č‘	13
(8)	ŋ-g	75	(28)	l-t‘	27	(48)	n-ž	12
(9)	n-šh	70	(29)	g-d	27	(49)	n-š	12
(10)	l-č‘	64	(30)	ŋ-ǰ	26	(50)	y-šh	12
(11)	r-g	58	(31)	d-t‘	25	(51)	k‘-d	11
(12)	l-ǰ	56	(32)	n-ǰ	22	(52)	r-d	11
(13)	l-q	55	(33)	r-t‘	21	(53)	š-m	10
(14)	r-b	44	(34)	ŋ-q	20	(54)	d-k‘	10
(15)	ŋ-k‘	43	(35)	r-q	19	(55)	ŋ-t	10
(16)	b-t‘	43	(36)	ŋ-l	19	(56)	l-mts‘	10
(17)	r-k‘	42	(37)	ŋ-d	19	(57)	ŋ-zh	10
(18)	g-s	41	(38)	n-k‘	19	(58)	w-g	10
(19)	g-t‘	41	(39)	r-ɣ	19			
(20)	y-d	40	(40)	n-g	15			

Here, we can see that the ⟨r-l⟩ sequence is the most frequently attested consonant sequence in our corpus. This is because of the frequent occurrences of the word ⟨ǰr-liq⟩ /ǰarliq/ “edict” in our data. One more thing to notice is that alveolar nasal ⟨n⟩ is hardly used before a velar consonant ⟨q, g, k‘⟩, while ⟨ŋ-k‘⟩ (43 times), ⟨ŋ-g⟩ (75 times), ⟨ŋ-q⟩ (20 times) are more attested than ⟨n-k‘⟩ (19 times) and ⟨n-g⟩ (15 times). Moreover, words containing ⟨n-k‘⟩ or ⟨n-g⟩ are all foreign, as in ⟨gey-dėn-ku⟩ /geydėnku/ “name of the treasury in Buddhist monasteries (Chinese word)” or ⟨’ven-gew-zhi⟩ /’vengewzhi/ “name of a temple.” Therefore, we

might suggest that /n/ is assimilated to /ŋ/ before a velar consonant, at least in Mongolian, so that the usage of 〈n〉 before a velar consonant is not attested.

3.4. Combination of a consonant and a vowel

In this section, we investigate frequency of 〈CV〉 structures, so that we can see which consonant can be combined with which vowel. We excluded foreign consonant clusters, but included the clusters of a consonant plus a glottal letter 〈•〉 before a vowel. Note that between a preceding consonant and a following consonant, 〈•〉 is transcribed as a long vowel in Hugjiltu (2004).

(17) Distribution of a consonant and a following vowel

	a	o	u	e	ė	eo	eu	i	Sum
b	579	91	441	173	1	40	17	109	1,451
bʻ	0	0	2	0	0	0	0	0	2
p	3	3	17	1	3	0	0	12	39
d	354	85	573	213	157	209	364	62	2017
tʻ	244	19	437	135	4	18	15	5	877
t	27	0	4	0	4	0	0	27	62
g	28	33	146	315	2	3	40	74	641
kʻ	47	1	201	165	1	37	38	36	526
k	5	0	2	45	0	0	0	10	62
q	609	52	390	0	0	0	0	7	1,058
γ	21	8	5	0	0	0	0	4	38
f	15	0	17	11	0	0	0	0	43
s	112	2	353	169	7	1	61	23	728
z	41	0	17	1	3	0	1	2	65
š	40	0	7	2	14	0	4	123	190
ž	2	0	2	0	0	0	0	15	19
h	95	20	4	31	1	0	11	67	229
ǰ	403	8	309	105	6	0	16	165	1.012

	a	o	u	e	ė	eo	eu	i	Sum
č‘	40	8	99	112	7	6	5	293	570
č	1	0	4	0	3	0	3	7	18
dz	5	0	6	1	1	0	1	5	19
ts‘	47	0	1	0	0	0	0	7	55
ts	1	0	2	0	0	0	0	6	9
m	122	66	83	120	10	4	1	34	440
n	144	94	428	110	1	8	0	64	849
ň	2	0	0	0	1	0	0	1	4
ŋ	4	1	74	0	7	0	0	4	90
r	160	8	171	41	3	4	0	588	975
l	141	16	222	164	2	0	8	384	937
w	21	0	1	0	0	0	0	12	34
y	318	110	43	29	50	0	7	391	948
q•	181	0	0	0	0	0	0	0	181
g•	0	0	0	68	0	0	0	0	68
k‘•	0	0	0	60	0	0	0	0	60
l•	33	0	0	0	0	0	0	0	33
h•	0	0	0	27	0	0	0	0	27
d•	7	0	35	7	0	0	0	0	49
r•	1	0	0	8	0	0	0	0	9
y•	7	0	0	0	0	0	0	0	7
ǰ•	2	0	0	0	0	0	0	0	2
b•	0	0	0	1	0	0	0	0	1
Sum	3,862	625	4,096	2,114	288	330	592	2,537	14,444

Let us discuss some notable facts observed in (17). First, as discussed in Section 2.1, velar consonant ⟨q⟩ appears only before light vowels ⟨a, o, u⟩. On the other hand, it seems that ⟨g, k‘⟩ are used freely regardless of the darkness of following/preceding vowels. Combinations of a velar consonant and a vowel, in the syllable-initial (before a vowel letter) and in the syllable-final (after a vowel letter) position, are re-tabulated in (18).

(18) Combination of a velar consonant and a vowel

Syllable-initial	Light			Dark				Neutral
	a	o	u	e	eo	eu	ė	i
g	28	33	146	315	3	40	1	36
k‘	47	1	201	165	37	38	1	36
q	609	52	390	0	0	0	0	7
Syllable-final	Light			Dark				Neutral
	a	o	u	e	eo	eu	ė	i
g	2	2	19	71	71	1	0	58
k‘	0	0	0	13	0	0	0	0
q	49	11	27	0	0	0	0	183

A close examination of our corpus shows that the usage of ⟨g, k‘⟩ before light vowels is limited to (i) foreign words, (ii) words where the darkness of a following vowel is expected due to vowel harmony, or (iii) conventional spelling of certain words. Such foreign examples include ⟨gl-b-w-rš⟩ /galbawaraš/ “Kalpavriksha, name of a divine tree in Hindu mythology (Sanskrit),” ⟨sŋ-g-ši-ri⟩ /saŋgaširi/ “Segge Siri, name of a Tibetan prince (Tibetan),” ⟨geuŋ-gon⟩ /geuŋgon/ “Taoist temple (Chinese).” On the other hand, in cases like ⟨’eo-teo-gu-le⟩ /ötögüle/ “to be senior” or ⟨neo-ko-•e⟩ /nökö•e/ “other,” ⟨o⟩ or ⟨u⟩ is expected to be pronounced as /ö/ or /ü/ respectively, without noting ⟨e⟩ due to vowel harmony. A detailed description of vowel harmony patterns in the ’Phags-pa script will be discussed in Section 4.2. Finally, words like ⟨moŋ-k‘⟩ /moŋk‘a/ “eternal” or /k‘u-č‘un-dur/ “strength,” are conventionally written with ⟨k‘⟩ or ⟨g⟩. There is some indirect evidence that these words are actually pronounced with [dark] vocalism. In our corpus, there is a case where /moŋ-k‘/ is written as /moŋ-k‘e/, with an /e/. Also, /k‘u-č‘un-dur/ is sometimes spelled /k‘eu-č‘eun-dur/ or /k‘u-č‘eu-dur/. This variety in spelling suggests that these words might not be [light] words, but [dark]. Poppe (1957) claims that these words are assumed to be specified for [dark] based on other written and spoken Mongolian data.

Furthermore, there are certain suffixes that change their form to match the vowel harmony of the preceding morpheme. Past tense suffix ⟨q-sn⟩ /qsan/ ∼ ⟨g-sen⟩ /gsen/ is one example. For instance, in ⟨bos-qq-sn⟩

/bosqaqsan/ "(he) erected," /-qsan/ is used since the preceding verb is /bosqa-/ which is specified for [light]. On the other hand, in ⟨i-deg-sen⟩ /idegsen/ "(he) ate," the verb is specified for [dark], because of /e/ in the second syllable, and the suffix changes to /-gsen/. If /-qsan/ and /-gsen/ are allomorphs of the same morpheme, we may assume that ⟨q⟩ and ⟨g⟩ contrast with vowel harmony, thus ⟨q⟩ is used for [light] vowels while ⟨g⟩ is used for [dark] vowels. Based on this evidence, we argue that velar consonant ⟨k‘⟩ and ⟨g⟩ are written before or after [dark] vowels.

Besides this, other observations that can be made from (17) are as follows: (Alveo-) palatal ⟨š⟩ and ⟨č‘⟩ is more frequently used before ⟨i⟩ than before other vowels. This suggests that palatalization might have played a role in this distribution of letters. In addition to this fact, distribution of alveolar consonants ⟨d, t‘⟩ before ⟨i⟩ is rather restricted. Furthermore, when consonants are followed by ⟨•⟩, which makes a following vowel long, it is only used when a following vowel is ⟨a, o, u, e⟩. Alveolar and palatal fricatives and affricates ⟨s, z, š, ž, ǰ, č‘, č, dz, ts‘, ts⟩ are never or hardly ever used before ⟨o⟩. ⟨γ⟩ is only combined with the light vowels ⟨a, o, u⟩. ⟨w⟩ is almost only used before ⟨a⟩ or ⟨i⟩.

4. Distribution of the "dark" vowels

In this section, we will deal with the distribution of dark vowels ⟨e, ė⟩. It will be presented that these two letters show a complementary distribution. Moreover, vowel harmony patterns in Mongolian words will be presented. It will be shown that patterns presented in our corpus are more complicated than expected, and we suggest a tendency towards marking vowel harmony in the script.

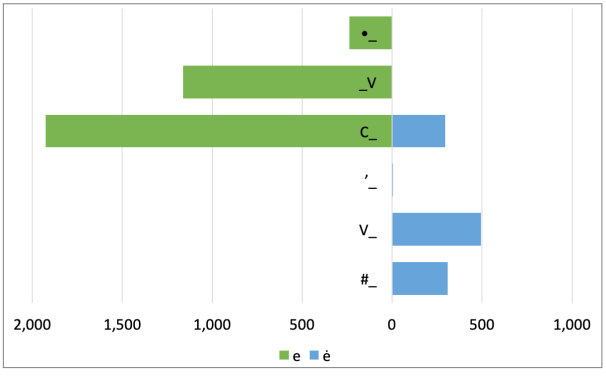
4.1. Complementary distribution of two dark vowel letters

In this section, we will deal with the distribution of dark vowels ⟨e, ė⟩. As previous studies argue (Yang Naisi 1986, Poppe 1957, among others), there are several opinions on the difference of function or distribution between these two letters. The problem becomes more complex when the script is used to write foreign languages. However, when we divide the occurrences of these letters by their surrounding environment, it is shown that it is

more likely that these letters represent a single phoneme /e/, at least in Middle Mongolian.

(19) Distribution of ⟨e⟩ and ⟨ė⟩
(“_” denotes the position where the letter occurs, and “C” and “V” means a consonant and a vowel, respectively.)

Environment	e	ė
#_	0	309
C_	1,927	295
V_	0	492
_V	1,162	0
’_	2	4
•_	237	0
Total	3,328	1,100



As seen in (19), ⟨e⟩ and ⟨ė⟩ are in a nearly complementary distribution except for the post-consonantal position and before ⟨’⟩. That is, ⟨e⟩ is used after a consonant, as a vowel, and before a vowel, as a “darkness” ([–front] or [+RTR]) marker which changes following /o/ or /u/ into /ö/ or /ü/, respectively. ⟨e⟩ is not used word-initially without a preceding consonant, nor is it used after a vowel. On the other hand, ⟨ė⟩ is used word-initially, post-consonantally, and post-vocalically. It is not used before a vowel. When ⟨ė⟩ is used after a vowel, it expresses a semivowel, as in ⟨eė, uė, üė⟩.

In order to prove a complementary distribution of ⟨e⟩ and ⟨ė⟩, the usage of these letters in a post-consonantal position should be explained, aside from the rare usage of ⟨e⟩ and ⟨ė⟩ before ⟨'⟩ or ⟨•⟩. In fact, almost all of the words with a post-consonantal ⟨ė⟩ are foreign, e.g. ⟨gey-dėn-ku⟩ /geydėnku/ "name of the treasury in Buddhist monasteries (Chinese; 解典庫)," ⟨duŋ-yw-mėw⟩ /duŋyawmėw/ "Dongyue temple (Chinese; 东岳庙)."[11] Thus, at least in Middle Mongolian, it can be said that these two letters belong to a single phoneme and show a complementary distribution.

Cases where ⟨e⟩ and ⟨ė⟩ are used after ⟨'⟩ are all from the word ⟨er-di-ni⟩ (spelled otherwise ⟨ėr-di-ni⟩ or ⟨ėr-ti-ni⟩). This word is rooted from a Sanskrit word *ratna*, "jewel" (Poppe 1957).

220 out of 237 cases where ⟨e⟩ is used after ⟨•⟩ are in the intervocalic position, in which ⟨•⟩ is used as a hiatus marker. 17 cases are those where ⟨•⟩ is placed word-initially before ⟨e⟩. Cases with ⟨•⟩ are to be discussed in Section 5.

4.2. Vowel harmony in 'Phags-pa script

In this section, we present vowel harmony patterns expressed in the 'Phags-pa script. Middle Mongolian, like many Modern Mongolian languages, had vowel harmony. This harmony is concerned with the "light-dark" contrast, where /a, o, u/ are light, /e, ö, ü/ are dark, and /i/ is neutral and can be realized regardless of harmony. Thus, all words are specified as either light or dark. For example, words like ⟨qo-to-l⟩ /qotola/ "entire" or ⟨eoŋ-ge-le⟩ /öŋgele/ "to paint" are possible, but */qotele/ or */öŋgela/ is impossible.

An interesting aspect about 'Phags-pa script is that the "darkness" marker ⟨e⟩ does not have to be written in all syllables in a word specified as [dark]. Once the first syllable of a word is marked with ⟨e⟩, following syllables will be automatically in harmony. Thus, to write a word like /nökö•e/ "other," it is both possible to write it as ⟨neo-keo-•e⟩ or ⟨neo-ko-•e⟩. In order to take a comprehensive look at the vowel harmony patterns in the 'Phags-pa script. we marked light-dark information to vowels as "+ (light; /a, o, u/)," "− (dark; /e, ö, ü, ė/)," and "0 (neutral; /i/)," and ignored other vowel qualities. The table of vowel harmony patterns in

[11] There is one word in this position that is assumed to be a Mongolian word, ⟨dėŋ-ri⟩ /dėŋri/ "heaven, god." However, it is doubtful that this word is a true native Mongolian word, since its reflexes are well attested in other languages such as Turkic.

bisyllabic and trisyllabic words is presented below.

(20) Vowel harmony patterns in bisyllabic words

Rank	Pattern	#	%
(1)	(+)-(+)	1,108	47.189
(2)	(−)-(−)	394	16.780
(3)	(+)-(0)	279	11.882
(4)	(−)-(+)	270	11.499
(5)	(−)-(0)	149	6.346
(6)	(0)-(0)	64	2.726
(7)	(0)-(−)	37	1.576
(8)	(0)-(+)	35	1.491
(9)	(+)-(−)	12	0.511
	Total	2,348	100

(21) Vowel harmony patterns in trisyllabic words

Rank	Pattern	#	%	Rank	Pattern	#	%
(1)	(+)-(+)-(+)	693	27.251	(15)	(0)-(−)-(+)	40	1.573
(2)	(+)-(0)-(+)	315	12.387	(16)	(−)-(−)-(0)	27	1.062
(3)	(−)-(−)-(+)	267	10.499	(17)	(0)-(−)-(−)	23	0.904
(4)	(+)-(+)-(0)	251	9.870	(18)	(+)-(−)-(+)	18	0.708
(5)	(+)-(0)-(0)	129	5.073	(19)	(+)-(0)-(−)	11	0.433
(6)	(−)-(0)-(+)	118	4.464	(20)	(−)-(+)-(0)	10	0.393
(7)	(−)-(0)-(0)	116	4.562	(21)	(0)-(0)-(+)	9	0.354
(8)	(−)-(−)-(−)	92	3.618	(22)	(0)-(0)-(0)	7	0.275
(9)	(−)-(+)-(−)	77	3.028	(23)	(+)-(+)-(−)	6	0.236
(10)	(0)-(+)-(+)	77	3.028	(24)	(+)-(−)-(−)	4	0.157
(11)	(−)-(+)-(+)	67	2.635	(25)	(0)-(+)-(0)	4	0.157
(12)	(−)-(0)-(−)	67	2.635	(26)	(+)-(−)-(0)	3	0.118
(13)	(0)-(+)-(−)	67	2.635	(27)	(0)-(−)-(0)	2	0.079
(14)	(0)-(0)-(−)	43	1.691				
					Total	2,543	100

Both in bisyllabic and trisyllabic words, more instances of words with light vowels are attested than the dark ones. In bisyllabic words, the (+)-(−) pattern is much less common than the (−)-(+) or (−)-(−) pattern. In fact, all words with (+)-(−) pattern are foreign, and therefore not as heavily influenced by vowel harmony as Mongolian words. This suggests progressive harmony marking, i.e. the pattern by which marking of ⟨e⟩ in a *preceding* syllable predicts harmony pattern in the word, is used rather than regressive harmony pattern, i.e. the pattern by which marking of ⟨e⟩ in a *following* syllable predicts harmony pattern in the word. Below is the comparison of progressive and regressive marking (neutral vowels excluded).

