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Author(s)	ONO, Yohei
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Some Remarks on Cognacy Judgments of Ainu Dialects: On Asai (1974)

Yohei Ono

(Graduate Student at the Open University of Japan)

1. Introduction

There are two lexicostatistical studies on Ainu dialects that still have a great influence on current Ainu linguistics: one by Hattori and Chiri (1960) and the other by Asai (1974). Hattori and Chiri's work comprises lexicostatistical surveys on 19 Ainu dialects (marked by Nos. 1-19 in Figure 1) with reference to Swadesh's (1955) word list. Since Ainu dialects were on the verge of vanishing at that time, their research made an invaluable contribution to Ainu linguistics.

Furthermore, Asai corrected some of the lexicostatistical data in Hattori and Chiri's study on the Obihiro, Kushiro, and Asahikawa dialects (Nos. 8, 9, and 11 in Figure 1) based on his own fieldwork (66); collected the Chitose dialect (No. 21 in Figure 1) from informants (64-66); and gathered the Kuril dialect (No. 20 in Figure 1) with reference to Torii (1903), Murayama (1971), and Pinart's vocabulary manuscripts (Asai 1974: Appendix). Moreover, Asai corrected his lexicostatistical data with Hattori (1964) as needed.

Notably, both Hattori and Chiri (1960) and Asai (1974) applied statistical methods to their data and presented a classification of Ainu dialects. Therefore, these two studies are still landmarks in Ainu dialectology.

Refsing (1986: 53-54) refers to Asai's classification as the "established" clusters of Ainu dialects. Asai (100) classified the 21 Ainu dialects into three groups: Hokkaido Ainu dialects (Nos. 1-13, and 21 in Figure 1),

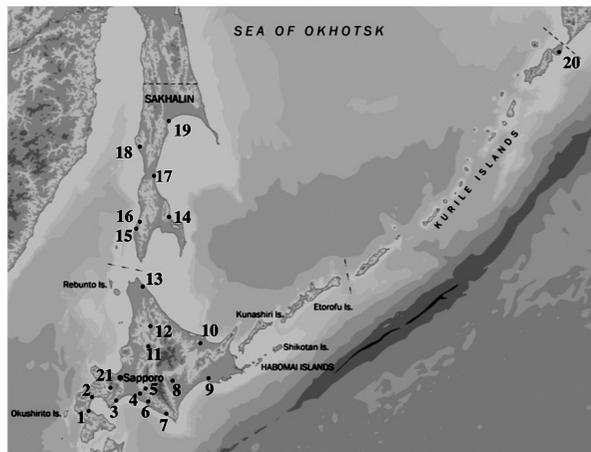


Figure 1: Map of a section of the region where the Ainu language is or was spoken (Geospatial Information Authority of Japan, 2019), edited by the author. Note: 1: Yakumo, 2: Oshamambe, 3: Horobetsu, 4: Biratori, 5: Nukibetsu, 6: Niikappu, 7: Samani, 8: Obihiro, 9: Kushiro, 10: Bihoro, 11: Asahikawa, 12: Nayoro, 13: Soya, 14: Ochiho, 15: Tarantomari, 16: Maoka, 17: Shiraura, 18: Raichishka, 19: Nairo, 20: North Kuril (Shumushu), 21: Chitose.

the North Kuril Ainu dialect (No. 20 in Figure 1), and Sakhalin Ainu dialects (Nos. 14-19 in Figure 1).

However, Hattori and Chiri (1960) and Asai (1974) differ from the viewpoint of linguistic material in the following ways. First, the number of words is different in both studies (i.e., Hattori and Chiri [1960] and Asai [1974] are 91 words and 110 words respectively). Moreover, the 110 words that Asai analyzed could still not be specified from 135 candidates. Second, the cognacy judgments on one word among the Ainu dialects do not correspond between Hattori and Chiri (1960) and Asai (1974).

Table 1 demonstrates the word list Hattori and Chiri (1960) included in the analysis, which Asai (1974) could have included in his own.