(22) Directionality of the darkness marker in bisyllabic words

Directionality	#	%
progressive	270	39.941
regressive	12	1.775
redundant	394	58.284
Total	676	100

One might ask why redundant harmony marking (58.284%), that is, marking of ⟨e⟩ in every syllable in a word, is more attested than progressive harmony marking (39.941%) in bisyllabic words. This is because ⟨e⟩ as a nucleus of a syllable should always be written in the script. For instance, ⟨beye⟩ /beye/ "body" is never written as *⟨be-y⟩. Nevertheless, there are a few words that are truly redundant in harmony marking, such as ⟨neo-k'eor⟩ /nökör/ "friend," ⟨t'eo-beod⟩ /töböd/ "Tibet," ⟨t'eo-reon⟩ /törön/ "to come to be," ⟨'eor-geon⟩ /'örgön/ "wide," of which there are 8 tokens.

In trisyllabic words, too, progressive marking is more prevalent than regressive marking, such that marking patterns of ⟨e⟩ only in the first syllable or in the first and the last syllables show the highest frequency, as shown in (23).

(23) Directionality of the darkness marker in trisyllabic words

Marking	#	%
1st syll.	195	21.739
2nd syll.	61	6.800
3rd syll.	84	9.365
first two	294	32.776
last two	27	3.010
first + last	144	16.053
all three	92	10.256
Total	897	100

Although it seems that redundant darkness-marking patterns are numerous, words with truly redundant marking consist only of 39 items (4.348%). Also, in cases where ⟨e⟩ is written in the first two syllables (32.776%), the last syllable is usually a suffix, like /-un/, /-dur/, /-ud/.

In sum, the vowel harmony pattern is well reflected in the ’Phags-pa script. Interestingly, there is variation in spelling. ⟨e⟩, the letter used to mark [dark] vocalism, is usually written once in the first syllable of a word. ⟨o⟩ and ⟨u⟩ in following syllables are expected to be [dark] without ⟨e⟩, due to vowel harmony. Rarely, ⟨e⟩ is marked more than once in a word. As said earlier, there are cases where the same word is written with a variety of spellings, such as ⟨neo-keo-•e⟩ or ⟨neo-ko-•e⟩ “other.”

5. Usage of the null initial and the glottal letter

In this section, we investigate the distribution of the null initial ꡝ ⟨’⟩ and the glottal letter ꡖ ⟨•⟩. These letters are assumed to have their own phonetic value in Tibetan, as corresponding Tibetan letters show (ཨ and འ, respectively). However, when we look into their distribution, these letters are better described in terms of functional graphemes in Mongolian texts, rather than phonological entities that have their own sound value.

(24) Distribution of ⟨’⟩
“#” denotes a word boundary, and “$” denotes a syllable boundary (a

space in the script). “C” is a consonant letter and “V” is a vowel letter ⟨o, u, e, ė, i⟩.

Environment	#
#_{eo, eu}	574
#_$	384
#_C$	153
#_v{V, C}	28
#_yi	8
#_{ė, e, o, u}	8
Total	1,155

(24) shows the distribution of ⟨’⟩. In all cases, ⟨’⟩ is used word-initially. And except when it is placed before ⟨v⟩, ⟨’⟩ marks an onsetless syllable. It is most frequently used word-initially before ⟨eo⟩ or ⟨eu⟩. In fact, most of the words in which ⟨eo⟩ or ⟨eu⟩ is written word-initially are always accompanied by a ⟨’⟩ (573 items out of 589 items). Next, it expresses /a/ in a word-initial position (#_$, #_C$), as in ⟨’-b-l⟩ /abala/ “to hunt” or ⟨’l-b⟩ /alba/ “duty.” Since there is no apparent letter for /a/, when ⟨’⟩ is used without any preceding letter in a syllable, it expresses /a/. There is no case where a consonant is parsed into the onset in transcription. Thus, ⟨’l⟩ is always read as /al/, not /la/.

When ⟨’⟩ is placed before ⟨v⟩, it is used to write foreign words, like ⟨’vŋ-ts‘iŋ-guė⟩ /vaŋts‘iŋguy/ “a person’s name (王清貴)” As discussed in Section 2.1, ⟨v⟩ is only used for foreign languages and it is always preceded by ⟨’⟩.

In ⟨#_yi⟩ environment, ⟨yi⟩ is a single semivowel in a coda position, so that it is transcribed as /ay/, as in ⟨’yi-mq⟩ /aymaq/ “provinces.”

Cases where ⟨’⟩ is placed before a vowel ⟨e, ė, o, u⟩ are rare. In 6 cases where ⟨’⟩ is used before ⟨e⟩ or ⟨ė⟩, it is used for the word ⟨er-di-ni⟩ (or spelled as ⟨ėr-di-ni⟩, ⟨ėr-ti-ni⟩) /erdini/ “jewel.” It is said (Poppe 1957) that this word is derived from the Sanskrit word *ratna*.

One case where ⟨’⟩ is placed before ⟨o⟩ is ⟨’om⟩, which denotes the Sanskrit sound *om* (ॐ), and the case where ⟨’⟩ is placed before ⟨u⟩ is ⟨’u-rts‘aŋ⟩ /’urts‘aŋ/ “Ü-Tsang, a traditional province of Tibet.” In these cases, ⟨’⟩ is assumed to have a phonetic value that corresponded to the

sound of Sanskrit or Tibetan.

In sum, except for usage in foreign words, 〈'〉 is used word-initially in order to express an onsetless /a/ or a dark vowel (/ö/ and /ü/). Next, we will look into distribution of 〈•〉. We list its environments based on transliteration below.

(25) Distribution of 〈•〉
"#" denotes a word boundary, and "$" denotes a syllable boundary (a space in the script). "C" is a consonant letter and "V" is a vowel letter 〈o, u, e, ė, i〉.

Environment	#	Characteristics
V$_V	571	intervocalic position
C_V	132	
C_C$	5	
V$_C$	57	
V$_yi$	35	
C_V	61	between a consonant and a vowel in a syllable
C_C	50	
$C_$	183	
C_VC	145	
$CC_$	4	
C$_C	5	elsewhere
V$_CV	1	
C$_V	10	
#_C$	6	
#_V(C)$	73	
$CV_$	13	
$_$	9	
Total	1,360	

The most frequent environment where 〈•〉 is used is the intervocalic position (V$_V), as in 〈neo-ko-•e〉 /nökö•e/ "other." Also, in environments like 〈C_V〉, 〈C_C$〉 and 〈V$_C$〉, it can be said that 〈•〉 is placed

intervocalically since the preceding syllable ends with a vowel letter or with an inherent vowel /a/[12] and ⟨•⟩ is placed in the syllable-initial position which is followed by a vowel or an inherent vowel, as in ⟨yo-su-•r⟩ /yosu•ar/ "in accordance with," ⟨y-•ud⟩ /ya•ud/ "what (plural)," or ⟨č'b-č'-•l⟩ /č'abč'a•al/ "ravine." Finally, in ⟨V$_yi$⟩ environment, ⟨•⟩ is placed in the intervocalic position since ⟨yi⟩ in the second syllable is expected to have /a/ so that its transcription would be /ayi/, as in ⟨y-bu-•yi⟩ /yabu•ay/ "(he) walked" (See Section 3). In sum, in these environments ⟨•⟩ is used between two (apparent or inherent) vowels, thus in the intervocalic position. Note that ⟨•⟩ is placed before the second vowel of two hiatal vowels.[13] As Poppe (1957) and Svantesson *et al.* (2005) suggest, it can be said that this usage of ⟨•⟩ shows its function as a hiatus marker.

Next, ⟨•⟩ is also frequently used after a consonant and before a vowel in a syllable (C_V, $C_VC). It expresses long vowels, as in ⟨d•e-du⟩ /dēdü/ "sublime," or ⟨k•g-de⟩ /kēgde/ "to be said." Also, in cases where ⟨•⟩ is used after a consonant and before another consonant or a syllable boundary (C_C, $C_$), it expresses a long vowel /ā/, since no apparent vowel exists in the syllable. Such examples include ⟨q•n⟩ /qān/ "Emperor" or ⟨ǰ-y•-t'n⟩ /ǰayāt'an/ "those having a predestination." However, it is unclear whether Middle Mongolian had a vowel quantity contrast (Svantesson *et al.* 2005). Rather, considering the limited usage of vowel length, it is suggested that two syllables are contracted into one syllable (Hugjiltu 1999). This is compatible with the view that ⟨•⟩ represents a glottal letter that had been lenited or deleted intervocalically in Middle Mongolian (Hill 2009). That is, two syllables with the same vowel might have been represented by Middle Mongolian people as a single syllable with a long vowel, marked by ⟨•⟩ that shows a trace of contraction.

Usage of ⟨•⟩ in other environments is rather rare. It is used before a consonant (C$_C, V$_CV, #_C$), or before a vowel when the preceding syllable ends with a consonant (C$_V). In these environments, it can be said that ⟨•⟩ is placed in the syllable-initial position. Also, ⟨•⟩ can be used in the word-initial position, which is followed by an inherent/apparent vowel (#_C$, #_V(C)$). Interestingly, most of the vowel letters

[12] In ⟨C⟩, the syllable is expected to have /a/ since there is no apparent vowel in it.

[13] There are two cases of the same word where ⟨•⟩ is written twice in the intervocalic position. This word is ⟨bos-q•-•d⟩ /bosqā•d/ "(he) erected." However, it is also written as ⟨bos-qa-•d⟩. The reason for this variation in writing is not clear.

which followed ⟨•⟩ were ⟨i⟩ or ⟨eu⟩. Finally, ⟨•⟩ is used in the syllable-final position ($CV_$), or used solely in a syllable ($_$). Examples of the syllable-final ⟨•⟩ include ⟨bo-lu•-su⟩ “to be-cond.”, ⟨ur-qu•-su⟩ “to grow-cond.”, ⟨y-bu•-su⟩ “to go-cond”, ⟨č‘-du•-su⟩ “to satiate oneself-cond.”, where ⟨•su⟩ denotes a conditional suffix (expressed as -γasu/-gesü in Poppe (1957)), and examples of solely used ⟨•⟩ in a syllable include ⟨qr-q-•-su⟩ “to show-cond.”, ⟨t‘o-•-sun⟩ “earth”, ⟨ǰir-qo-•-n⟩ “six”, ⟨do-lo-•-n⟩ “seven”.[14] It is interesting to see that the conditional suffix ⟨•(e)su⟩ has a variety of spelling positions as shown in ⟨bu-ši-r•e-su⟩ “to respect-cond.”, ⟨de-le-du-•e-su⟩ “to strike-cond.”, ⟨qu-ri-y•-su⟩ “to collect-cond.” and ⟨b-y-ǰi-•u-lu-•su⟩ “to enrich-cond.” In all these rarely attested environments, ⟨•⟩ might have a phonetically consonantal value such as glottal stop or glottal fricative (Hill 2009). Otherwise, it might show a trace of a phonetic value that had been pronounced in earlier Mongolian or in other languages. However, due to the scarcity of data, it is unclear whether this letter has a phonemic status in Middle Mongolian.

6. Conclusion

In this paper, we investigated the general tendencies regarding the usage and distribution of the ’Phags-pa letters with a large size of data. Specifically, we looked into frequency of letters, syllabic structures reflected in the script, vowel harmony patterns, and some idiosyncratic usage and distributions of several letters. Studying the ’Phags-pa script is complicated in that it was used not only for Mongolian, but also for foreign languages such as Sanskrit, Tibetan and Chinese. Regarding this fact, our observations verified the phonological structures of the Middle Mongolian language reported in previous studies, and gave a comprehensive view on the rules and the exceptions of the script itself. Given that variation in spelling shows some aspects of the linguistic knowledge possessed by its users, our study could be an important step toward a quantitative study of the ’Phags-pa script and the Middle Mongolian language. Nevertheless, given that our study did not exclude repeating words in the corpus, future

[14] There are some variations in spelling of some of these words: ⟨ǰir-qo-•-n⟩ - ⟨ǰir-qo-•n⟩, ⟨do-lo-•-n⟩ - ⟨do-lo-•n⟩. It might be the case that the space between syllables is hard to recognize.

study is necessary in order to verify if results with type-frequency based statistics square with the general tendencies of this study, especially for a more accurate view on the phonological structure of Middle Mongolian. Moreover, classifying the corpus by languages would be another task in the future study. Different word structures and usage of letters between Mongolian words and foreign words are quite apparent, and an analysis on the usage of letters based on the language would be interesting in order to investigate linguistic borrowings and adaptations between Mongolian, Sanskrit, Chinese and Tibetan.

References

Choe, Gyeyeong, Hyoungmi Lee, Sangchul Park, Gyudong Yurn (2017). Shapes and usage of the ’Phags-pa letters added for Chinese writing. *Scripta* 9. 1-28.

Coblin, W. South (2007). *A Handbook of ’Phags-pa script*. Honolulu: University of Hawai’i Press.

Hill, Nathan W. (2009). The Ḥphags-pa letter 〈ḥ〉 and laryngeal phenomena in Mongolian and Chinese. *Central Asiatic Journal* 53:2. 183-205.

Hugjiltu, Wu (1999). On contraction in Mongolian ḥP’ags-pa documents. *Studia Orientalia* 87. 123-131.

Hugjiltu, Wu & Sarula (2004). *Basibazi Mengguyu wenxian huibian* 八思巴字蒙古语 文献汇编 [*A collection of ’Phags-pa monuments in Mongolian*]. Hohhot: Inner Mongolia Education Press.

Ko, Seongyeon (2018). *Tongue root harmony and vowel contrast in Northeast Asian languages*. Turcologica 112. Wiesbaden: Harrassowitz Verlag.

Poppe, Nicholas (1957). *The Mongolian monuments in ḥP‘ags-pa script*. Wiesbaden: Otto Harrassowitz.

Poppe, Nicholas (1965). *Introduction to Altaic linguistics*. Wiesbaden: Otto Harrassowitz.

Svantesson, Jan-Olof, Anna Tsendina, Anastasia Karlsson, & Vivan Franzén (2005). *The phonology of Mongolian*. Oxford and New York: Oxford University Press.

Tumurtogoo, D. (2010). *Mongolian monuments in ’Phags-pa script*. Taipei: Institute of Linguistics, Academia Sinica.

Vaux, Bert (2009). [atr] and [back] harmony in Altaic languages. In S. Tatevosov, ed., *Investigations into Formal Altaic Linguistics: Proceedings of WAFL* 3. 50-67. Moscow: MAKS Press.
Yang, Naisi (1986). 近代漢語京經等韻類分合考.『音韻學研究』2. 北京: 中華書局.

Byun Hanyoung
Department of Linguistics
Seoul National University
<0913pupu@snu.ac.kr>

Kim Minkyu
Department of Cognitive Science
University of California at Irvine
<mail@minkyu.kim>

Choe Gyeyeong
Department of Linguistics
Seoul National University
<zarafah@snu.ac.kr>

Yurn Gyudong
The Institute of Humanities
Yonsei University
<iamyurn@gmail.com>

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Appendix: Distribution of ’Phags-pa letters in syllabic units

Below are the tables representing the distribution of each ’Phags-pa letter within a syllabic unit. The letters are ordered alphabetically based on their transcriptions. The letters are denoted above their tables respectively, with the transcription in brackets. The first column denotes the number of occurrences per syllable; the second column denotes the relative ratio of the number to the total occurrences of the letter of interest; the third (transcription) and the fourth (’Phags-pa) columns represent the syllabic units in which the letter of interest is included, with the position of letter denoted with an underscore. In each table, the sum of all occurrences is shown at the top, the ratio being 100%.