We can observe that Asai excluded many words from the analysis by Hattori and Chiri, as follows. First, Asai stated that “*An initial (*) before a word guide number indicates that the word is omitted in our counting and corresponding Ainu forms except of P21 [i.e., Chitose dialect] are generally omitted, for in some dialects we could not find any correspondent*” (67)¹⁾ and these 32 words are marked with X-1 in Table 1. Second, Asai (1974: 85) excluded 35 words for some linguistic reason, which are marked with X-2 in Table 1. Thus, the candidate words in Asai’s analysis reduced from 202 words to 135 words.

Conversely, we can also observe that Asai included many words in his analysis that Hattori and Chiri excluded. The reason for this was that Hattori and Chiri judged those words as cognate in all 19 dialects (Nos. 1-19 in Figure 1), which are marked with C in Table 1.

Therefore, Table 1 demonstrates that the lexicostatistical research by Hattori and Chiri (1960) and Asai (1974) analyzed different data and, at least partially, made different cognacy judgments on the Ainu dialects.

However, no other documents exist where Ainu linguists demonstrate cognacy judgments among Ainu dialects sufficiently in terms of quality and quantity. Thus, for about half a century, researchers had to compare the two classifications in Ainu dialects based on different words and cognacy judgments.

Recent studies based on Hattori and Chiri’s work (e.g., Ono 2015) illustrated that Sakhalin Ainu dialects split into an east coast group (Nos. 14, 17, and 19 in Figure 1) and a west coast group (Nos. 15, 16, and 18 in Figure 1), whose classification differed from those by Asai (1974), which clusters Sakhalin Ainu dialects into the South Sakhalin group (No. 15 in Figure 1), the Central Sakhalin group (Nos. 14, 16-18 in Figure 1), and the North Sakhalin group (No. 19 in Figure 1).

Since the classification of Sakhalin Ainu dialects and the relationships among Hokkaido Ainu dialects and Sakhalin Ainu dialects are also closely connected to the problem of the origin of the Ainu language (that is, whether the Ainu language transferred from Hokkaido to Sakhalin or from Sakhalin to Hokkaido), dealing with the issues with Hattori and Chiri’s (1960) and Asai’s (1974) works will contribute to Ainu linguistics.

However, Hattori and Chiri (1960) and Asai (1974) assumed different data and different cognacy judgments, which resulted in difficulties when researchers compared the two classifications of Ainu

1) In the following sentences, unless italicized, the English translation of the Japanese literature is by the author.

Table 1: The words put forward by Hattori and Chiri (1960) and 135 candidates for 110 words by Asai (1974).

(1)

number	word	Hattori and Chiri's (1960) judgments	Asai's (1974) judgments	number	word	Hattori and Chiri's (1960) judgments	Asai's (1974) judgments
1	I	◎	○	43	tooth	C	○
2	thou	C	○	44	tongue	◎	○
3	we	X	X-2	45	claw	C	○
4	this	C	X-1	46	foot	◎	X-2
5	that	◎	X-1	47	knee	◎	○
6	who	◎	○	48	hand	◎	○
7	what	◎	○	49	belly	◎	○
8	not	◎	X-1	50	neck	◎	○
9	all	◎	X-2	51	breast	◎	○
10	many	◎	○	52	heart	C	○
11	one	C	X-1	53	liver	◎	○
12	two	C	X-1	54	drink	C	○
13	big	C	○	55	eat	C	○
14	long	C	○	56	bite	C	○
15	small	◎	○	57	see	C	○
16	woman	◎	X-2	58	hear	C	○
17	man	C	○	59	know	◎	○
18	person	C	○	60	sleep	C	○
19	fish	C	○	61	die	C	○
20	bird	◎	X-2	62	kill	◎	○
21	dog	C	○	63	swim	◎	○
22	louse	◎	○	64	fly	◎	○
23	tree	C	○	65	walk	C	○
24	seed	C	○	66	come	C	○
25	leaf	◎	○	67	lie	◎	X-2
26	root	◎	○	68	sit	C	X-2
27	bark	◎	X-1	69	stand	◎	○
28	skin	◎	X-2	70	give	C	○
29	meat	C	○	71	say	C	X-2
30	blood	C	○	72	sun	◎	○
31	bone	C	○	73	moon	◎	X-1
32	grease	C	○	74	star	◎	○
33	egg	X	X-1	75	water	C	○
34	horn	C	○	76	rain(the rain)	◎	○
35	tail	◎	X-2	76'	rain(it rains)	※1	○
36	feather	C	○	77	stone	C	○
37	hair	C	○	78	sand	C	○
38	head	C	○	79	earth	C	○
39	ear	C	○	80	cloud	◎	X-2
40	eye	C	○	81	smoke	◎	○
41	nose	C	○	82	fire	◎	○
42	mouth	C	○	83	ashes	C	○