ꡈ <•>

1389	100.00%	total	
249	17.93%	_ u	_ ꡎ
146	10.51%	q _	ꡈ _
123	8.86%	_ e	_ ꡁ
77	5.54%	_ ud	_ ꡎꡁ
74	5.33%	_ uė	_ ꡎꡂ
67	4.82%	_ er	_ ꡁꡀ
66	4.75%	_ un	_ ꡎꡃ
49	3.53%	_ r	_ ꡀ
45	3.24%	q _ n	ꡈ _ ꡃ
38	2.74%	_ i	_ ꡃ
36	2.59%	d _ ul	ꡁ _ ꡎꡅ
35	2.52%	_ yi	_ ꡄꡃ
32	2.30%	l _	ꡅ _
30	2.16%	g _ en	ꡆ _ ꡁꡃ
27	1.94%	h _ en	ꡇ _ ꡁꡃ
24	1.73%	k‘ _ e	ꡉ _ ꡁ
23	1.66%	g _ e	ꡆ _ ꡁ
21	1.51%	_ ul	_ ꡎꡅ
20	1.44%	_ ed	_ ꡁꡁ
19	1.37%	k‘ _ en	ꡉ _ ꡁꡃ
17	1.22%	k‘ _ eg	ꡉ _ ꡁꡆ
17	1.22%	_ eu	_ ꡁꡎ
14	1.01%	g _ ek‘	ꡆ _ ꡁꡈ
13	0.94%	_ ir	_ ꡃꡀ
10	0.72%	_ n	_ ꡃ
9	0.65%	_	_
8	0.58%	bu _	ꡂꡎ _
7	0.50%	_ en	_ ꡁꡃ
6	0.43%	_ d	_ ꡁ
6	0.43%	d _ e	ꡁ _ ꡁ
6	0.43%	lu _	ꡅꡎ _
4	0.29%	y _	ꡄ _
4	0.29%	r _ e	ꡀ _ ꡁ
4	0.29%	_ od	_ ꡋꡁ
4	0.29%	_ ur	_ ꡎꡀ
3	0.22%	y _ n	ꡄ _ ꡃ
3	0.22%	d _	ꡁ _
3	0.22%	_ m	_ ꡄ
3	0.22%	_ o	_ ꡋ
3	0.22%	r _	ꡀ _

3	0.22%	_ iŋ	_
2	0.14%	ǰ _	_
2	0.14%	_ on	_
2	0.14%	g _ eg	_
2	0.14%	_ eg	_
2	0.14%	_ ut‘	_
2	0.14%	mŋ _	_
2	0.14%	_ bo	_
1	0.07%	b _ su	_
1	0.07%	q _ e	_
1	0.07%	s _ r	_
1	0.07%	d _ n	_
1	0.07%	_ su	_
1	0.07%	’ _	_
1	0.07%	b _ en	_
1	0.07%	d _ eg	_
1	0.07%	d _ g	_
1	0.07%	md _	_
1	0.07%	’ _ u	_
1	0.07%	dg _	_
1	0.07%	q _ l	_
1	0.07%	d _ en	_
1	0.07%	_ bor	_
1	0.07%	se _ d	_
1	0.07%	du _	_
1	0.07%	_ brog	_
1	0.07%	b _	_
1	0.07%	_ r _ er	_
1	0.07%	qu _	_
1	0.07%	d _ d	_
1	0.07%	šhi _	_
1	0.07%	t‘ _	_
1	0.07%	_ l	_
1	0.07%	_ oq	_
1	0.07%	_ bu	_

 <’>

1147	100.00%	total	
381	33.22%	_	_
250	21.80%	_ eu	_
114	9.94%	_ eo	_
105	9.15%	_ euė	_
99	8.63%	_ l	_
71	6.19%	_ eog	_
45	3.92%	_ b	_
20	1.74%	_ eol	_
20	1.74%	_ ven	_
8	0.70%	_ yi	_
8	0.70%	_ vŋ	_
4	0.35%	_ ėr	_
3	0.26%	_ eoŋ	_
2	0.17%	_ eor	_
2	0.17%	_ eun	_
2	0.17%	_ q	_
2	0.17%	_ er	_
1	0.09%	_ •u	_
1	0.09%	_ euŋ	_
1	0.09%	_ •	_
1	0.09%	_ ŋoŋ	_
1	0.09%	_ eus	_
1	0.09%	_ us	_
1	0.09%	_ om	_
1	0.09%	_ r	_
1	0.09%	_ ve	_
1	0.09%	_ ŋ	_
1	0.09%	_ š	_

𑖌 <b>			
1662	100.00%	total	
492	29.60%	_	_
454	27.32%	_ u	_ 𑖯
86	5.17%	_ i	_ 𑖨
78	4.69%	qu _	𑖓𑖯 _
76	4.57%	_ er	_ 𑖝𑖪
74	4.45%	_ eė	_ 𑖝𑖿
51	3.07%	_ ol	_ 𑖜𑖍
45	2.71%	’ _	𑖮 _
40	2.41%	_ eo	_ 𑖝𑖜
32	1.93%	_ n	_ 𑖨
31	1.87%	_ q	_ 𑖓
21	1.26%	_ id	_ 𑖨𑖰
19	1.14%	_ o	_ 𑖜
18	1.08%	_ eu	_ 𑖝𑖯
15	0.90%	_ e	_ 𑖝
12	0.72%	_ os	_ 𑖜𑖲
9	0.54%	_ uė	_ 𑖯𑖿
8	0.48%	_ u•	_ 𑖯𑖓
7	0.42%	_ w	_ 𑖔
7	0.42%	_ un	_ 𑖯𑖨
6	0.36%	_ eyi	_ 𑖝𑖷𑖨
6	0.36%	_ ur	_ 𑖯𑖪
5	0.30%	_ yi	_ 𑖷𑖨
5	0.30%	_ rs	_ 𑖪𑖲
4	0.24%	_ oq	_ 𑖜𑖓
4	0.24%	_ ud	_ 𑖯𑖰
3	0.18%	_ on	_ 𑖜𑖨
3	0.18%	_ or	_ 𑖜𑖪
3	0.18%	_ l	_ 𑖍
2	0.12%	g _	𑖌 _
2	0.12%	_ eod	_ 𑖝𑖜𑖰
2	0.12%	_ en	_ 𑖝𑖨
2	0.12%	_ uq	_ 𑖯𑖓
2	0.12%	_ s	_ 𑖲
2	0.12%	_ r	_ 𑖪
2	0.12%	• _ o	𑖓 _ 𑖜
2	0.12%	_ ŋ	_ 𑖒
2	0.12%	ė _	𑖿 _
1	0.06%	_ rge	_ 𑖪𑖌𑖷
1	0.06%	_ m	_ 𑖩
1	0.06%	• _ rog	𑖓 _ 𑖪𑖜𑖌
1	0.06%	rgj _	𑖪𑖌𑖸 _
1	0.06%	_ •	_ 𑖓
1	0.06%	n _	𑖨 _
1	0.06%	l _	𑖍 _
1	0.06%	_ •en	_ 𑖓𑖝𑖨
1	0.06%	_ ė	_ 𑖿
1	0.06%	_ č‘ug	_ 𑖇𑖯𑖌
1	0.06%	_ el	_ 𑖝𑖍
1	0.06%	č‘ _	𑖇 _
1	0.06%	de _	𑖘𑖝 _
1	0.06%	sg _	𑖲𑖌 _
1	0.06%	r _ on	𑖪 _ 𑖜𑖨
1	0.06%	_ sod	_ 𑖲𑖜𑖰
1	0.06%	• _ u	𑖓 _ 𑖯
1	0.06%	_ zŋ	_ 𑖙𑖒
1	0.06%	• _ or	𑖓 _ 𑖜𑖪
1	0.06%	r _	𑖪 _
1	0.06%	sn _	𑖲𑖨 _
1	0.06%	_ rin	_ 𑖪𑖨𑖩
1	0.06%	se _	𑖲𑖰 _
1	0.06%	_ om	_ 𑖜𑖩
1	0.06%	_ j	_ 𑖸
1	0.06%	_ us	_ 𑖯𑖲

1	0.06%	_ •su	_ꡖꡛꡟ
1	0.06%	gru _	ꡂꡘꡟ _
1	0.06%	t‘ _	ꡉ _
1	0.06%	d _ l	ꡊ _ ꡙ

ꡍ <b‘>

3	100.00%	total	
2	66.67%	_ u	_ꡟ
1	33.33%	_ ur	_ꡟꡘ

ꡄ <č>

20	100.00%	total	
4	20.00%	_ i	_ꡞ
4	20.00%	_ uŋ	_ꡟꡃ
3	15.00%	_ ėw	_ꡦꡓ
3	15.00%	_ in	_ꡞꡋ
3	15.00%	_ eu	_ꡠꡟ
1	5.00%	r _	ꡘ _
1	5.00%	_	_
1	5.00%	_ hi	_ꡜꡞ

ꡅ <č‘>

568	100.00%	total	
219	38.56%	_ i	_ꡞ
84	14.79%	_ e	_ꡠ
44	7.75%	_ in	_ꡞꡋ
43	7.57%	_ un	_ꡟꡋ
33	5.81%	_ u	_ꡟ
31	5.46%	_	_
26	4.58%	_ en	_ꡠꡋ
16	2.82%	_ ig	_ꡞꡂ
13	2.29%	_ us	_ꡟꡛ
11	1.94%	_ id	_ꡞꡊ
7	1.23%	_ s	_ꡛ
5	0.88%	_ ėn	_ꡦꡋ
5	0.88%	_ eol	_ꡠꡡꡙ
4	0.70%	_ uŋ	_ꡟꡃ
3	0.53%	_ od	_ꡡꡊ
3	0.53%	_ eu	_ꡠꡟ
2	0.35%	_ im	_ꡞꡏ
2	0.35%	_ eun	_ꡠꡟꡋ
2	0.35%	_ ė	_ꡦ
2	0.35%	m _ od	ꡏ _ ꡡꡊ
2	0.35%	_ o	_ꡡ
2	0.35%	_ oq	_ꡡꡢ
1	0.18%	_ ul	_ꡟꡙ
1	0.18%	_ el	_ꡠꡙ
1	0.18%	_ q	_ꡢ
1	0.18%	b _ ug	ꡎ _ ꡟꡂ
1	0.18%	_ os	_ꡡꡛ
1	0.18%	_ y	_ꡗ
1	0.18%	_ ir	_ꡞꡘ
1	0.18%	_ eon	_ꡠꡡꡋ
1	0.18%	_ b	_ꡎ

ꡊ <d>

2150	100.00%	total	
337	15.67%	_	_
289	13.44%	_ ur	_ꡟꡘ
145	6.74%	_ u	_ꡟ
141	6.56%	_ e	_ꡠ
113	5.26%	_ un	_ꡟꡋ
101	4.70%	_ ėŋ	_ꡦꡃ
90	4.19%	y _	ꡗ _
90	4.19%	yi _	ꡗꡞ _
77	3.58%	_ o	_ꡡ

77	3.58%	•u _	[illegible]
55	2.56%	ŋu _	[illegible]
48	2.23%	_ i	[illegible]
45	2.09%	k‘e _	[illegible]
36	1.67%	_ •ul	[illegible]
35	1.63%	_ eg	[illegible]
35	1.63%	_ ėm	[illegible]
33	1.54%	se _	[illegible]
29	1.35%	me _	[illegible]
27	1.26%	le _	[illegible]
23	1.07%	_ eė	[illegible]
22	1.02%	mu _	[illegible]
21	0.98%	bi _	[illegible]
20	0.93%	•e _	[illegible]
15	0.70%	_ ėn	[illegible]
11	0.51%	m _	[illegible]
11	0.51%	č‘i _	[illegible]
9	0.42%	_ hiy	[illegible]
8	0.37%	_ um	[illegible]
8	0.37%	_ š	[illegible]
7	0.33%	_ l	[illegible]
7	0.33%	m _ o	[illegible]
6	0.28%	• _	[illegible]
6	0.28%	_ •e	[illegible]
6	0.28%	ge _	[illegible]
6	0.28%	_ pl	[illegible]
6	0.28%	ė _	[illegible]
6	0.28%	_ hi	[illegible]
5	0.23%	_ n	[illegible]
5	0.23%	_ en	[illegible]
5	0.23%	wi _	[illegible]
5	0.23%	_ em	[illegible]
5	0.23%	lu _	[illegible]
5	0.23%	_ el	[illegible]
5	0.23%	su _	[illegible]
5	0.23%	_ uq	[illegible]
4	0.19%	bu _	[illegible]
4	0.19%	ri _	[illegible]
4	0.19%	•o _	[illegible]
4	0.19%	q _	[illegible]
4	0.19%	_ uŋ	[illegible]
4	0.19%	_ eu	[illegible]
3	0.14%	č‘o _	[illegible]
3	0.14%	r _	[illegible]
3	0.14%	_ iš	[illegible]
3	0.14%	ho _	[illegible]
3	0.14%	_ on	[illegible]
3	0.14%	_ hr	[illegible]
3	0.14%	_ •	[illegible]
3	0.14%	s _	[illegible]
2	0.09%	_ eor	[illegible]
2	0.09%	_ uė	[illegible]
2	0.09%	_ i _	[illegible]
2	0.09%	_ oq	[illegible]
2	0.09%	t‘o _	[illegible]
2	0.09%	_ r	[illegible]
2	0.09%	_ ŋ	[illegible]
2	0.09%	sm _	[illegible]
2	0.09%	beo _	[illegible]
2	0.09%	mč‘o _	[illegible]
2	0.09%	_ or	[illegible]
1	0.05%	_ ris	[illegible]
1	0.05%	yo _	[illegible]
1	0.05%	_ •eg	[illegible]
1	0.05%	_ •g	[illegible]
1	0.05%	_ p	[illegible]

1	0.05%	p _	ꡂ _
1	0.05%	_ eb	_ ꡁꡃ
1	0.05%	_ u _	_ ꡄ _
1	0.05%	_ g•	_ ꡃꡈ
1	0.05%	qu _	ꡈꡄ _
1	0.05%	_ wus	_ ꡊꡄꡞ
1	0.05%	gu _	ꡃꡄ _
1	0.05%	_ ri	_ ꡁꡀ
1	0.05%	u _	ꡄ _
1	0.05%	_ • _	_ ꡈ _
1	0.05%	_ •en	_ ꡈꡁꡀ
1	0.05%	_ ė	_ ꡆ
1	0.05%	se• _	ꡞꡁꡈ _
1	0.05%	_ rs	_ ꡁꡞ
1	0.05%	_ eur	_ ꡁꡄꡁ
1	0.05%	seo _	ꡞꡁꡇ _
1	0.05%	_ us	_ ꡄꡞ
1	0.05%	k‘ _	ꡈ _
1	0.05%	_ il	_ ꡀꡃ
1	0.05%	nu _	ꡀꡄ _
1	0.05%	_ eŋ	_ ꡁꡆ
1	0.05%	mo _	ꡂꡇ _
1	0.05%	_ u•	_ ꡄꡈ
1	0.05%	ǰu _	ꡆꡄ _
1	0.05%	wr _	ꡊꡁ _
1	0.05%	ye _	ꡅꡂ _
1	0.05%	bso _	ꡂꡞꡇ _
1	0.05%	li _	ꡃꡀ _
1	0.05%	_ •n	_ ꡈꡀ
1	0.05%	_ iŋs	_ ꡀꡆꡞ
1	0.05%	_ is	_ ꡀꡞ
1	0.05%	_ s	_ ꡞ
1	0.05%	m _ •	ꡂ _ ꡈ
1	0.05%	_ bl	_ ꡂꡃ

ꡁ <dz>

22	100.00%	total	
4	18.18%	_ i	_ ꡀ
4	18.18%	_ u	_ ꡄ
3	13.64%	_ ŋ	_ ꡆ
2	9.09%	_ uŋ	_ ꡄꡆ
2	9.09%	_ hi	_ ꡅꡀ
1	4.55%	_ ew	_ ꡁꡊ
1	4.55%	_ w	_ ꡊ
1	4.55%	_ euŋ	_ ꡁꡄꡆ
1	4.55%	_ r	_ ꡁ
1	4.55%	_ ėn	_ ꡆꡀ
1	4.55%	_ m	_ ꡂ
1	4.55%	_ in	_ ꡂꡀ

ꡃ <e>

2400	100.00%	total	
168	7.00%	g _	ꡃ _
141	5.88%	d _	ꡁ _
123	5.13%	• _	ꡈ _
110	4.58%	k‘ _	ꡈ _
109	4.54%	n _	ꡀ _
101	4.21%	t‘ _	ꡌ _
93	3.88%	l _	ꡉ _
92	3.83%	g _ ė	ꡃ _ ꡆ
84	3.50%	č‘ _	ꡋ _
79	3.29%	s _ n	ꡞ _ ꡀ
76	3.17%	b _ r	ꡂ _ ꡁ
74	3.08%	b _ ė	ꡂ _ ꡆ
67	2.79%	• _ r	ꡈ _ ꡁ
65	2.71%	ǰ _ n	ꡆ _ ꡀ

57	2.38%	m _	𐤌 _
45	1.88%	k _	𐤊 _
45	1.88%	kʻ _ d	𐤐 _ 𐤃
44	1.83%	s _	𐤑 _
36	1.50%	r _	𐤓 _
36	1.50%	l _ s	𐤋 _ 𐤑
35	1.46%	d _ g	𐤃 _ 𐤂
33	1.38%	s _ d	𐤑 _ 𐤃
31	1.29%	tʻ _ n	𐤕 _ 𐤍
30	1.25%	g• _ n	𐤂𐤉 _ 𐤍
29	1.21%	m _ d	𐤌 _ 𐤃
28	1.17%	m _ s	𐤌 _ 𐤑
27	1.13%	h• _ n	𐤇𐤉 _ 𐤍
27	1.13%	l _ d	𐤋 _ 𐤃
26	1.08%	čʻ _ n	𐤎 _ 𐤍
24	1.00%	kʻ• _	𐤐𐤉 _
23	0.96%	g• _	𐤂𐤉 _
23	0.96%	d _ ė	𐤃 _ 𐤅
20	0.83%	ǰ _ ė	𐤉 _ 𐤅
20	0.83%	• _ d	𐤉 _ 𐤃
20	0.83%	ʾv _ n	𐤆𐤅 _ 𐤍
19	0.79%	kʻ• _ n	𐤐𐤉 _ 𐤍
17	0.71%	kʻ• _ g	𐤐𐤉 _ 𐤂
16	0.67%	y _ r	𐤉 _ 𐤓
16	0.67%	h _	𐤇 _
16	0.67%	g _ y	𐤂 _ 𐤉
15	0.63%	b _	𐤁 _
14	0.58%	g• _ kʻ	𐤂𐤉 _ 𐤐
13	0.54%	ǰ _	𐤉 _
9	0.38%	g _ i	𐤂 _ 𐤍
9	0.38%	kʻ _ n	𐤐 _ 𐤍
9	0.38%	kʻ _ r	𐤐 _ 𐤓
9	0.38%	sv _ n	𐤑𐤅 _ 𐤍
8	0.33%	f _ n	𐤅 _ 𐤍
7	0.29%	g _ w	𐤂 _ 𐤈
7	0.29%	• _ n	𐤉 _ 𐤍
7	0.29%	y _	𐤉 _
6	0.25%	g _ d	𐤂 _ 𐤃
6	0.25%	d• _	𐤃𐤉 _
6	0.25%	rg _ l	𐤓𐤂 _ 𐤋
6	0.25%	y _ n	𐤉 _ 𐤍
6	0.25%	g _ n	𐤂 _ 𐤍
6	0.25%	b _ yi	𐤁 _ 𐤉𐤍
5	0.21%	h _ iŋ	𐤇 _ 𐤍𐤊
5	0.21%	d _ l	𐤃 _ 𐤋
5	0.21%	d _ m	𐤃 _ 𐤌
5	0.21%	d _ n	𐤃 _ 𐤍
5	0.21%	tsv _ n	𐤑𐤅 _ 𐤍
4	0.17%	g _ r	𐤂 _ 𐤓
4	0.17%	r _ g	𐤓 _ 𐤂
4	0.17%	r• _	𐤓𐤉 _
4	0.17%	m _ r	𐤌 _ 𐤓
3	0.13%	g _ m	𐤂 _ 𐤌
3	0.13%	l _ n	𐤋 _ 𐤍
3	0.13%	l _ g	𐤋 _ 𐤂
3	0.13%	h _ n	𐤇 _ 𐤍
3	0.13%	tʻ _ r	𐤕 _ 𐤓
3	0.13%	g _ s	𐤂 _ 𐤑
2	0.08%	• _ g	𐤉 _ 𐤂
2	0.08%	ǰ _ m	𐤉 _ 𐤌
2	0.08%	s _ tʻ	𐤑 _ 𐤕
2	0.08%	n _ n	𐤍 _ 𐤍
2	0.08%	g _ l	𐤂 _ 𐤋
2	0.08%	m _ g	𐤌 _ 𐤂
2	0.08%	_	_
2	0.08%	f _	𐤅 _