(Continue)

(2)

number	word	Hattori and Chiri's (1960) judgments	Asai's (1974) judgments	number	word	Hattori and Chiri's (1960) judgments	Asai's (1974) judgments
84	burn	◎	○	126	back	◎	○
85	path	C	○	127	leg	◎	○
86	mountain	C	○	128	arm	◎	X-2
87	red	C	○	129	wing	◎	○
88	green	◎	X-1	130	lip	◎	○
89	yellow	◎	X-1	131	fur	C	X-1
90	white	C	○	132	navel	C	○
91	black	C	○	133	guts	X	○
92	night	C	○	134	saliva	C	X-1
93	hot	C	○	135	milk	C	○
94	cold	◎	○	136	fruit	◎	X-2
95	full	C	X-1	137	flower	◎	X-2
96	new	C	○	138	grass	C	○
97	good	C	○	139	with	C	X-1
98	round	◎	X-1	140	in	C	X-1
99	dry	◎	○	141	at	C	X-1
100	name	C	○	142	if	◎	X-1
101	ye	◎	○	143	mother	◎	○
102	he	◎	X-1	144	father	◎	○
103	they	◎	X-1	145	husband	C	○
104	how	◎	○	146	wife	C	○
105	when	◎	○	147	salt	C	○
106	where	◎	○	148	ice	◎	○
107	here	◎	○	149	snow	C	○
108	there	◎	○	150	freeze	C	○
109	other	◎	X-2	151	child	C	○
110	three	C	X-1	152	dark	C	X-2
111	four	C	X-1	153	cut	C	○
112	five	C	X-1	154	wide	C	○
113	few	C	○	155	narrow	C	○
114	sky	C	○	156	far	C	○
115	day	◎	○	157	near	C	○
116	fog	C	○	158	thick	C	○
117	wind	C	○	159	thin	C	○
118	flow	C	X-1	160	short	C	X-1
119	sea	C	○	161	heavy	C	○
120	lake	C	○	162	dull	◎	X-2
121	river	◎	○	163	sharp	C	○
122	wet	◎	○	164	dirty	C	○
123	wash	C	○	165	bad	C	○
124	snake	◎	X-1	166	rotten	C	○
125	worm	C	○	167	smooth	◎	○

(Continue)

(3)

number	word	Hattori and Chiri's (1960) judgments	Asai's (1974) judgments	number	word	Hattori and Chiri's (1960) judgments	Asai's (1974) judgments
168	straight	◎	X-2	185	think	◎	X-2
169	correct	C	X-1	186	sing	◎	X-2
170	left	C	X-1	187	smell (odor)	※1	X-2
171	right	C	○	187	smell	◎	X-2
172	old	C	○	188	puke, vomit	◎	○
173	rub	C	○	189	suck	◎	X-2
174	pull	◎	○	190	blow (it blows)	C	X-2
175	push	◎	○	191	fear	◎	X-2
176	throw	◎	X-1	192	squeeze	◎	X-1
177	hit	◎	X-2	193	hold	C	X-2
178	split	◎	X-2	194	down	C	X-2
179	pierce (stab)	◎	X-2	195	up	C	X-2
180	dig	◎	○	196	ripe	◎	X-1
181	tie	X	X-2	197	dust	◎	X-2
182	sew	◎	X-2	198	alive	◎	○
183	fall	◎	X-2	199	rope	◎	○
184	swell	◎	X-1	200	year	C	○