2	0.08%	s _ ŋ	ꡏ _ ꡄ
2	0.08%	r _ n	ꡍ _ ꡐ
2	0.08%	š _	ꡊ _
2	0.08%	l _ l	ꡂ _ ꡂ
2	0.08%	t‘ _ g	ꡔ _ ꡊ
2	0.08%	’ _ r	ꡅ _ ꡍ
2	0.08%	g• _ g	ꡊꡄ _ ꡊ
2	0.08%	l _ ŋ	ꡂ _ ꡄ
2	0.08%	b _ n	ꡁ _ ꡐ
1	0.04%	š _ n	ꡊ _ ꡐ
1	0.04%	brg _	ꡁꡍꡊ _
1	0.04%	s _ r	ꡏ _ ꡍ
1	0.04%	ǰ _ s	ꡃ _ ꡏ
1	0.04%	y _ d	ꡈ _ ꡀ
1	0.04%	d _ b	ꡀ _ ꡁ
1	0.04%	k‘ _ m	ꡄ _ ꡑ
1	0.04%	z _ ŋ	ꡇ _ ꡄ
1	0.04%	d• _ n	ꡀꡄ _ ꡐ
1	0.04%	ǰ _ w	ꡃ _ ꡞ
1	0.04%	s _ •d	ꡏ _ ꡄꡀ
1	0.04%	b• _ n	ꡁꡄ _ ꡐ
1	0.04%	d _ ŋ	ꡀ _ ꡄ
1	0.04%	k _ s	ꡋ _ ꡏ
1	0.04%	r _ s	ꡍ _ ꡏ
1	0.04%	rg _	ꡍꡊ _
1	0.04%	p _ in	ꡂ _ ꡐꡒ
1	0.04%	k‘ _ ė	ꡄ _ ꡆ
1	0.04%	d• _ g	ꡀꡄ _ ꡊ
1	0.04%	dz _ w	ꡉ _ ꡞ
1	0.04%	g _ g	ꡊ _ ꡊ
1	0.04%	g _ iŋ	ꡊ _ ꡐꡄ
1	0.04%	s _ g	ꡏ _ ꡊ
1	0.04%	h _ g	ꡎ _ ꡊ
1	0.04%	g _ ŋ	ꡊ _ ꡄ
1	0.04%	gv _ n	ꡊꡔ _ ꡐ
1	0.04%	č‘ _ l	ꡈ _ ꡂ
1	0.04%	q• _	ꡀꡀ _
1	0.04%	ž _	ꡆ _
1	0.04%	k _ w	ꡋ _ ꡞ
1	0.04%	yv _ n	ꡈꡔ _ ꡐ
1	0.04%	•r• _ r	ꡀꡍꡀ _ ꡍ
1	0.04%	b _ l	ꡁ _ ꡂ
1	0.04%	s _ b	ꡏ _ ꡁ
1	0.04%	’v _	ꡅꡔ _
1	0.04%	h _ ėn	ꡎ _ ꡄꡐ
1	0.04%	ǰ _ g	ꡃ _ ꡊ
1	0.04%	k‘ _ i	ꡄ _ ꡐ
1	0.04%	t‘ _ yi	ꡔ _ ꡈꡐ

ꡎꡀ <eo>

345	100.00%	total	
114	33.04%	’ _	ꡅ _
71	20.58%	’ _ g	ꡅ _ ꡊ
40	11.59%	b _	ꡁ _
31	8.99%	k‘ _	ꡄ _
20	5.80%	’ _ l	ꡅ _ ꡂ
19	5.51%	t‘ _	ꡔ _
5	1.45%	č‘ _ l	ꡈ _ ꡂ
5	1.45%	n _	ꡐ _
5	1.45%	k‘ _ r	ꡄ _ ꡍ
5	1.45%	n _ r	ꡐ _ ꡍ
4	1.16%	r _	ꡍ _
3	0.87%	’ _ ŋ	ꡅ _ ꡄ
3	0.87%	m _ r	ꡑ _ ꡍ
2	0.58%	b _ d	ꡁ _ ꡀ
2	0.58%	g _ n	ꡊ _ ꡐ

2	0.58%	d _ r	[illegible]
2	0.58%	k‘ _ l	[illegible]
2	0.58%	g _	[illegible]
2	0.58%	’ _ r	[illegible]
1	0.29%	l _	[illegible]
1	0.29%	r _ n	[illegible]
1	0.29%	č‘ _ n	[illegible]
1	0.29%	k‘ _ rg	[illegible]
1	0.29%	r _ l	[illegible]
1	0.29%	m _	[illegible]
1	0.29%	s _ d	[illegible]
1	0.29%	k‘ _ n	[illegible]

[illegible] <eu>

610	100.00%	total	
250	40.98%	’ _	[illegible]
105	17.21%	’ _ ė	[illegible]
56	9.18%	s _	[illegible]
32	5.25%	g _ ŋ	[illegible]
27	4.43%	k‘ _	[illegible]
18	2.95%	b _	[illegible]
17	2.79%	• _	[illegible]
15	2.46%	ǰ _	[illegible]
15	2.46%	t‘ _	[illegible]
12	1.97%	h _	[illegible]
8	1.31%	k‘ _ r	[illegible]
7	1.15%	g _	[illegible]
4	0.66%	l _	[illegible]
4	0.66%	d _	[illegible]
4	0.66%	y _	[illegible]
4	0.66%	š _	[illegible]
3	0.49%	č‘ _	[illegible]
3	0.49%	č _	[illegible]
2	0.33%	’ _ n	[illegible]
2	0.33%	s _ ŋ	[illegible]
2	0.33%	g _ n	[illegible]
2	0.33%	l _ ŋ	[illegible]
2	0.33%	y _ ŋ	[illegible]
2	0.33%	č‘ _ n	[illegible]
2	0.33%	k‘ _ ŋ	[illegible]
1	0.16%	l _ g	[illegible]
1	0.16%	z _ ŋ	[illegible]
1	0.16%	d _ r	[illegible]
1	0.16%	dz _ ŋ	[illegible]
1	0.16%	’ _ s	[illegible]
1	0.16%	ž _ n	[illegible]
1	0.16%	s _ n	[illegible]
1	0.16%	’ _ ŋ	[illegible]
1	0.16%	m _ r	[illegible]
1	0.16%	ž _	[illegible]
1	0.16%	k‘ _ n	[illegible]
1	0.16%	ǰ _ ŋ	[illegible]

[illegible] <ė>

1100	100.00%	total	
192	17.46%	_	_
105	9.55%	’eu _	[illegible]
101	9.18%	d _ ŋ	[illegible]
92	8.36%	ge _	[illegible]
74	6.73%	be _	[illegible]
74	6.73%	•u _	[illegible]
66	6.00%	_ l	[illegible]
44	4.00%	y _	[illegible]
42	3.82%	qu _	[illegible]
36	3.27%	_ r	[illegible]
35	3.18%	d _ m	[illegible]

26	2.36%	gu _	
23	2.09%	de _	
20	1.82%	ǰe _	
15	1.36%	d _ n	
14	1.27%	k‘u _	
10	0.91%	š _ n	
9	0.82%	m _ w	
9	0.82%	bu _	
7	0.64%	mu _	
6	0.55%	_ d	
5	0.46%	ŋ _ m	
5	0.46%	č‘ _ n	
5	0.46%	s _ n	
5	0.46%	ǰ _ w	
4	0.36%	y _ r	
4	0.36%	’ _ r	
3	0.27%	y _ n	
3	0.27%	t‘ _ n	
3	0.27%	r _ n	
3	0.27%	z _ r	
3	0.27%	č _ w	
3	0.27%	t _ n	
2	0.18%	š _ s	
2	0.18%	p _ n	
2	0.18%	_ n	
2	0.18%	č‘ _	
2	0.18%	_ ŋ	
2	0.18%	s _ ŋ	
2	0.18%	h _ n	
2	0.18%	š _ w	
2	0.18%	šu _	
2	0.18%	m _	
2	0.18%	rǰ _	
2	0.18%	du _	
2	0.18%	_ b	
2	0.18%	gh _	
1	0.09%	su _	
1	0.09%	dz _ n	
1	0.09%	g _ m	
1	0.09%	d _	
1	0.09%	š _ r	
1	0.09%	l _ ŋ	
1	0.09%	he _ n	
1	0.09%	u _	
1	0.09%	g _	
1	0.09%	m _ n	
1	0.09%	_ m	
1	0.09%	k‘e _	
1	0.09%	ň _ n	
1	0.09%	n _ n	
1	0.09%	y _ u	
1	0.09%	gy _ r	
1	0.09%	gy _ l	
1	0.09%	t _	
1	0.09%	b _	
1	0.09%	ǰ _ n	
1	0.09%	l _ m	
1	0.09%	y _ w	
1	0.09%	k‘ _	
1	0.09%	t‘ _	
1	0.09%	p _ sr	
1	0.09%	lu _	

 <f>

41	100.00%	total	
12	29.27%	_ u	

11	26.83%	_	_
8	19.51%	_ en	_ [illegible]
5	12.20%	_ uŋ	_ [illegible]
3	7.32%	_ ŋ	_ [illegible]
2	4.88%	_ e	_ [illegible]

[illegible] <g>

1010	100.00%	total	
168	16.63%	_ e	_ [illegible]
92	9.11%	_ eė	_ [illegible]
77	7.62%	_ un	_ [illegible]
71	7.03%	’eo _	[illegible] _
35	3.47%	de _	[illegible] _
34	3.37%	ri _	[illegible] _
32	3.17%	_ euŋ	_ [illegible]
30	2.97%	_ •en	_ [illegible]
30	2.97%	_ is	_ [illegible]
29	2.87%	_ ir	_ [illegible]
26	2.57%	_ uė	_ [illegible]
25	2.48%	_ on	_ [illegible]
24	2.38%	_ u	_ [illegible]
23	2.28%	_ •e	_ [illegible]
17	1.68%	k‘•e _	[illegible] _
17	1.68%	lu _	[illegible] _
16	1.58%	_ ey	_ [illegible]
16	1.58%	č‘i _	[illegible] _
14	1.39%	_ •ek‘	_ [illegible]
10	0.99%	_ us	_ [illegible]
9	0.89%	_ ei	_ [illegible]
8	0.79%	_ jy	_ [illegible]
8	0.79%	_ o	_ [illegible]
8	0.79%	_	_
8	0.79%	_ i	_ [illegible]
8	0.79%	_ m	_ [illegible]
7	0.69%	_ jŋ	_ [illegible]
7	0.69%	_ ew	_ [illegible]
7	0.69%	_ eu	_ [illegible]
6	0.59%	_ en	_ [illegible]
6	0.59%	r _ el	[illegible] _ [illegible]
6	0.59%	_ ed	_ [illegible]
5	0.50%	r _ jl	[illegible] _ [illegible]
5	0.50%	ši _	[illegible] _
5	0.50%	_ vŋ	_ [illegible]
4	0.40%	re _	[illegible] _
4	0.40%	_ er	_ [illegible]
4	0.40%	_ r	_ [illegible]
4	0.40%	_ žis	_ [illegible]
3	0.30%	_ em	_ [illegible]
3	0.30%	_ es	_ [illegible]
3	0.30%	s _ ŋ	[illegible] _ [illegible]
3	0.30%	_ il	_ [illegible]
3	0.30%	_ uŋ	_ [illegible]
3	0.30%	li _	[illegible] _
3	0.30%	le _	[illegible] _
2	0.20%	•e _	[illegible] _
2	0.20%	t‘e _	[illegible] _
2	0.20%	_ r _ s	_ [illegible] _ [illegible]
2	0.20%	_ js	_ [illegible]
2	0.20%	_ b	_ [illegible]
2	0.20%	me _	[illegible] _
2	0.20%	_ el	_ [illegible]
2	0.20%	_ eon	_ [illegible]
2	0.20%	_ l	_ [illegible]
2	0.20%	_ im	_ [illegible]
2	0.20%	_ eun	_ [illegible]
2	0.20%	_ jw	_ [illegible]

2	0.20%	s _ or	ꡛ _ ꡡꡘ
2	0.20%	_ •e _	_ ꡖꡠ _
2	0.20%	_ iŋ	_ ꡞꡃ
2	0.20%	_ hė	_ ꡜꡦ
2	0.20%	_ ur	_ ꡟꡘ
2	0.20%	_ ŋ	_ ꡃ
2	0.20%	_ w	_ ꡓ
2	0.20%	_ eo	_ ꡠꡡ
2	0.20%	_ s	_ ꡛ
1	0.10%	_ tsŋ	_ ꡐꡃ
1	0.10%	k‘eor _	ꡁꡠꡡꡘ _
1	0.10%	se _	ꡛꡠ _
1	0.10%	_ ŋs	_ ꡃꡛ
1	0.10%	bč‘u _	ꡎꡅꡟ _
1	0.10%	•bro _	ꡖꡎꡘꡡ _
1	0.10%	_ sum	_ ꡛꡟꡏ
1	0.10%	d•e _	ꡊꡖꡠ _
1	0.10%	_ ė	_ ꡦ
1	0.10%	_ e _	_ ꡠ _
1	0.10%	d• _	ꡊꡖ _
1	0.10%	_ os	_ ꡡꡛ
1	0.10%	he _	ꡜꡠ _
1	0.10%	s _ l	ꡛ _ ꡙ
1	0.10%	qro _	ꡢꡘꡡ _
1	0.10%	r _ m	ꡘ _ ꡏ
1	0.10%	_ r _	_ ꡘ _
1	0.10%	r _ jb	ꡘ _ ꡗꡎ
1	0.10%	br _ e	ꡎꡘ _ ꡠ
1	0.10%	_ jl	_ ꡗꡙ
1	0.10%	ǰe _	ꡆꡠ _
1	0.10%	_ yėl	_ ꡭꡦꡙ
1	0.10%	_ eŋ	_ ꡠꡃ
1	0.10%	k‘i _	ꡁꡞ _
1	0.10%	s _ o	ꡛ _ ꡡ
1	0.10%	_ yėr	_ ꡭꡦꡘ
1	0.10%	_ eiŋ	_ ꡠꡞꡃ
1	0.10%	t‘u _	ꡉꡟ _
1	0.10%	_ ėm	_ ꡦꡏ
1	0.10%	s _ u	ꡛ _ ꡟ
1	0.10%	_ ji	_ ꡗꡞ
1	0.10%	_ ud	_ ꡟꡊ
1	0.10%	_ iw	_ ꡞꡓ
1	0.10%	leu _	ꡙꡠꡟ _
1	0.10%	s _ b	ꡛ _ ꡎ
1	0.10%	d _ •	ꡊ _ ꡖ
1	0.10%	r _ jis	ꡘ _ ꡗꡞꡛ
1	0.10%	r _ e	ꡘ _ ꡠ
1	0.10%	_ rub	_ ꡘꡟꡎ
1	0.10%	_ roŋ	_ ꡘꡡꡃ
1	0.10%	_ j	_ ꡗ
1	0.10%	_ ven	_ ꡤꡠꡋ

ꡣ <γ>

48	100.00%	total	
13	27.08%	_	_
7	14.58%	_ n	_ ꡋ
5	10.42%	_ v	_ ꡤ
5	10.42%	_ o	_ ꡡ
3	6.25%	_ uŋ	_ ꡟꡃ
3	6.25%	_ oŋ	_ ꡡꡃ
3	6.25%	_ iw	_ ꡞꡓ
2	4.17%	_ vo	_ ꡤꡡ
2	4.17%	_ u	_ ꡟ
1	2.08%	_ vy	_ ꡤꡭ
1	2.08%	_ w	_ ꡓ
1	2.08%	_ ŋ	_ ꡃ

1	2.08%	_ iŋ	_ [illegible]
1	2.08%	_ vn	_ [illegible]

[illegible] <h>

442	100.00%	total	
95	21.49%	š _ i	[illegible] _ [illegible]
75	16.97%	_	_
65	14.71%	_ i	_ [illegible]
31	7.01%	z _ i	[illegible] _ [illegible]
27	6.11%	_ •en	_ [illegible]
16	3.62%	_ e	_ [illegible]
15	3.39%	s _ i	[illegible] _ [illegible]
15	3.39%	_ r	_ [illegible]
14	3.17%	_ on	_ [illegible]
12	2.72%	_ eu	_ [illegible]
9	2.04%	d _ iy	[illegible] _ [illegible]
6	1.36%	d _ i	[illegible] _ [illegible]
5	1.13%	_ eiŋ	_ [illegible]
4	0.91%	ǰ _ ŋ	[illegible] _ [illegible]
3	0.68%	l _	[illegible] _
3	0.68%	d _ r	[illegible] _ [illegible]
3	0.68%	_ en	_ [illegible]
3	0.68%	_ od	_ [illegible]
3	0.68%	_ y	_ [illegible]
3	0.68%	_ j	_ [illegible]
3	0.68%	t‘ _	[illegible] _
3	0.68%	_ u	_ [illegible]
2	0.45%	g _ ė	[illegible] _ [illegible]
2	0.45%	_ ėn	_ [illegible]
2	0.45%	dz _ i	[illegible] _ [illegible]
2	0.45%	_ o	_ [illegible]
2	0.45%	s _ iŋ	[illegible] _ [illegible]
2	0.45%	l _ s	[illegible] _ [illegible]
1	0.23%	š _ i•	[illegible] _ [illegible]
1	0.23%	t _ iy	[illegible] _ [illegible]
1	0.23%	k‘r _ s	[illegible] _ [illegible]
1	0.23%	_ jiŋ	_ [illegible]
1	0.23%	č _ i	[illegible] _ [illegible]
1	0.23%	l _ os	[illegible] _ [illegible]
1	0.23%	_ jŋ	_ [illegible]
1	0.23%	_ eėn	_ [illegible]
1	0.23%	_ uŋ	_ [illegible]
1	0.23%	t _ i	[illegible] _ [illegible]
1	0.23%	_ eg	_ [illegible]
1	0.23%	t _ iŋ	[illegible] _ [illegible]
1	0.23%	ǰ _ iw	[illegible] _ [illegible]
1	0.23%	ts _ i	[illegible] _ [illegible]
1	0.23%	t _ iw	[illegible] _ [illegible]
1	0.23%	_ or	_ [illegible]
1	0.23%	_ oq	_ [illegible]