Note: ◎: the words included by Hattori and Chiri (1960); C: the words that Hattori and Chiri (1960) judged as cognate in all 19 dialects (Nos. 1-19 in Figure 1) and excluded from the analysis; X: the words where Hattori and Chiri (1960) judged the data to be problematic and excluded from the analysis; ※1: Hattori and Chiri (1960) did not distinguish the noun of rain (i.e., 'the rain') from the verb of rain (i.e., 'it rains') and only used the information on the noun of rain (i.e., 'the rain'); ※2: Hattori and Chiri (1960) did not distinguish the noun of smell (i.e., 'odor') from the verb of smell (i.e., 'smell') and only used the information on the verb of smell (i.e., smell); ○: the words that are candidates for the 110 words by Asai (1974); X-1: the words that Asai (1974: 67) excluded from the analysis for lack of a corresponding word form in some dialects; X-2: the words that Asai (1974: 85) excluded from the analysis for some reason.

dialects as they were. As the main results in this paper will illustrate, the specification of 110 words from the 135 candidates by Asai is the obstacle that has prevented researchers from comparing Hattori and Chiri (1960) with Asai (1974) on their substantive knowledge of the Ainu language and from investigating further lexicostatistical research based on the integration of Hattori and Chiri's (1960) and Asai's (1974) works.

As a starting point, this paper is an attempt to identify 110 words from 135 candidates by Asai and the corresponding cognacy judgments.

The author adopts an approach for the specification of 110 words from 135 candidates put forward by Asai. As demonstrated in Section 3, the approach partially reveals 110 words and cognacy judgments among the 110 words by Asai. Several cognacy judgments by Asai, retrieved using our approach, demonstrate the clear distinction of cognacy between Hattori and Chiri (1960) and Asai (1974).

The main results in this paper are summarized in the following two points. First, this paper proves that the descriptions by Asai are insufficient for specifying all 110 words, and indicates that this property of Asai's data has prevented Ainu linguists from specifying 110 words for about half a century.

Second, part of the cognacy judgments between Tarantomari and Maoka (Nos. 15 and 16 in Figure

Table 2: The correspondence chart between Hokkaido Ainu and Sakhalin Ainu in Hattori (1967: 209). The corresponding English words refer to Hattori (1964) as needed.

English words	Hokkaido Ainu dialects	Sakhalin Ainu dialects
skin	kap	kah
spear	'op	'oh (pole)
string, cord	'at	'ah
belt	kut	kuh
younger brother	'ak	'ah (younger brother, younger sister)
hand and arm	tek	teh
boat, ship	cip	cis [tʃiʃ]
tendon	rit	ris (sinew)
eye	sik [ʃik]	sis [ʃiʃ]

1), specified by our approach, differ from a phonetic correspondence on current Ainu linguistics. Table 2 illustrates examples in Hattori (1967: 209). Hattori states that “CVw, CVy, CVm, CVn, and CVs agree in both Hokkaido and Sakhalin Ainu dialects. Furthermore, CVp, CVt, and CVk in Hokkaido Ainu dialects correspond to CVh in Sakhalin Ainu dialects and CVr in Hokkaido Ainu dialects to CVrV in Sakhalin Ainu dialects. Note that Cip, Cit,

and Cik in Hokkaido Ainu dialects correspond to Cis in Sakhalin Ainu dialects.” (208-209).

However, part of the cognacy judgments, specified by our approach, are clearly different from the phonetic correspondence as a result.

The fact clarifies that the different purpose characterizes the classification of Ainu dialects in both Hattori and Chiri (1960) and Asai (1974): Hattori and Chiri (1960) focus on divergence time of the Ainu language with the percentages of the remaining words, which resulted in applying the phonetic correspondence to their cognacy judgments and classifying the Ainu dialects with these aspects; Asai (1974) might aim to demonstrate the classification of Ainu dialects with a quantitative approach, which resulted in emphasizing the differences among word forms in Ainu dialects.

Thus, the author will leave to Ainu linguists which standpoint is appropriate for the classification of Ainu dialects from the substantive linguistics knowledge. The issues over the cognacy judgments are promising towards a new classification of Ainu dialects.

The remainder of this paper is structured as follows. Section 2 explains the property of lexicostatistical data in Asai’s work and states an approach that can specify 110 words from 135 candidates and some of the cognacy judgments among word forms on the words by Asai.

Section 3 explains the results on the specified words and cognacy judgments in Asai’s work. Moreover, the author illustrates that the descriptions by Asai are insufficient for specifying all 110 words.

Section 4 discusses this paper’s significance from the viewpoint of linguistics. Our approach reveals the view on lexicostatistical data in Asai’s work, creates the possibility for researchers to verify the different assumptions on the data used by Hattori and Chiri (1960) and Asai (1974) in current Ainu linguistics, and demonstrates a need for the classification of Ainu dialects through the integration of Hattori and Chiri’s (1960) and Asai’s (1974) works.

2. Materials and Methods

Section 2.1 presents the property in Asai’s data and explains the possibility that the property in Asai’s work could enable researchers to identify some of the 110 words from the 135 candidates put forward by Asai. Section 2.2 states our approach for a specification utilizing the “relation index” by Asai (61-62).

2.1 Materials

The typical data in Asai's (67-85) work are represented in Table 3. Table 3 demonstrates the word forms for 'all' in Asai (68).²⁾ Asai explained that "*Obviously similar or nearly similar Ainu forms are also put in parentheses, but considerably many forms which may be easily taken as cognates are not placed in parentheses*" (67).

However, Asai remarked that "*In both countings we omitted those (W_i) which had many (W_{ix}) that seemed unsuitable for our study. Next, we decided to count C_{ij} , identifying only the same or nearly the same forms and computed C_{ij}/N_0 , which better precludes any arbitrariness in identification of forms*" (85).³⁾

Significant questions soon arise as to what corresponds to "*many (W_{ix}) that seemed unsuitable for our study*" and "*only the same or nearly the same forms.*" In fact, Asai did not define these terms in any description. Therefore, these unsolved problems have prevented Ainu linguists from identifying (1) 110 words from 135 candidates in Asai's work and (2) his cognacy judgments on 110 words.

Furthermore, in comparison with Hattori and Chiri, the author noticed several errors in the lexicostatistical data in Asai's work that did not exist in the corrigenda by Asai, referencing Hattori and Chiri (1960) and Hattori (1964). These errors are summarized in Table 4.

The reason for these corrections is as follows. On 7.what, Asai (68) demonstrates the word form *nep* in the Ochiho dialect (No. 14 in Figure 1) but does not demonstrate the word form *hemata* in the Soya dialect (No. 13 in Figure 1). However, these descriptions are inconsistent with both Hattori and Chiri (314) and Hattori (313).

On 10.many, Asai (68) demonstrates the word form *poronno* in the Shiraura dialect (No. 17 in Figure 1). However, Hattori and Chiri (314) do not demonstrate the word form *poronno*, but another word form, *poroono*, which Asai summarizes *poroonno*-type, in the Shiraura dialect.

On 23.tree, Asai (69) lacks the corresponding word form in the Niikappu dialect (No. 6 in Figure 1). However, Hattori and Chiri (316) demonstrate the corre-

Table 3: The word forms for 'all' according to Asai (1974: 68).

(opitta(1, 3-9, 11-13, 21), oputta(9-11)),
epitta(1, 2, 11),
emujke(14, 17-19),
anpahno(15),
imiki(15, 16),
okore(18),
anajkip(20).