[illegible] <i>

3085	100.00%	total	
501	16.24%	r _	[illegible] _
219	7.10%	qy _	[illegible] _
219	7.10%	č‘ _	[illegible] _
186	6.03%	l _	[illegible] _
176	5.71%	y _ n	[illegible] _ [illegible]
170	5.51%	l _ q	[illegible] _ [illegible]
111	3.60%	y _	[illegible] _
95	3.08%	šh _	[illegible] _
90	2.92%	y _ d	[illegible] _ [illegible]
89	2.89%	š _	[illegible] _
86	2.79%	b _	[illegible] _
65	2.11%	h _	[illegible] _
56	1.82%	ǰ _	[illegible] _

56	1.82%	n _	
48	1.56%	d _	
44	1.43%	č‘ _ n	
38	1.23%	• _	
37	1.20%	ǰ _ ŋ	
35	1.14%	•y _	
35	1.14%	ǰ _ l	
34	1.10%	r _ g	
32	1.04%	k‘ _	
31	1.01%	zh _	
30	0.97%	g _ s	
29	0.94%	g _ r	
29	0.94%	r _ n	
25	0.81%	t _	
22	0.71%	ǰ _ n	
21	0.68%	b _ d	
20	0.65%	s _	
19	0.62%	_	_
18	0.58%	m _	
16	0.52%	č‘ _ g	
15	0.49%	sh _	
14	0.45%	ly _	
13	0.42%	m _ ŋ	
13	0.42%	• _ r	
12	0.39%	ǰ _ w	
11	0.36%	č‘ _ d	
10	0.32%	k _	
9	0.29%	ge _	
9	0.29%	dh _ y	
8	0.26%	p _ ŋ	
8	0.26%	š _ ŋ	
8	0.26%	g _	
8	0.26%	’y _	
8	0.26%	ǰ _ r	
8	0.26%	ž _ n	
7	0.23%	w _	
7	0.23%	l _ m	
6	0.19%	t‘y _	
6	0.19%	š _ w	
6	0.19%	dh _	
6	0.19%	q _	
6	0.19%	ž _	
6	0.19%	bey _	
5	0.16%	š _ g	
5	0.16%	ny _	
5	0.16%	š _ r	
5	0.16%	n _ ŋ	
5	0.16%	by _	
5	0.16%	he _ ŋ	
5	0.16%	w _ d	
4	0.13%	š _ n	
4	0.13%	r _ q	
4	0.13%	t _ ŋ	
4	0.13%	n _ s	
4	0.13%	ts‘ _ n	
4	0.13%	č _	
4	0.13%	gž _ s	
4	0.13%	š _ l	
4	0.13%	r _ d	
4	0.13%	dz _	
4	0.13%	ŋ _	
3	0.10%	t‘ _ n	
3	0.10%	γ _ w	
3	0.10%	l _ g	
3	0.10%	ts‘ _ ŋ	
3	0.10%	g _ l	

3	0.10%	č _ n	𐤌 _ 𐤍
3	0.10%	r _ s	𐤇 _ 𐤔
3	0.10%	• _ ŋ	𐤋 _ 𐤎
3	0.10%	l _ ŋ	𐤋 _ 𐤎
3	0.10%	d _ š	𐤆 _ 𐤅
3	0.10%	ts _ ŋ	𐤑 _ 𐤎
3	0.10%	qoy _	𐤒𐤊𐤉 _
2	0.07%	st _	𐤔𐤕 _
2	0.07%	g _ m	𐤂 _ 𐤌
2	0.07%	m _ n	𐤌 _ 𐤍
2	0.07%	d _ d	𐤆 _ 𐤆
2	0.07%	y _ l	𐤉 _ 𐤋
2	0.07%	t‘ _	𐤈 _
2	0.07%	rǰ _	𐤇𐤓 _
2	0.07%	n _ n	𐤍 _ 𐤍
2	0.07%	sh _ ŋ	𐤔𐤅 _ 𐤎
2	0.07%	g _ ŋ	𐤂 _ 𐤎
2	0.07%	dzh _	𐤂𐤔𐤅 _
2	0.07%	n _ r	𐤍 _ 𐤇
2	0.07%	l _ w	𐤋 _ 𐤁
2	0.07%	k‘ _ l	𐤊 _ 𐤋
2	0.07%	č‘ _ m	𐤇 _ 𐤌
1	0.03%	r _ r	𐤇 _ 𐤇
1	0.03%	p _	𐤐 _
1	0.03%	kž _ s	𐤄𐤑 _ 𐤔
1	0.03%	ts _ r	𐤑 _ 𐤇
1	0.03%	rgj _ s	𐤇𐤂𐤉 _ 𐤔
1	0.03%	gj _	𐤂𐤉 _
1	0.03%	_ t‘	_ 𐤈
1	0.03%	g _ w	𐤂 _ 𐤁
1	0.03%	dr _	𐤆𐤇 _
1	0.03%	hj _ ŋ	𐤅𐤉 _ 𐤎
1	0.03%	s _ m	𐤔 _ 𐤌
1	0.03%	ts _	𐤑 _
1	0.03%	th _ w	𐤕𐤅 _ 𐤁
1	0.03%	k‘ _ w	𐤊 _ 𐤁
1	0.03%	d _ l	𐤆 _ 𐤋
1	0.03%	th _ y	𐤕𐤅 _ 𐤉
1	0.03%	d _ ŋs	𐤆 _ 𐤎𐤔
1	0.03%	z _ m	𐤌 _ 𐤌
1	0.03%	dz _ n	𐤖 _ 𐤍
1	0.03%	l _ d	𐤋 _ 𐤆
1	0.03%	š _ s	𐤅 _ 𐤔
1	0.03%	y _ q	𐤉 _ 𐤒
1	0.03%	t‘ey _	𐤈𐤆𐤉 _
1	0.03%	th _ ŋ	𐤕𐤅 _ 𐤎
1	0.03%	k‘ _ ŋ	𐤊 _ 𐤎
1	0.03%	y _ m	𐤉 _ 𐤌
1	0.03%	q _ q	𐤒 _ 𐤒
1	0.03%	d _ s	𐤆 _ 𐤔
1	0.03%	s _ ŋ	𐤔 _ 𐤎
1	0.03%	k‘ _ g	𐤊 _ 𐤂
1	0.03%	q _ s	𐤒 _ 𐤔
1	0.03%	čh _	𐤌𐤅 _
1	0.03%	br _ n	𐤁𐤇 _ 𐤍
1	0.03%	dr _ s	𐤆𐤇 _ 𐤔
1	0.03%	k‘e _	𐤊𐤆 _
1	0.03%	th _	𐤕𐤅 _
1	0.03%	ts _ n	𐤑 _ 𐤍
1	0.03%	l _ l	𐤋 _ 𐤋
1	0.03%	ge _ ŋ	𐤂𐤆 _ 𐤎
1	0.03%	m _ s	𐤌 _ 𐤔
1	0.03%	ǰh _ w	𐤄𐤅 _ 𐤁
1	0.03%	ǰ _ u	𐤄 _ 𐤅
1	0.03%	r _ l	𐤇 _ 𐤋
1	0.03%	č‘ _ r	𐤇 _ 𐤇

	1	0.03%	ž _ ŋ	ꡐ _ ꡏ
	1	0.03%	s _ w	ꡗ _ ꡡ
	1	0.03%	ň _	ꡎ _
	1	0.03%	ɣ _ ŋ	ꡢ _ ꡏ
	1	0.03%	z _ r	ꡍ _ ꡊ
	1	0.03%	pe _ n	ꡃꡡ _ ꡅ
	1	0.03%	tsh _	ꡖꡘ _
	1	0.03%	p _ z	ꡃ _ ꡍ
	1	0.03%	ry _	ꡊꡦ _
	1	0.03%	šh _ •	ꡒꡘ _ ꡎ

ꡯ <j>

	48	100.00%	total	
	8	16.67%	g _ y	ꡁ _ ꡦ
	7	14.58%	g _ ŋ	ꡁ _ ꡏ
	6	12.50%	z _ ŋ	ꡍ _ ꡏ
	5	10.42%	rg _ l	ꡊꡁ _ ꡃ
	3	6.25%	h _	ꡘ _
	2	4.17%	k _	ꡀ _
	2	4.17%	g _ s	ꡁ _ ꡗ
	2	4.17%	g _ w	ꡁ _ ꡡ
	1	2.08%	z _	ꡍ _
	1	2.08%	h _ iŋ	ꡘ _ ꡅꡏ
	1	2.08%	g _ l	ꡁ _ ꡃ
	1	2.08%	k _ uŋ	ꡀ _ ꡩꡏ
	1	2.08%	rg _ b	ꡊꡁ _ ꡐ
	1	2.08%	ǰ _	ꡯ _
	1	2.08%	g _ i	ꡁ _ ꡅ
	1	2.08%	g _	ꡁ _
	1	2.08%	p _ ŋ	ꡃ _ ꡏ
	1	2.08%	rg _ is	ꡊꡁ _ ꡅꡗ
	1	2.08%	h _ ŋ	ꡘ _ ꡏ
	1	2.08%	b _	ꡐ _
	1	2.08%	l _ m	ꡃ _ ꡄ

ꡯ <ǰ>

1017	100.00%	total	
295	29.01%	_ u	_ ꡩ
251	24.68%	_ r	_ ꡊ
65	6.39%	_ en	_ ꡅꡐ
64	6.29%	_ l	_ ꡃ
61	6.00%	_	_
56	5.51%	_ i	_ ꡅ
37	3.64%	_ iŋ	_ ꡅꡏ
35	3.44%	_ il	_ ꡅꡃ
22	2.16%	_ in	_ ꡅꡐ
20	1.97%	_ eė	_ ꡈ
15	1.48%	_ eu	_ ꡈꡩ
14	1.38%	_ ŋ	_ ꡏ
13	1.28%	_ e	_ ꡈ
12	1.18%	_ iw	_ ꡅꡡ
8	0.79%	_ uŋ	_ ꡩꡏ
8	0.79%	_ o	_ ꡋ
8	0.79%	_ ir	_ ꡅꡊ
5	0.49%	_ ėw	_ ꡈꡡ
4	0.39%	_ hŋ	_ ꡘꡏ
4	0.39%	_ m	_ ꡄ
2	0.20%	r _ ė	ꡊ _ ꡈ
2	0.20%	_ em	_ ꡈꡄ
2	0.20%	_ •	_ ꡃ
2	0.20%	r _ i	ꡊ _ ꡅ
1	0.10%	_ ėn	_ ꡈꡐ
1	0.10%	_ ul	_ ꡩꡃ
1	0.10%	_ n	_ ꡅ
1	0.10%	_ euŋ	_ ꡈꡩꡏ
1	0.10%	_ hiw	_ ꡘꡅꡡ

1	0.10%	_ eg	_ ᔑᑌ
1	0.10%	_ es	_ ᔑᔦ
1	0.10%	_ ew	_ ᔑᑲ
1	0.10%	_ y	_ ᕒ
1	0.10%	_ j	_ ᐯ
1	0.10%	_ iu	_ ᖘᐱᓄ
1	0.10%	_ ud	_ ᐱᓄᔑ

ᑕ <k>

70	100.00%	total	
45	64.29%	_ e	_ ᔑ
10	14.29%	_ i	_ ᖘ
3	4.29%	_	_
2	2.86%	_ j	_ ᐯ
1	1.43%	_ es	_ ᔑᔦ
1	1.43%	_ ew	_ ᔑᑲ
1	1.43%	_ un	_ ᐱᓄᖘ
1	1.43%	_ r	_ ᕼ
1	1.43%	_ žis	_ ᑉᖘᔦ
1	1.43%	_ juŋ	_ ᐯᐱᓄᑘ
1	1.43%	s _ or	ᔦ _ ᛕᕼ
1	1.43%	_ l	_ ᓪ
1	1.43%	_ u	_ ᐱ
1	1.43%	s _ u	ᔦ _ ᐱ

ᑎ <kʻ>

612	100.00%	total	
123	20.10%	_ u	_ ᐱ
110	17.97%	_ e	_ ᔑ
45	7.35%	_ ed	_ ᔑᐢ
37	6.05%	_	_
36	5.88%	_ un	_ ᐱᓄᖘ
32	5.23%	_ i	_ ᖘ
31	5.07%	_ eo	_ ᔑᛕ
27	4.41%	_ eu	_ ᔑᐱ
24	3.92%	_ •e	_ ᑌᔑ
23	3.76%	_ ur	_ ᐱᓄᕼ
19	3.11%	_ •en	_ ᑌᔑᓄᖘ
17	2.78%	_ •eg	_ ᑌᔑᑌ
14	2.29%	g•e _	ᑌᑌᔑ _
14	2.29%	_ uė	_ ᐱᓄᒾ
9	1.47%	_ en	_ ᔑᓄᖘ
9	1.47%	_ er	_ ᔑᕼ
8	1.31%	_ eur	_ ᔑᐱᓄᕼ
5	0.82%	_ eor	_ ᔑᛕᕼ
3	0.49%	_ uŋ	_ ᐱᓄᑘ
3	0.49%	_ y	_ ᕒ
2	0.33%	_ il	_ ᖘᓪ
2	0.33%	_ n	_ ᖘ
2	0.33%	_ euŋ	_ ᔑᐱᓄᑘ
2	0.33%	_ eol	_ ᔑᛕᓪ
1	0.16%	_ d	_ ᐢ
1	0.16%	_ iw	_ ᖘᑲ
1	0.16%	_ em	_ ᔑᔦ
1	0.16%	_ ė	_ ᒾ
1	0.16%	_ ig	_ ᖘᑌ
1	0.16%	_ ei	_ ᔑᖘ
1	0.16%	_ iŋ	_ ᖘᑘ
1	0.16%	_ o	_ ᛕ
1	0.16%	_ eorg	_ ᔑᛕᕼᑌ
1	0.16%	_ eė	_ ᔑᒾ
1	0.16%	_ eun	_ ᔑᐱᓄᖘ
1	0.16%	_ rhs	_ ᕼᕽᔦ
1	0.16%	_ r	_ ᕼ
1	0.16%	_ eon	_ ᔑᛕᓄᖘ
1	0.16%	_ ŋ	_ ᑘ

ꡙ <1>

1451	100.00%	total	
186	12.82%	_ i	_ ꡞ
170	11.72%	_ iq	_ ꡞꡢ
162	11.17%	_ u	_ ꡟ
104	7.17%	_	_
99	6.82%	ʼ _	ꡖ _
93	6.41%	_ e	_ ꡠ
66	4.55%	ė _	ꡦ _
64	4.41%	ǰ _	ꡆ _
51	3.52%	bo _	ꡎꡡ _
36	2.48%	d•u _	ꡊꡝꡟ _
36	2.48%	_ es	_ ꡠꡛ
35	2.41%	ǰi _	ꡆꡞ _
32	2.21%	_ •	_ ꡝ
27	1.86%	_ ed	_ ꡠꡊ
21	1.45%	•u _	ꡝꡟ _
20	1.38%	ʼeo _	ꡖꡠꡡ _
20	1.38%	_ un	_ ꡟꡋ
17	1.17%	_ ug	_ ꡟꡂ
14	0.97%	_ yi	_ ꡗꡞ
12	0.83%	_ w	_ ꡓ
9	0.62%	_ on	_ ꡡꡋ
7	0.48%	_ im	_ ꡞꡏ
7	0.48%	_ o	_ ꡡ
7	0.48%	d _	ꡊ _
6	0.41%	_ n	_ ꡋ
6	0.41%	dp _	ꡊꡌ _
6	0.41%	_ u•	_ ꡟꡝ
6	0.41%	_ ŋ	_ ꡃ
6	0.41%	rge _	ꡘꡂꡠ _
6	0.41%	_ uq	_ ꡟꡢ
5	0.35%	rgj _	ꡘꡂꡨ _
5	0.35%	q _	ꡢ _
5	0.35%	č'eo _	ꡅꡠꡡ _
5	0.35%	_ ud	_ ꡟꡊ
5	0.35%	de _	ꡊꡠ _
4	0.28%	ši _	ꡚꡞ _
4	0.28%	qo _	ꡢꡡ _
4	0.28%	_ eu	_ ꡠꡟ
3	0.21%	gi _	ꡂꡞ _
3	0.21%	_ eg	_ ꡠꡂ
3	0.21%	_ en	_ ꡠꡋ
3	0.21%	b _	ꡎ _
3	0.21%	t' _	ꡉ _
3	0.21%	_ h	_ ꡜ
3	0.21%	_ iŋ	_ ꡞꡃ
3	0.21%	_ ig	_ ꡞꡂ
2	0.14%	_ iw	_ ꡞꡓ
2	0.14%	_ e _	_ ꡠ _
2	0.14%	yi _	ꡗꡞ _
2	0.14%	_ us	_ ꡟꡛ
2	0.14%	n _	ꡋ _
2	0.14%	_ eŋ	_ ꡠꡃ
2	0.14%	_ euŋ	_ ꡠꡟꡃ
2	0.14%	g _	ꡂ _
2	0.14%	k'i _	ꡁꡞ _
2	0.14%	ge _	ꡂꡠ _
2	0.14%	k'eo _	ꡁꡠꡡ _
2	0.14%	_ hs	_ ꡜꡛ
1	0.07%	šu _	ꡚꡟ _
1	0.07%	• _	ꡝ _
1	0.07%	ts' _	ꡑ _
1	0.07%	di _	ꡊꡞ _
1	0.07%	db _	ꡊꡎ _
1	0.07%	y _	ꡗ _