Table 4: Errors by Asai (1974) and corrections based on Hattori and Chiri's (1960) and Hattori's (1964) works.

word_names	errors in Asai (1974)	corrections
7.what	nep(1-3, 7-14)	nep(1-3, 7-13)
7.what	hemata(14-19)	hemata(13-19)
10.many	poronno(1, 3-13, 15-19, 21)	poronno(1, 3-13, 15, 16, 18, 19, 21)
10.many	poroonno(2, 14)	poroonno(2, 14, 17)
23.tree	cikuni(1-5, 13, 21)	cikuni(1-6, 13, 21)
47.knee	kokka(9-13, 20)	kokka(9-12, 20)
59.know	eraman(1-13)	eraman(1-4, 11-13)
59.know	eramuan(21)	eramuan(4-10, 21)
81.smoke	sipuja(1, 2)	sipuja(1, 2, 13)
114.sky	nis(1, 3, 8-10, 20)	nis(1, 3, 8-11, 20)
123.wash	uraje(6-12)	uraje(8-12)

2) The numbers in parentheses following each word form correspond to the places in Figure 1 in the following sentences.

3) W_i : i th word; W_{ix} : x th word form in i th word; C_{ij} : the number of words where i dialect and j dialect share at least one common word form in the words that exist in at least one word form in all dialects; N_0 : the number of words where there exists at least one word form in all dialects.

sponding word form, *cikuni*.

On 47.knee, Asai (71) demonstrates the word form *kokka*, in the Soya dialect (No. 13 in Figure 1). However, the description is inconsistent with both Hattori and Chiri (318) and Hattori (17) who describe only *kókkasapa*-type in the Soya dialect.

On 81.smoke, Asai (73) demonstrates the word form *sipuja* in the Yakumo and Oshamambe dialects (Nos. 1-2 in Figure 1). However, both Hattori and Chiri (321) and Hattori (106) also demonstrate the word form *sipuja* in the Soya dialect (No. 13 in Figure 1).

On 123.wash, Asai (76) demonstrates the word form *uraje* in the Niikappu and Samani dialects (Nos. 6-7 in Figure 1). However, Hattori and Chiri (326) do not demonstrate the word form *uraje*, but another word form, *huraje*, in the Niikappu and Samani dialects.

Since Asai does not state any corrections on these six words nor does he investigate further in the corresponding place, the author assumes these corrections in Asai's work.

On 59.know, Asai (71) distinguishes the word form *eraman* from the word form *eramuan*. Since Hattori and Chiri (319) demonstrate the word form *eraman* in the Yakumo, Oshamambe, Horobetsu, Biratori, Asahikawa, Nayoro, and Soya dialects (Nos. 1-4, and 11-13 in Figure 1) and the word form *eramuan* in the Biratori, Nukibetsu, Niikappu, Samani, Obihiro, Kushiro, and Bihoro dialects (Nos. 4-10 in Figure 1), the author corrects the description in Asai (71) consistent with that in Hattori and Chiri (319).

On 114.sky, Asai (75) does not demonstrate the word form *nis* in the Asahikawa dialect (No. 11 in Figure 1). However, both Hattori and Chiri (325) and Hattori (222) demonstrate the word form *nis* in the Asahikawa dialect. The author does not exclude the possibility that Asai corrected the corresponding word form based on his own fieldwork with the informant in the Asahikawa dialect (66). However, to my knowledge, no other documents exist where *nis* does not mean sky in the Asahikawa dialect. Therefore, the author assumes the correction in the following analysis. Note that the correction on 114.sky does not affect the specification on 110 words from 135 candidates in Tables 11 and 12 that the author focuses on in Section 3.

Furthermore, the author found some questionable typos by Asai, as shown in Table 5, based on Hattori and Chiri (1960) and Hattori (1964). However, the author did not adopt the candidates for correction in Table 5 for the following reasons.