1	0.07%	_ uė	_ ᏯᏆ
1	0.07%	r _	Ꮒ _
1	0.07%	k _	Ꭿ _
1	0.07%	_ i _	_ ᏼ _
1	0.07%	_ b	_ ᏸ
1	0.07%	u _	Ꮹ _
1	0.07%	be _	ᏸᏁ _
1	0.07%	o _	Ꮶ _
1	0.07%	reo _	ᎻᏁᏦ _
1	0.07%	_ q	_ ᖴ
1	0.07%	č‘u _	ᏊᏫ _
1	0.07%	ri _	Ꮋᏼ _
1	0.07%	_ _	_ _
1	0.07%	_ eug	_ ᏁᏯᏭ
1	0.07%	_ jm	_ ᏓᏍ
1	0.07%	_ ėŋ	_ ᏢᏢ
1	0.07%	_ id	_ ᏼᏁ
1	0.07%	ǰu _	ᏗᏫ _
1	0.07%	_ ėm	_ ᏢᏍ
1	0.07%	gj _	ᏭᏓ _
1	0.07%	q• _	ᖴᖴ _
1	0.07%	_ hos	_ ᏆᏦᏣ
1	0.07%	_ uŋ	_ ᏯᏢ
1	0.07%	_ eo	_ ᏁᏦ
1	0.07%	yŋ _	ᏃᏢ _
1	0.07%	gyė _	ᏭᏃᏆ _
1	0.07%	č‘e _	ᏊᏁ _
1	0.07%	sg _	ᏣᏭ _
1	0.07%	so _	ᏣᏦ _

ᏼ <m>

631	100.00%	total	
101	16.01%	_	_
57	9.03%	_ e	_ Ꮑ
42	6.66%	_ oŋ	_ ᏦᏢ
38	6.02%	t‘ _	Ꮤ _
35	5.55%	dė _	ᏁᏆ _
31	4.91%	_ u	_ Ꮹ
29	4.60%	_ ed	_ ᏁᏁ
28	4.44%	_ es	_ ᏁᏣ
22	3.49%	_ ud	_ ᏯᏁ
21	3.33%	_ un	_ Ꮿᏼ
18	2.85%	_ i	_ ᏼ
15	2.38%	_ o	_ Ꮶ
13	2.06%	_ iŋ	_ ᏼᏢ
11	1.74%	_ d	_ Ꮑ
9	1.43%	_ ėw	_ ᏆᏫ
8	1.27%	g _	Ꭿ _
8	1.27%	du _	ᏁᏫ _
7	1.11%	_ uė	_ ᏯᏆ
7	1.11%	li _	Ꮥᏼ _
7	1.11%	_ do	_ ᏁᏦ
6	0.95%	n _	ᏼ _
6	0.95%	_ ts‘n	_ Ꮣᏼ
5	0.79%	no _	ᏨᏦ _
5	0.79%	ŋė _	ᏢᏆ _
5	0.79%	de _	ᏁᏭ _
5	0.79%	q _	ᖴ _
4	0.63%	ǰ _	Ꮟ _
4	0.63%	_ ts‘	_ Ꮣ
4	0.63%	_ er	_ ᏁᎻ
4	0.63%	_ q	_ ᖴ
3	0.48%	_ eor	_ ᏁᏦᎻ
3	0.48%	• _	ᖴ _
3	0.48%	ge _	ᎯᏁ _
3	0.48%	u _	Ꮹ _

2	0.32%	_ w	_ ꡓ
2	0.32%	ǰe _	ꡆꡠ _
2	0.32%	_ in	_ ꡞꡋ
2	0.32%	ru _	ꡘꡟ _
2	0.32%	o _	ꡡ _
2	0.32%	ts‘ _	ꡑ _
2	0.32%	gi _	ꡂꡞ _
2	0.32%	_ on	_ ꡡꡋ
2	0.32%	y _	ꡗ _
2	0.32%	_ eg	_ ꡠꡂ
2	0.32%	_ ŋ•	_ ꡃꡖ
2	0.32%	_ ė	_ ꡦ
2	0.32%	t‘u _	ꡉꡟ _
2	0.32%	_ č‘od	_ ꡅꡡꡊ
2	0.32%	_ ur	_ ꡟꡘ
2	0.32%	_ r	_ ꡘ
2	0.32%	s _ d	ꡛ _ ꡊ
2	0.32%	č‘i _	ꡅꡞ _
1	0.16%	su _	ꡛꡟ _
1	0.16%	bo _	ꡎꡡ _
1	0.16%	_ uq	_ ꡟꡢ
1	0.16%	gsu _	ꡂꡛꡟ _
1	0.16%	ro _	ꡘꡡ _
1	0.16%	si _	ꡛꡞ _
1	0.16%	_ uŋ	_ ꡟꡃ
1	0.16%	_ n	_ ꡋ
1	0.16%	ė _	ꡦ _
1	0.16%	_ is	_ ꡞꡛ
1	0.16%	lj _	ꡙꡆ _
1	0.16%	k‘e _	ꡁꡠ _
1	0.16%	lė _	ꡙꡦ _
1	0.16%	dz _	ꡒ _
1	0.16%	_ eur	_ ꡠꡟꡘ
1	0.16%	_ ėn	_ ꡦꡋ
1	0.16%	gė _	ꡂꡦ _
1	0.16%	zi _	ꡕꡞ _
1	0.16%	_ od	_ ꡡꡊ
1	0.16%	b _	ꡎ _
1	0.16%	_ d•	_ ꡊꡖ
1	0.16%	sro _	ꡛꡘꡡ _
1	0.16%	’o _	ꡝꡡ _
1	0.16%	_ ts‘o	_ ꡑꡡ
1	0.16%	rg _	ꡘꡂ _
1	0.16%	_ eo	_ ꡠꡡ
1	0.16%	yi _	ꡗꡞ _
1	0.16%	s _	ꡛ _

ꡋ <n>

2666	100.00%	total	
434	16.28%	_ u	_ ꡟ
176	6.60%	yi _	ꡗꡞ _
156	5.85%	qu _	ꡢꡟ _
122	4.58%	_	_
113	4.24%	du _	ꡊꡟ _
109	4.09%	_ e	_ ꡠ
101	3.79%	_ o	_ ꡡ
91	3.41%	su _	ꡛꡟ _
79	2.96%	se _	ꡛꡠ _
77	2.89%	gu _	ꡂꡟ _
70	2.63%	t‘ _	ꡉ _
66	2.48%	•u _	ꡖꡟ _
65	2.44%	ǰe _	ꡆꡠ _
56	2.10%	_ i	_ ꡞ
51	1.91%	ru _	ꡘꡟ _
45	1.69%	q• _	ꡢꡖ _
44	1.65%	č‘i _	ꡅꡞ _

43	1.61%	č‘u _	ᓚᐢᓄ _
36	1.35%	k‘u _	ᑕᐢᓄ _
35	1.31%	r _	ᕼ _
32	1.20%	b _	ᑑ _
31	1.16%	t‘e _	ᑌᒼ _
30	1.13%	g•e _	ᑲᑎᒼ _
29	1.09%	ri _	ᕼᐣ _
27	1.01%	h•e _	ᐺᑎᒼ _
27	1.01%	y _	ᖻ _
26	0.98%	č‘e _	ᓚᒼ _
25	0.94%	go _	ᑲᑭ _
22	0.83%	ǰi _	ᒪᐣ _
21	0.79%	mu _	ᓂᐢᓄ _
20	0.75%	’ve _	ᘐᐯᒼ _
20	0.75%	lu _	ᓕᐢᓄ _
19	0.71%	k‘•e _	ᑕᑎᒼ _
15	0.56%	dė _	ᐞᒪ _
14	0.53%	ho _	ᐺᑐ _
14	0.53%	s _	ᔕ _
12	0.45%	q _	ᑌ _
10	0.38%	• _	ᑎ _
10	0.38%	šė _	ᑲᒧᒪ _
9	0.34%	sve _	ᔕᐯᒼ _
9	0.34%	lo _	ᓕᑭ _
9	0.34%	k‘e _	ᑕᒼ _
8	0.30%	fe _	ᐸᐯᒼ _
8	0.30%	ži _	ᘘᐣ _
7	0.26%	•e _	ᑎᒼ _
7	0.26%	bu _	ᑘᐢᓄ _
7	0.26%	š _	ᑲ _
7	0.26%	w _	ᐯ _
7	0.26%	ɣ _	ᖇ _
6	0.23%	l _	ᓕ _
6	0.23%	mts‘ _	ᓂᑦᔆ _
6	0.23%	ge _	ᑲᒪᒼ _
6	0.23%	_ m	_ ᓂ
6	0.23%	ye _	ᖻᒼ _
5	0.19%	_ eor	_ ᒪᑭᕼ
5	0.19%	_ eo	_ ᒪᑭ
5	0.19%	tsve _	ᑐᔆᐯᒼ _
5	0.19%	d _	ᐞ _
5	0.19%	_ iŋ	_ ᓂᐣᒦ
5	0.19%	č‘ė _	ᓚᐞᒪ _
5	0.19%	_ yi	_ ᖻᐣ
5	0.19%	de _	ᐞᒼ _
5	0.19%	sė _	ᔕᒪ _
5	0.19%	_ om	_ ᑭᓂ
5	0.19%	_ s	_ ᔕ
4	0.15%	ŋu _	ᒦᐢᓄ _
4	0.15%	ši _	ᑲᒧᐣ _
4	0.15%	ts‘i _	ᑎᑦᐣ _
4	0.15%	_ is	_ ᓂᔆ
3	0.11%	yo _	ᖻᑭ _
3	0.11%	t‘ė _	ᑌᒪ _
3	0.11%	rė _	ᕼᒪ _
3	0.11%	do _	ᐞᑭ _
3	0.11%	he _	ᐺᑐᒼ _
3	0.11%	t‘i _	ᑌᐣ _
3	0.11%	či _	ᒦᐣ _
3	0.11%	_ _	_ _
3	0.11%	yė _	ᖻᒪ _
3	0.11%	tė _	ᑐᒪ _
3	0.11%	y• _	ᖻᑎ _
3	0.11%	le _	ᓕᒼ _
3	0.11%	bo _	ᑘᑭ _
2	0.08%	č‘eu _	ᓚᐢᐞᓄ _

2	0.08%	’eu _	_
2	0.08%	_ ir	_
2	0.08%	_ i _	_ _
2	0.08%	be _	_
2	0.08%	_ e _	_ _
2	0.08%	re _	_
2	0.08%	hė _	_
2	0.08%	k‘ _	_
2	0.08%	_ l	_
2	0.08%	mi _	_
2	0.08%	mo _	_
2	0.08%	geo _	_
2	0.08%	•o _	_
2	0.08%	pė _	_
2	0.08%	_ r	_
2	0.08%	_ ŋ	_
2	0.08%	ė _	_
2	0.08%	geu _	_
1	0.04%	tsi _	_
1	0.04%	ts‘ _	_
1	0.04%	wu _	_
1	0.04%	_ b	_
1	0.04%	u _	_
1	0.04%	d•e _	_
1	0.04%	č‘eo _	_
1	0.04%	dzi _	_
1	0.04%	_ ė _	_ _
1	0.04%	ro _	_
1	0.04%	žeu _	_
1	0.04%	reo _	_
1	0.04%	d• _	_
1	0.04%	b•e _	_
1	0.04%	ǰė _	_
1	0.04%	heė _	_
1	0.04%	bri _	_
1	0.04%	ǰ _	_
1	0.04%	mė _	_
1	0.04%	še _	_
1	0.04%	γv _	_
1	0.04%	t‘o _	_
1	0.04%	ňė _	_
1	0.04%	t‘u _	_
1	0.04%	_ ur	_
1	0.04%	gve _	_
1	0.04%	m _	_
1	0.04%	_ ud	_
1	0.04%	yve _	_
1	0.04%	seu _	_
1	0.04%	rbo _	_
1	0.04%	k‘eo _	_
1	0.04%	s _ b	_
1	0.04%	pei _	_
1	0.04%	k‘eu _	_
1	0.04%	dzė _	_
1	0.04%	ku _	_

< ŋ >			
602	100.00%	total	
101	16.78%	dė _	_
55	9.14%	_ ud	_
42	6.98%	mo _	_
37	6.15%	ǰi _	_
36	5.98%	ts‘ _	_
32	5.32%	geu _	_
14	2.33%	ǰ _	_
13	2.16%	mi _	_

10	1.66%	š _	
10	1.66%	_ u	
9	1.50%	t‘u _	
8	1.33%	y _	
8	1.33%	ši _	
8	1.33%	pi _	
8	1.33%	’v _	
8	1.33%	ǰu _	
7	1.16%	gj _	
7	1.16%	o _	
6	1.00%	l _	
6	1.00%	zj _	
5	0.83%	gv _	
5	0.83%	hei _	
5	0.83%	ni _	
5	0.83%	_ ėm	
5	0.83%	fu _	
4	0.66%	ǰh _	
4	0.66%	č‘u _	
4	0.66%	_	
4	0.66%	tu _	
4	0.66%	ti _	
4	0.66%	_ i	
4	0.66%	_ un	
4	0.66%	ču _	
4	0.66%	du _	
3	0.50%	k‘u _	
3	0.50%	tsi _	
3	0.50%	•i _	
3	0.50%	’eo _	
3	0.50%	gu _	
3	0.50%	ts‘i _	
3	0.50%	γo _	
3	0.50%	γu _	
3	0.50%	f _	
3	0.50%	dz _	
3	0.50%	rts‘ _	
3	0.50%	li _	
3	0.50%	sg _	
2	0.33%	gi _	
2	0.33%	yeu _	
2	0.33%	se _	
2	0.33%	b _	
2	0.33%	ru _	
2	0.33%	sė _	
2	0.33%	shi _	
2	0.33%	n _	
2	0.33%	d _	
2	0.33%	g _	
2	0.33%	ž _	
2	0.33%	seu _	
2	0.33%	leu _	
2	0.33%	ė _	
2	0.33%	le _	
2	0.33%	k‘eu _	
2	0.33%	m _ •	
2	0.33%	dzu _	
1	0.17%	kju _	
1	0.17%	pj _	
1	0.17%	’eu _	
1	0.17%	tsu _	
1	0.17%	gro _	
1	0.17%	hj _	
1	0.17%	γi _	
1	0.17%	dzeu _	
1	0.17%	y _ l	

1	0.17%	t‘ _	ꡉ _
1	0.17%	ǰeu _	ꡆꡠꡟ _
1	0.17%	gts _	ꡂꡐ _
1	0.17%	’ _	ꡖ _
1	0.17%	ro _	ꡘꡡ _
1	0.17%	ze _	ꡕꡠ _
1	0.17%	_ o	_ ꡡ
1	0.17%	k‘ _	ꡁ _
1	0.17%	bz _	ꡎꡕ _
1	0.17%	hu _	ꡜꡟ _
1	0.17%	’ _ o _	ꡖ _ ꡡ _
1	0.17%	t‘o _	ꡉꡡ _
1	0.17%	k‘i _	ꡁꡞ _
1	0.17%	ži _	ꡔꡞ _
1	0.17%	mu _	ꡏꡟ _
1	0.17%	ge _	ꡂꡠ _
1	0.17%	su _	ꡛꡟ _
1	0.17%	hji _	ꡜꡯꡞ _
1	0.17%	o _ s	ꡡ _ ꡛ
1	0.17%	di _ s	ꡊꡞ _ ꡛ
1	0.17%	si _	ꡛꡞ _
1	0.17%	ň _	ꡇ _
1	0.17%	lė _	ꡙꡦ _
1	0.17%	gei _	ꡂꡠꡞ _
1	0.17%	_ u _	_ ꡟ _
1	0.17%	de _	ꡊꡠ _
1	0.17%	thi _	ꡈꡜꡞ _
1	0.17%	g _ s	ꡂ _ ꡛ
1	0.17%	γ _	ꡣ _
1	0.17%	s _	ꡛ _
1	0.17%	lu _	ꡙꡟ _
1	0.17%	zeu _	ꡕꡠꡟ _

ꡇ <ň>

4	100.00%	total	
1	25.00%	_ q	_ ꡢ
1	25.00%	_ ŋ	_ ꡃ
1	25.00%	_ i	_ ꡞ
1	25.00%	_ ėn	_ ꡦꡋ

ꡡ <o>

712	100.00%	total	
101	14.19%	n _	ꡋ _
77	10.82%	d _	ꡊ _
74	10.39%	y _	ꡗ _
51	7.16%	b _ l	ꡎ _ ꡙ
42	5.90%	m _ ŋ	ꡏ _ ꡃ
42	5.90%	q _	ꡢ _
33	4.64%	y _ r	ꡗ _ ꡘ
27	3.79%	_	_
25	3.51%	g _ n	ꡂ _ ꡋ
19	2.67%	b _	ꡎ _
15	2.11%	m _	ꡏ _
14	1.97%	t‘ _	ꡉ _
14	1.97%	h _ n	ꡜ _ ꡋ
12	1.69%	b _ s	ꡎ _ ꡛ
9	1.26%	l _ n	ꡙ _ ꡋ
8	1.12%	ǰ _	ꡆ _
8	1.12%	g _	ꡂ _
7	0.98%	l _	ꡙ _
7	0.98%	_ ŋ	_ ꡃ
7	0.98%	md _	ꡏꡊ _
6	0.84%	r _	ꡘ _
5	0.70%	n _ m	ꡋ _ ꡏ
5	0.70%	γ _	ꡣ _
4	0.56%	• _ d	ꡌ _ ꡊ