Table 5: Questionable typos by Asai (1974) and their candidates for correction based on Hattori and Chiri's (1960) and Hattori's (1964) works.

word_names	questionable typos in Asai (1974)	candidates for correction
48.hand	teh(14, 16, 18)	teh(14, 16)
76'.rain(it rains)	as(1-13, 20, 21)	as(1-7, 9-13, 20, 21)
76'.rain(it rains)		ruy(8)
84.burn		'eynu(10)
126.back	seturu(14, 16-20)	seturu(14, 16, 17, 19, 20)
150.freeze	rupus(1-14, 16-18, 20, 21)	rupus(1-18, 20, 21)
173.rub	sirusiru(1-6, 8-19, 21)	sirusiru(1-3, 8-19, 21)
173.rub		sirsiru(4-6)
173.rub		siru(3, 9)

On 48.hand, Hattori (11) demonstrates the corresponding word form as *teh* in the Sakhalin dialect, whose informant is introduced as the Raichishka dialect in Hattori (14; Introduction).

On 76'. rain (it rains), Asai corrected some lexicostatistical data in Hattori and Chiri's study on the Obihiro, Kushiro, and Asahikawa dialects based on his

own fieldwork (66) and Asai noted that “*Ainu, as well as Japanese, has no verb corresponding to ‘rain’ and has the noun ‘rain’ with which various verbs are used to express different states of raining. /...as/ (it rains) is a more popular verb in Hokkaido than /...ran/ (it falls), though the latter may be used, while /...ruj/ (it rains heavily) is also popular*” (88). Therefore, the author cannot deny the possibility that Asai corrected the word form in Obihiro (No. 8 in Figure 1) based on his own linguistic knowledge.

On 84.burn, Hattori and Chiri (321) recorded ‘eynu in Asahikawa (No. 10 in Figure 1). However, the author does not deny Asai’s correction either. Furthermore, in this case, the correction does not affect the specification of words and corresponding cognacy judgments in Section 3.

On 126.back, Hattori and Chiri (326) recorded only *menay* in Raichishka (No. 18 in Figure 1). However, Hattori (14) demonstrated the corresponding word forms as *menay* and *seturu* in the Sakhalin dialect, whose informant was introduced as the Raichishka dialect in Hattori (14; Introduction).

On 150.freeze, Hattori and Chiri (329) recorded *rupus* in Tarantomari (No. 15 in Figure 1). However, they also remarked that *rupus* in Tarantomari meant ‘something cold’. Therefore, the author does not deny Asai’s correction here either.

On 173.rub, the author does not exclude the possibility that researchers adopt the correction in Table 6. However, in this case, the correction does not affect the specification of words and corresponding cognacy judgments in Section 3. Therefore, the author will leave the examination of the validity of this correction to Ainu linguists.

The author notes that only the correction on 76’.rain (it rains) in Table 5 affected the results on the specification of 110 words from 135 candidates put forward by Asai and the corresponding cognacy judgments by him. Thus, Section 3 demonstrates the results that did not adopt the correction on 76’.rain as well as the results that did adopt the correction on 76’.rain, respectively.

Next, the author focuses on similarity data among the Ainu dialects that were utilized by Asai (92; Table 1), as demonstrated in Table 6. Asai constructed Table 6 with 110 words, which are not specified at present, based on his definition of a “relation index” (61-62).

The definition of a “relation index” is as follows: “*We assume that the value of the relation index is 1, if there is at least one similar or the same form in both of any two given dialects (P_i, P_j) and if there is no common form in the two given dialects, the relation index of the two dialects equals a value of 0*” (Asai 1974: 61-62).

For example, Asai (78) demonstrated the data on ‘mother’ as *hapo* (1-10, 13), *totto* (9-12, 21), *nonno* (20), *nanna* (14-17, 19), *onmo* (14, 18), and *unn* (11, 14, 18), where the numbers in parentheses following each word form correspond to the places in Figure 1.