4	0.56%	q _ l	𐤒 _ 𐤋
4	0.56%	b _ q	𐤁 _ 𐤒
3	0.42%	y _ n	𐤉 _ 𐤍
3	0.42%	h _ d	𐤄 _ 𐤃
3	0.42%	• _	𐤒 _
3	0.42%	ɣ _ ŋ	𐤦 _ 𐤏
3	0.42%	p _	𐤐 _
3	0.42%	b _ r	𐤁 _ 𐤓
3	0.42%	d _ n	𐤃 _ 𐤍
3	0.42%	č‘ _ d	𐤘 _ 𐤃
3	0.42%	b _ n	𐤁 _ 𐤍
3	0.42%	q _ yi	𐤒 _ 𐤉𐤍
2	0.28%	mč‘ _ d	𐤌𐤘 _ 𐤃
2	0.28%	č‘ _ q	𐤘 _ 𐤒
2	0.28%	t‘ _ d	𐤕 _ 𐤃
2	0.28%	d _ r	𐤃 _ 𐤓
2	0.28%	d _ q	𐤃 _ 𐤒
2	0.28%	h _	𐤄 _
2	0.28%	_ m	_ 𐤌
2	0.28%	•b _	𐤅𐤁 _
2	0.28%	sg _ r	𐤑𐤂 _ 𐤓
2	0.28%	m _ n	𐤌 _ 𐤍
2	0.28%	ɣv _	𐤦𐤗 _
2	0.28%	č‘ _	𐤘 _
2	0.28%	• _ n	𐤒 _ 𐤍
2	0.28%	q _ r	𐤒 _ 𐤓
1	0.14%	•br _ g	𐤅𐤁𐤓 _ 𐤂
1	0.14%	m _ d	𐤌 _ 𐤃
1	0.14%	t‘ _ n	𐤕 _ 𐤍
1	0.14%	h _ r	𐤄 _ 𐤓
1	0.14%	r _ q	𐤓 _ 𐤒
1	0.14%	sg _	𐤑𐤂 _
1	0.14%	č‘ _ s	𐤘 _ 𐤑
1	0.14%	ŋ _	𐤏 _
1	0.14%	r _ n	𐤓 _ 𐤍
1	0.14%	t‘ _ r	𐤕 _ 𐤓
1	0.14%	qr _ g	𐤒𐤓 _ 𐤂
1	0.14%	b _ m	𐤁 _ 𐤌
1	0.14%	sk _ r	𐤑𐤊 _ 𐤓
1	0.14%	rb _ n	𐤓𐤁 _ 𐤍
1	0.14%	t‘ _ ŋ	𐤕 _ 𐤏
1	0.14%	mts‘ _	𐤌𐤑 _
1	0.14%	sr _ m	𐤑𐤓 _ 𐤌
1	0.14%	bs _ d	𐤁𐤑 _ 𐤃
1	0.14%	_ ŋs	_ 𐤏𐤑
1	0.14%	gr _ ŋ	𐤂𐤓 _ 𐤏
1	0.14%	r _ m	𐤓 _ 𐤌
1	0.14%	•b _ r	𐤅𐤁 _ 𐤓
1	0.14%	s _	𐤑 _
1	0.14%	s _ l	𐤑 _ 𐤋
1	0.14%	g _ s	𐤂 _ 𐤑
1	0.14%	y _ d	𐤉 _ 𐤃
1	0.14%	k‘ _	𐤊 _
1	0.14%	r _ ŋ	𐤓 _ 𐤏
1	0.14%	h _ q	𐤄 _ 𐤒
1	0.14%	• _ q	𐤒 _ 𐤒
1	0.14%	lh _ s	𐤋𐤄 _ 𐤑
1	0.14%	’ŋ _ ŋ	𐤆𐤏 _ 𐤏
1	0.14%	_ l	_ 𐤋
1	0.14%	’ _ m	𐤆 _ 𐤌

𐤋 <p>

48	100.00%	total	
16	33.33%	_ ur	_ 𐤅𐤓
8	16.67%	_ iŋ	_ 𐤉𐤏
6	12.50%	d _ l	𐤃 _ 𐤋

3	6.25%	_	_
3	6.25%	_ o	_ ꡀ
2	4.17%	_ ėn	_ ꡊꡂ
2	4.17%	_ u	_ ꡉ
1	2.08%	_ ein	_ ꡇꡂꡂ
1	2.08%	_ uq	_ ꡉꡁ
1	2.08%	_ i	_ ꡂ
1	2.08%	_ iz	_ ꡂꡃ
1	2.08%	_ d	_ ꡆ
1	2.08%	_ jŋ	_ ꡅꡊ
1	2.08%	_ ėsr	_ ꡊꡟꡎ
1	2.08%	d _	ꡆ _

ꡁ <q>

1521	100.00%	total	
323	21.24%	_	_
219	14.40%	_ yi	_ ꡔꡂ
170	11.18%	li _	ꡉꡂ _
156	10.26%	_ un	_ ꡉꡂ
146	9.60%	_ •	_ ꡁ
101	6.64%	_ u	_ ꡉ
78	5.13%	_ ub	_ ꡉꡋ
45	2.96%	_ •n	_ ꡁꡂ
42	2.76%	_ o	_ ꡀ
42	2.76%	_ uė	_ ꡉꡊ
37	2.43%	_ s	_ ꡟ
31	2.04%	b _	ꡋ _
17	1.12%	_ ur	_ ꡉꡎ
12	0.79%	_ n	_ ꡂ
10	0.66%	t‘u _	ꡍꡉ _
8	0.53%	_ _	_ _
6	0.39%	_ i	_ ꡂ
6	0.39%	lu _	ꡉꡉ _
5	0.33%	_ m	_ ꡃ
5	0.33%	du _	ꡇꡉ _
5	0.33%	_ l	_ ꡉ
4	0.26%	m _	ꡃ _
4	0.26%	_ d	_ ꡆ
4	0.26%	ri _	ꡎꡂ _
4	0.26%	_ ol	_ ꡀꡉ
4	0.26%	_ r	_ ꡎ
4	0.26%	bo _	ꡋꡀ _
3	0.20%	_ oyi	_ ꡀꡔꡂ
2	0.13%	do _	ꡇꡀ _
2	0.13%	č‘o _	ꡈꡀ _
2	0.13%	bu _	ꡋꡉ _
2	0.13%	’ _	ꡁ _
2	0.13%	_ or	_ ꡀꡎ
1	0.07%	su _	ꡟꡉ _
1	0.07%	ho _	ꡇꡃꡀ _
1	0.07%	l _	ꡉ _
1	0.07%	ro _	ꡎꡀ _
1	0.07%	ru _	ꡎꡉ _
1	0.07%	_ •e	_ ꡁꡆ
1	0.07%	č‘ _	ꡈ _
1	0.07%	ň _	ꡄ _
1	0.07%	_ rog	_ ꡎꡀꡌ
1	0.07%	_ u•	_ ꡉꡁ
1	0.07%	mu _	ꡃꡉ _
1	0.07%	•o _	ꡁꡀ _
1	0.07%	pu _	ꡊꡉ _
1	0.07%	yi _	ꡔꡂ _
1	0.07%	r _	ꡎ _
1	0.07%	_ is	_ ꡂꡟ
1	0.07%	_ •l	_ ꡁꡉ
1	0.07%	_ i _	_ ꡂ _

1	0.07%	_ ud	_ ᄋᄃ
1	0.07%	u _	ᄋ _

ㅐ <r>

2121	100.00%	total	
501	23.62%	_ i	_ ᄀ
289	13.63%	du _	ᄃᄋ _
251	11.83%	ǰ _	ᄌ _
119	5.61%	_	_
114	5.38%	_ u	_ ᄋ
76	3.58%	be _	ᄇᄃ _
67	3.16%	•e _	ᄃᄃ _
51	2.41%	_ un	_ ᄋᄂᄀ
49	2.31%	• _	ᄃ _
36	1.70%	_ e	_ ᄃ
36	1.70%	ė _	ᄐ _
35	1.65%	_ n	_ ᄀ
34	1.60%	_ ig	_ ᄀᄀᄆ
33	1.56%	yo _	ᄎᄏ _
29	1.37%	_ in	_ ᄀᄂᄀ
29	1.37%	gi _	ᄆᄀᄀ _
23	1.08%	k‘u _	ᄐᄋ _
17	0.80%	qu _	ᄃᄂ _
16	0.75%	ye _	ᄎᄃ _
16	0.75%	pu _	ᄁᄂ _
15	0.71%	h _	ᄉ _
13	0.61%	•i _	ᄃᄂᄀ _
11	0.52%	y _	ᄎ _
9	0.42%	k‘e _	ᄐᄃ _
8	0.38%	ǰi _	ᄊᄂᄀ _
8	0.38%	k‘eu _	ᄐᄃᄂᄋ _
6	0.28%	_ o	_ ᄏ
6	0.28%	bu _	ᄇᄂᄋ _
6	0.28%	t‘u _	ᄠᄋ _
6	0.28%	_ gel	_ ᄆᄃᄅ
5	0.24%	_ gjl	_ ᄆᄌᄅ
5	0.24%	k‘eo _	ᄐᄃᄏ _
5	0.24%	ši _	ᄃᄂᄀ _
5	0.24%	neo _	ᄅᄃᄏ _
5	0.24%	b _ s	ᄇ _ ᄌ
5	0.24%	s _	ᄌ _
4	0.19%	_ eg	_ ᄃᄆ
4	0.19%	q _	ᄆ _
4	0.19%	u _	ᄋ _
4	0.19%	me _	ᄅᄆ _
4	0.19%	_ iq	_ ᄀᄆ
4	0.19%	’ė _	ᄒᄐ _
4	0.19%	_ •e	_ ᄃᄃ
4	0.19%	_ id	_ ᄀᄃ
4	0.19%	g _	ᄆ _
4	0.19%	yė _	ᄎᄐ _
4	0.19%	•u _	ᄃᄋ _
4	0.19%	ge _	ᄆᄃ _
4	0.19%	_ eo	_ ᄃᄏ
3	0.14%	t‘e _	ᄠᄃ _
3	0.14%	meo _	ᄅᄃᄏ _
3	0.14%	zė _	ᄣᄐ _
3	0.14%	_ ts‘ŋ	_ ᄀᄃᄆ
3	0.14%	_ ėn	_ ᄐᄂᄀ
3	0.14%	_ d	_ ᄃ
3	0.14%	_ •	_ ᄃ
3	0.14%	dh _	ᄂᄉ _
3	0.14%	_ is	_ ᄀᄌ
3	0.14%	bo _	ᄇᄏ _
2	0.09%	deo _	ᄂᄃᄏ _
2	0.09%	_ ǰi	_ ᄊᄂᄀ

2	0.09%	_ um	_ ꡊꡛ
2	0.09%	g _ gs	ꡁ _ ꡁꡢ
2	0.09%	do _	ꡇꡀ _
2	0.09%	_ en	_ ꡇꡛ
2	0.09%	b _	ꡂ _
2	0.09%	gu _	ꡁꡊ _
2	0.09%	n _	ꡛ _
2	0.09%	d _	ꡇ _
2	0.09%	_ ǰė	_ ꡎꡐ
2	0.09%	qo _	ꡄꡀ _
2	0.09%	ni _	ꡋꡛ _
2	0.09%	mu _	ꡘꡊ _
2	0.09%	m _	ꡘ _
2	0.09%	’eo _	ꡓꡇꡀ _
2	0.09%	’e _	ꡓꡇ _
2	0.09%	_ uŋ	_ ꡊꡂ
2	0.09%	sgo _	ꡢꡁꡀ _
1	0.05%	q _ og	ꡄ _ ꡀꡁ
1	0.05%	pės _	ꡅꡐꡢ _
1	0.05%	tsi _	ꡊꡛ _
1	0.05%	_ on	_ ꡀꡛ
1	0.05%	sko _	ꡢꡤꡀ _
1	0.05%	•bo _	ꡃꡁꡀ _
1	0.05%	_ yi	_ ꡖꡛ
1	0.05%	k _	ꡤ _
1	0.05%	se _	ꡢꡇ _
1	0.05%	zi _	ꡐꡛ _
1	0.05%	g _ oŋ	ꡁ _ ꡀꡂ
1	0.05%	d _ is	ꡇ _ ꡛꡢ
1	0.05%	_ u _	_ ꡊ _
1	0.05%	k‘ _ hs	ꡃ _ ꡎꡢ
1	0.05%	_ i _	_ ꡛ _
1	0.05%	t‘ _	ꡔ _
1	0.05%	_ b	_ ꡂ
1	0.05%	ho _	ꡎꡀ _
1	0.05%	b‘u _	ꡂꡊ _
1	0.05%	meu _	ꡙꡇꡊ _
1	0.05%	’ _	ꡓ _
1	0.05%	_ bon	_ ꡂꡀꡛ
1	0.05%	nu _	ꡛꡊ _
1	0.05%	_ q	_ ꡄ
1	0.05%	s• _	ꡢꡃ _
1	0.05%	_ ge	_ ꡁꡇ
1	0.05%	_ es	_ ꡇꡢ
1	0.05%	d _ i	ꡇ _ ꡛ
1	0.05%	_ us	_ ꡊꡢ
1	0.05%	k‘ _	ꡃ _
1	0.05%	_ š	_ ꡎ
1	0.05%	_ eon	_ ꡇꡀꡛ
1	0.05%	s _ om	ꡢ _ ꡀꡛ
1	0.05%	_ l	_ ꡅ
1	0.05%	_ gjis	_ ꡁꡋꡛꡢ
1	0.05%	_ il	_ ꡛꡅ
1	0.05%	_ gjb	_ ꡁꡋꡍ
1	0.05%	d _ s	ꡇ _ ꡢ
1	0.05%	g _ g	ꡁ _ ꡁ
1	0.05%	t‘o _	ꡔꡀ _
1	0.05%	• _ •e _	ꡃ _ ꡃꡇ _
1	0.05%	dz _	ꡈ _
1	0.05%	k‘eo _ g	ꡃꡇꡀ _ ꡁ
1	0.05%	_ oq	_ ꡀꡄ
1	0.05%	g _ ub	ꡁ _ ꡊꡂ
1	0.05%	b _ ge	ꡂ _ ꡁꡇ
1	0.05%	b _ in	ꡂ _ ꡛꡛ
1	0.05%	su _	ꡢꡊ _
1	0.05%	šė _	ꡎꡎ _

1	0.05%	_ s
1	0.05%	ts‘u _
1	0.05%	deu _
1	0.05%	w _ d
1	0.05%	_ oŋ
1	0.05%	_ č
1	0.05%	_ uq
1	0.05%	_ om
1	0.05%	•b _ og
1	0.05%	_ eol
1	0.05%	gyė _
1	0.05%	_ gm
1	0.05%	č‘i _

<s>

1030	100.00%	total
261	25.34%	_ u
94	9.13%	_
91	8.84%	_ un
79	7.67%	_ en
56	5.44%	_ eu
44	4.27%	_ e
37	3.59%	q _
36	3.50%	le _
33	3.20%	_ ed
30	2.91%	gi _
28	2.72%	me _
20	1.94%	_ i
15	1.46%	_ hi
14	1.36%	_ n
13	1.26%	č‘u _
12	1.17%	bo _
10	0.97%	gu _
9	0.87%	_ ven
7	0.68%	č‘ _
5	0.49%	br _
5	0.49%	_ ėn
5	0.49%	n _
5	0.49%	_ r
5	0.49%	_ ud
4	0.39%	ni _
4	0.39%	gži _
3	0.29%	ri _
3	0.29%	_ d
3	0.29%	ge _
3	0.29%	_ gŋ
2	0.19%	b _
2	0.19%	_ et‘
2	0.19%	_ hiŋ
2	0.19%	_ ti
2	0.19%	_ gor
2	0.19%	lu _
2	0.19%	_ v
2	0.19%	_ ėŋ
2	0.19%	_ eŋ
2	0.19%	_ euŋ
2	0.19%	g _
2	0.19%	grg _
2	0.19%	lh _
2	0.19%	gj _
2	0.19%	šė _
2	0.19%	_ u _
2	0.19%	_ md
1	0.10%	go _
1	0.10%	g _ um
1	0.10%	’eu _

1	0.10%	di _	ꡊꡞ _
1	0.10%	_ eg	_ ꡠꡂ
1	0.10%	č‘o _	ꡅꡡ _
1	0.10%	_ uė	_ ꡟꡦ
1	0.10%	r _	ꡘ _
1	0.10%	ši _	ꡚꡞ _
1	0.10%	_ eun	_ ꡠꡟꡋ
1	0.10%	_ eb	_ ꡠꡎ
1	0.10%	_ um	_ ꡟꡏ
1	0.10%	_ ol	_ ꡡꡙ
1	0.10%	gŋ _	ꡂꡃ _
1	0.10%	_ o	_ ꡡ
1	0.10%	b _ od	ꡎ _ ꡡꡊ
1	0.10%	_ gl	_ ꡂꡙ
1	0.10%	rgji _	ꡘꡂꡆꡞ _
1	0.10%	_ im	_ ꡞꡏ
1	0.10%	diŋ _	ꡊꡞꡃ _
1	0.10%	_ nb	_ ꡋꡎ
1	0.10%	_ iw	_ ꡞꡓ
1	0.10%	ru _	ꡘꡟ _
1	0.10%	dri _	ꡊꡘꡞ _
1	0.10%	t‘ _	ꡉ _
1	0.10%	bu _	ꡎꡟ _
1	0.10%	_ go	_ ꡂꡡ
1	0.10%	re _	ꡘꡠ _
1	0.10%	lho _	ꡙꡜꡡ _
1	0.10%	_ _	_ _
1	0.10%	pė _ r	ꡌꡦ _ ꡘ
1	0.10%	_ •r	_ ꡝꡘ
1	0.10%	ǰe _	ꡆꡠ _
1	0.10%	k‘rh _	ꡁꡘꡜ _
1	0.10%	d _	ꡊ _
1	0.10%	mi _	ꡏꡞ _
1	0.10%	kži _	ꡀꡔꡞ _
1	0.10%	_ gu	_ ꡂꡟ
1	0.10%	_ iŋ	_ ꡞꡃ
1	0.10%	_ er	_ ꡠꡘ
1	0.10%	t‘u _	ꡉꡟ _
1	0.10%	š _	ꡚ _
1	0.10%	_ ur	_ ꡟꡘ
1	0.10%	oŋ _	ꡡꡃ _
1	0.10%	’u _	ꡖꡟ _
1	0.10%	dr _	ꡊꡘ _
1	0.10%	_ ŋ	_ ꡃ
1	0.10%	_ gb	_ ꡂꡎ
1	0.10%	qi _	ꡢꡞ _
1	0.10%	_ rom	_ ꡘꡡꡏ
1	0.10%	_ m	_ ꡏ
1	0.10%	_ uŋ	_ ꡟꡃ
1	0.10%	_ kor	_ ꡀꡡꡘ
1	0.10%	_ uq	_ ꡟꡢ
1	0.10%	dwu _	ꡊꡓꡟ _
1	0.10%	_ eod	_ ꡠꡡꡊ
1	0.10%	• _ u	ꡝ _ ꡟ
1	0.10%	b• _ u	ꡎꡝ _ ꡟ
1	0.10%	_ e•d	_ ꡠꡝꡊ
1	0.10%	_ ku	_ ꡀꡟ
1	0.10%	ke _	ꡀꡠ _
1	0.10%	du _	ꡊꡟ _

ꡚ <š>

299	100.00%	total	
95	31.77%	_ hi	_ ꡜꡞ
89	29.77%	_ i	_ ꡞ
20	6.69%	_	_
10	3.34%	_ ėn	_ ꡦꡋ

10	3.34%	_ ŋ
8	2.68%	d _
8	2.68%	_ iŋ
7	2.34%	_ n
6	2.01%	_ iw
5	1.67%	_ ig
5	1.67%	_ ir
4	1.34%	_ il
4	1.34%	_ in
4	1.34%	_ eu
3	1.00%	di _
3	1.00%	_ u
2	0.67%	_ e
2	0.67%	_ ėw
2	0.67%	_ ės
2	0.67%	_ uė
2	0.67%	t‘ _
1	0.33%	’ _
1	0.33%	_ ul
1	0.33%	_ en
1	0.33%	r _
1	0.33%	_ ėr
1	0.33%	_ hi•
1	0.33%	_ is
1	0.33%	_ s

<t>

117	100.00%	total
42	35.90%	_ y
25	21.37%	_ i
19	16.24%	_ w
13	11.11%	_
4	3.42%	_ uŋ
4	3.42%	_ iŋ
3	2.56%	_ ėn
2	1.71%	s _ i
1	0.86%	_ hiŋ
1	0.86%	_ hiw
1	0.86%	_ hiy
1	0.86%	_ ė
1	0.86%	_ hi

<t‘>

888	100.00%	total
405	45.61%	_ u
102	11.49%	_
101	11.37%	_ e
70	7.88%	_ n
38	4.28%	_ m
31	3.49%	_ en
19	2.14%	_ eo
15	1.69%	_ eu
14	1.58%	_ o
14	1.58%	_ y
10	1.13%	_ uq
9	1.01%	_ uŋ
6	0.68%	_ ur
6	0.68%	_ yi
5	0.56%	_ w
3	0.34%	_ ėn
3	0.34%	_ in
3	0.34%	_ er
3	0.34%	_ h
3	0.34%	_ l
2	0.23%	_ um
2	0.23%	_ eg

2	0.23%	se _	ꡛꡠ _
2	0.23%	_ od	_ ꡡꡊ
2	0.23%	_ š	_ ꡚ
2	0.23%	_ i	_ ꡞ
2	0.23%	•u _	ꡖꡟ _
1	0.11%	i _	ꡞ _
1	0.11%	_ on	_ ꡡꡋ
1	0.11%	_ ė	_ ꡦ
1	0.11%	_ un	_ ꡟꡋ
1	0.11%	_ us	_ ꡟꡛ
1	0.11%	_ eyi	_ ꡠꡗꡞ
1	0.11%	_ oŋ	_ ꡡꡃ
1	0.11%	_ •	_ ꡖ
1	0.11%	_ ug	_ ꡟꡂ
1	0.11%	_ s	_ ꡛ
1	0.11%	_ r	_ ꡘ
1	0.11%	_ ŋ	_ ꡃ
1	0.11%	_ or	_ ꡡꡘ
1	0.11%	_ b	_ ꡎ

ꡐ <ts>

16	100.00%	total	
5	31.25%	_ ven	_ ꡓꡠꡋ
3	18.75%	_ iŋ	_ ꡞꡃ
1	6.25%	_ ir	_ ꡞꡘ
1	6.25%	g _ ŋ	ꡂ _ ꡃ
1	6.25%	_ i	_ ꡞ
1	6.25%	_ uŋ	_ ꡟꡃ
1	6.25%	_ u	_ ꡟ
1	6.25%	_ in	_ ꡞꡋ
1	6.25%	_ hi	_ ꡜꡞ
1	6.25%	_ w	_ ꡧ

ꡑ <ts‘>

68	100.00%	total	
36	52.94%	_ ŋ	_ ꡃ
6	8.82%	m _ n	ꡏ _ ꡋ
6	8.82%	_	_
4	5.88%	m _	ꡏ _
4	5.88%	_ in	_ ꡞꡋ
3	4.41%	r _ ŋ	ꡘ _ ꡃ
3	4.41%	_ iŋ	_ ꡞꡃ
2	2.94%	_ m	_ ꡏ
1	1.47%	_ n	_ ꡋ
1	1.47%	m _ o	ꡏ _ ꡡ
1	1.47%	_ l	_ ꡙ
1	1.47%	_ ur	_ ꡟꡘ

ꡟ <u>

4807	100.00%	total	
454	9.45%	b _	ꡎ _
434	9.03%	n _	ꡋ _
405	8.43%	t‘ _	ꡉ _
295	6.14%	ǰ _	ꡆ _
289	6.01%	d _ r	ꡊ _ ꡘ
261	5.43%	s _	ꡛ _
249	5.18%	• _	ꡖ _
162	3.37%	l _	ꡙ _
156	3.25%	_	_
156	3.25%	q _ n	ꡢ _ ꡋ
145	3.02%	d _	ꡊ _
123	2.56%	k‘ _	ꡁ _
114	2.37%	r _	ꡘ _
113	2.35%	d _ n	ꡊ _ ꡋ
101	2.10%	q _	ꡢ _
91	1.89%	s _ n	ꡛ _ ꡋ

78	1.62%	q _ b	ᑌ _ ᑕ
77	1.60%	• _ d	ᑌ _ ᔦ
77	1.60%	g _ n	ᑓ _ ᑐ
74	1.54%	• _ ė	ᑌ _ ᑎ
66	1.37%	• _ n	ᑌ _ ᑐ
55	1.14%	ŋ _ d	ᑍ _ ᔦ
51	1.06%	r _ n	ᕼ _ ᑐ
43	0.90%	č‘ _ n	ᐦ _ ᑐ
43	0.90%	y _	ᖻ _
42	0.87%	q _ ė	ᑌ _ ᑎ
36	0.75%	k‘ _ n	ᑊ _ ᑐ
36	0.75%	d• _ l	ᒪᑌ _ ᓪ
33	0.69%	č‘ _	ᐦ _
31	0.65%	m _	ᘐ _
26	0.54%	g _ ė	ᑓ _ ᑎ
24	0.50%	g _	ᑓ _
23	0.48%	k‘ _ r	ᑊ _ ᕼ
22	0.46%	m _ d	ᘐ _ ᔦ
21	0.44%	m _ n	ᘐ _ ᑐ
21	0.44%	• _ l	ᑌ _ ᓪ
20	0.42%	l _ n	ᓪ _ ᑐ
17	0.35%	l _ g	ᓪ _ ᑓ
17	0.35%	q _ r	ᑌ _ ᕼ
16	0.33%	p _ r	ᑕ _ ᕼ
14	0.29%	k‘ _ ė	ᑊ _ ᑎ
13	0.27%	č‘ _ s	ᐦ _ ᔕ
12	0.25%	f _	ᖴ _
10	0.21%	t‘ _ q	ᑏ _ ᑌ
10	0.21%	ŋ _	ᑍ _
10	0.21%	g _ s	ᑓ _ ᔕ
9	0.19%	t‘ _ ŋ	ᑏ _ ᑍ
9	0.19%	b _ ė	ᑐ _ ᑎ
8	0.17%	b _ •	ᑐ _ ᑌ
8	0.17%	d _ m	ᔦ _ ᘐ
8	0.17%	ǰ _ ŋ	ᒪ _ ᑍ
7	0.15%	m _ ė	ᘐ _ ᑎ
7	0.15%	b _ n	ᑐ _ ᑐ
6	0.13%	l _ •	ᓪ _ ᑌ
6	0.13%	l _ q	ᓪ _ ᑌ
6	0.13%	t‘ _ r	ᑏ _ ᕼ
6	0.13%	b _ r	ᑐ _ ᕼ
5	0.10%	d _ q	ᔦ _ ᑌ
5	0.10%	f _ ŋ	ᖴ _ ᑍ
5	0.10%	s _ d	ᔕ _ ᔦ
5	0.10%	l _ d	ᓪ _ ᔦ
4	0.08%	t _ ŋ	ᑎ _ ᑍ
4	0.08%	ŋ _ n	ᑍ _ ᑐ
4	0.08%	_ r	_ ᕼ
4	0.08%	č‘ _ ŋ	ᐦ _ ᑍ
4	0.08%	dz _	ᖵ _
4	0.08%	• _ r	ᑌ _ ᕼ
4	0.08%	č _ ŋ	ᑏ _ ᑍ
4	0.08%	b _ d	ᑐ _ ᔦ
4	0.08%	d _ ŋ	ᔦ _ ᑍ
3	0.06%	š _	ᑎ _
3	0.06%	k‘ _ ŋ	ᑊ _ ᑍ
3	0.06%	g _ ŋ	ᑓ _ ᑍ
3	0.06%	h _	ᐸ _
3	0.06%	ɣ _ ŋ	ᖇ _ ᑍ
3	0.06%	_ m	_ ᘐ
2	0.04%	p _	ᑕ _
2	0.04%	t‘ _ m	ᑏ _ ᘐ
2	0.04%	š _ ė	ᑎ _ ᑎ
2	0.04%	r _ m	ᕼ _ ᘐ
2	0.04%	l _ s	ᓪ _ ᔕ
2	0.04%	g _ r	ᑓ _ ᕼ

2	0.04%	• _ t‘	
2	0.04%	r _ ŋ	
2	0.04%	dz _ ŋ	
2	0.04%	b _ q	
2	0.04%	s _ s	
2	0.04%	γ _	
2	0.04%	b‘ _	
2	0.04%	m _ r	
2	0.04%	d _ ė	
1	0.02%	t‘ _ n	
1	0.02%	kj _ ŋ	
1	0.02%	r _ q	
1	0.02%	gr _ b	
1	0.02%	s _ r	
1	0.02%	_ n	
1	0.02%	q _ d	
1	0.02%	h _ ŋ	
1	0.02%	g _ d	
1	0.02%	’• _	
1	0.02%	s _ m	
1	0.02%	m _ q	
1	0.02%	r _ r	
1	0.02%	ts _	
1	0.02%	k _	
1	0.02%	d _ d	
1	0.02%	ǰ _ d	
1	0.02%	m _ ŋ	
1	0.02%	w _ n	
1	0.02%	•s _	
1	0.02%	s _ q	
1	0.02%	_ ė	
1	0.02%	_ q	
1	0.02%	•b _	
1	0.02%	r _ s	
1	0.02%	b•s _	
1	0.02%	l _ ė	
1	0.02%	_ l	
1	0.02%	d _ s	
1	0.02%	s _ ŋ	
1	0.02%	_ d	
1	0.02%	š _ l	
1	0.02%	t‘ _ s	
1	0.02%	k _ n	
1	0.02%	ǰi _	
1	0.02%	yė _	
1	0.02%	p _ q	
1	0.02%	ts‘ _ r	
1	0.02%	gs _ m	
1	0.02%	q _ •	
1	0.02%	č‘ _ l	
1	0.02%	n _ r	
1	0.02%	ǰ _ l	
1	0.02%	bč‘ _ g	
1	0.02%	l _ ŋ	
1	0.02%	d _ •	
1	0.02%	b‘ _ r	
1	0.02%	dw _ s	
1	0.02%	ŋ _ ŋ	
1	0.02%	b _ s	
1	0.02%	ts _ ŋ	
1	0.02%	sk _	
1	0.02%	s _ ė	
1	0.02%	t‘ _ g	
1	0.02%	n _ d	
1	0.02%	sg _	
1	0.02%	’ _ s	

<v>

61	100.00%	total
20	32.79%	’ _ en
9	14.75%	s _ en
8	13.12%	’ _ ŋ
5	8.20%	g _ ŋ
5	8.20%	ts _ en
5	8.20%	γ _
2	3.28%	s _
2	3.28%	γ _ o
1	1.64%	g _ en
1	1.64%	γ _ n
1	1.64%	y _ en
1	1.64%	’ _ e
1	1.64%	γ _ y

<w>

147	100.00%	total
19	12.93%	t _
14	9.52%	_
12	8.16%	l _
12	8.16%	ǰi _
9	6.12%	mė _
7	4.76%	_ n
7	4.76%	b _
7	4.76%	ge _
7	4.76%	_ i
6	4.08%	ši _
5	3.40%	_ id
5	3.40%	ǰė _
5	3.40%	t‘ _
3	2.04%	γi _
3	2.04%	čė _
2	1.36%	m _
2	1.36%	šė _
2	1.36%	g _
2	1.36%	gj _
2	1.36%	li _
1	0.68%	_ rd
1	0.68%	ǰhi _
1	0.68%	si _
1	0.68%	_ un
1	0.68%	gi _
1	0.68%	d _ us
1	0.68%	yė _
1	0.68%	y _
1	0.68%	dz _
1	0.68%	k‘i _
1	0.68%	γ _
1	0.68%	dze _
1	0.68%	ts _
1	0.68%	ǰe _
1	0.68%	ke _
1	0.68%	thi _

<y>

1369	100.00%	total
219	16.00%	q _ i
192	14.03%	_
176	12.86%	_ in
111	8.11%	_ i
90	6.57%	_ d
90	6.57%	_ id
74	5.41%	_ o
44	3.21%	_ ė
43	3.14%	_ u

42	3.07%	t _	ꡐ _
35	2.56%	• _ i	ꡏ _ ꡂ
33	2.41%	_ or	_ ꡎꡍ
27	1.97%	_ n	_ ꡂ
16	1.17%	_ er	_ ꡍꡍ
16	1.17%	ge _	ꡆꡍ _
14	1.02%	l _ i	ꡊ _ ꡂ
14	1.02%	t‘ _	ꡔ _
11	0.80%	_ r	_ ꡍ
9	0.66%	dhi _	ꡍꡎꡂ _
8	0.58%	gj _	ꡆꡅ _
8	0.58%	’ _ i	ꡘ _ ꡂ
8	0.58%	_ ŋ	_ ꡐ
7	0.51%	_ e	_ ꡍ
6	0.44%	_ en	_ ꡍꡂ
6	0.44%	t‘ _ i	ꡔ _ ꡂ
6	0.44%	be _ i	ꡁꡍ _ ꡂ
5	0.37%	n _ i	ꡂ _ ꡂ
5	0.37%	b _ i	ꡁ _ ꡂ
4	0.29%	_ •	_ ꡏ
4	0.29%	_ ėr	_ ꡐꡍ
4	0.29%	_ eu	_ ꡍꡉ
3	0.22%	_ ėn	_ ꡐꡂ
3	0.22%	_ on	_ ꡎꡂ
3	0.22%	_ •n	_ ꡏꡂ
3	0.22%	k‘ _	ꡑ _
3	0.22%	h _	ꡎ _
3	0.22%	qo _ i	ꡏꡎ _ ꡂ
2	0.15%	_ il	_ ꡂꡊ
2	0.15%	_ euŋ	_ ꡍꡉꡐ
2	0.15%	_ m	_ ꡃ
1	0.07%	_ im	_ ꡂꡃ
1	0.07%	_ w	_ ꡗ
1	0.07%	ǰ _	ꡜ _
1	0.07%	g _ ėl	ꡆ _ ꡐꡊ
1	0.07%	_ ed	_ ꡍꡍ
1	0.07%	g _ ėr	ꡆ _ ꡐꡍ
1	0.07%	r _ i	ꡍ _ ꡂ
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1	0.07%	γv _	ꡕꡖ _
1	0.07%	č‘ _	ꡗ _
1	0.07%	thi _	ꡐꡎꡂ _
1	0.07%	_ iq	_ ꡂꡏ
1	0.07%	_ od	_ ꡎꡍ
1	0.07%	_ ven	_ ꡖꡍꡂ
1	0.07%	_ ŋl	_ ꡐꡊ
1	0.07%	_ l	_ ꡊ
1	0.07%	_ ėu	_ ꡐꡉ

ꡓ <z>

85	100.00%	total	
38	44.71%	_	_
31	36.47%	_ hi	_ ꡎꡂ
6	7.06%	_ jŋ	_ ꡀꡐ
3	3.53%	_ ėr	_ ꡐꡍ
1	1.18%	_ j	_ ꡀ
1	1.18%	_ eŋ	_ ꡍꡐ
1	1.18%	_ im	_ ꡂꡃ
1	1.18%	_ ir	_ ꡂꡍ
1	1.18%	_ euŋ	_ ꡍꡉꡐ
1	1.18%	b _ ŋ	ꡁ _ ꡐ
1	1.18%	pi _	ꡒꡂ _

ꡙ <ž>

25	100.00%	total

8	32.00%	_ in	_
6	24.00%	_ i	_
4	16.00%	g _ is	_
2	8.00%	_ ŋ	_
1	4.00%	_ e	_
1	4.00%	_ iŋ	_
1	4.00%	_ eun	_
1	4.00%	k _ is	_
1	4.00%	_ eu	_