Table 7 exemplifies similarity data on the word ‘mother,’ utilizing the definition of a “relation index” with the tentative assumption that the word forms are not cognate with each other. Although Ochiho (No. 14 in Figure 1) and Raichishka (No. 18 in Figure 1) share the two word forms (i. e., *onmo* and *unn*) under the assumptions, these two dialects demonstrate the value of 1 in the definition of a “relation index” (Asai 1974: 61-62).⁴⁾ Thus, Table 6 is comprised of the summation of 110 words, which are not specified at the present time, according to the definition of a “relation

Table 6: Asai (1974: 92; Table 1) on cognacy judgments on 110 words among the 21 Ainu dialects. The numbers in the first row correspond to the dialects in the first column.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 Yakumo	110	104	102	97	96	95	83	88	88	83	94	89	77	40	52	43	39	42	43	54	94
2 Oshamambe	104	110	101	95	94	93	80	84	84	78	92	84	77	37	50	39	36	41	42	50	95
3 Horobetsu	102	101	110	104	98	98	83	91	90	85	96	93	76	41	56	45	41	44	46	59	99
4 Biratori	97	95	104	110	103	105	79	87	86	81	92	89	73	42	58	47	42	45	48	59	104
5 Nukibetsu	96	94	98	103	110	98	75	81	81	74	87	83	72	38	51	41	36	40	41	54	101
6 Niikappu	95	93	98	105	98	110	73	84	84	78	89	83	70	40	54	43	39	42	45	56	101
7 Samani	83	80	83	79	75	73	110	94	92	84	85	81	74	33	49	36	33	33	38	52	80
8 Obihiro	88	84	91	87	81	84	94	110	106	100	95	93	79	38	54	43	38	31	46	59	84
9 Kushiro	88	84	90	86	81	84	92	106	110	101	98	98	83	38	54	42	38	41	45	63	85
10 Bihoro	83	78	85	81	74	78	84	100	101	110	92	91	78	36	52	42	36	39	43	58	79
11 Asahikawa	94	92	96	92	87	89	85	95	98	92	110	102	82	43	58	47	40	45	47	60	93
12 Nayoro	89	84	93	89	83	83	81	93	98	91	102	110	84	44	59	51	42	48	49	61	87
13 Soya	77	77	76	73	72	70	74	79	83	78	82	84	110	47	65	56	48	55	52	51	72
14 Ochiho	40	37	41	42	38	40	33	38	38	36	43	44	47	110	66	90	91	84	60	29	40
15 Tarantomari	52	50	56	58	51	54	49	54	54	52	58	59	65	66	110	78	67	67	74	44	55
16 Maoka	43	39	45	47	41	43	36	43	42	42	47	51	56	90	78	110	92	87	68	32	46
17 Shiraura	39	36	41	42	36	39	33	38	38	36	40	42	48	91	67	92	110	93	68	27	40
18 Raichishka	42	41	44	45	40	42	33	31	41	39	45	48	55	84	67	87	93	110	62	33	41
19 Nairo	43	42	46	48	41	45	38	46	45	43	47	49	52	60	74	68	68	62	110	38	39
20 North Kuril	54	50	59	59	54	56	52	59	63	58	60	61	51	29	44	32	27	33	38	110	54
21 Chitose	94	95	99	104	101	101	80	84	85	79	93	87	72	40	55	46	40	41	39	54	110

index.”

This paper considers Table 6 from another perspective. Table 8 transforms Table 6 subtracting Table 6 from 110, the total number of words.

According to the definition of a “relation index,” Table 8 demonstrates the number of words where the given dialects share no common word forms. In the next section, the author states an approach that can specify some of the 110 words from the 135 candidates put forward by Asai and the corresponding cognacy judgments, utilizing the properties of Table 8.

2.2 Methods

This Section explains our approach for the specification of 110 words from the 135 candidates in Asai’s work. First, this paper does not unconditionally adopt the criteria that “*Obviously similar or nearly similar Ainu forms are also put in parentheses*” (Asai 1974: 67). Rather, it adopts the numbers in parentheses following each word form as a minimum unit whose places of origin share one common word form.

This assumption will enable researchers to calculate the number of words where both of the given dialects share no common word forms. Since there is no other smaller unit than the numbers in parentheses following each word form from the description by Asai, the calculated values are the maximal number of words where both of the given dialects share no common word forms.

4) Asai (1974) applied a cluster analysis to Table 6 and illustrated the classification of Ainu dialects. However, the mathematical property of the “relation index” in Tables 6 and 7 led the author to reconsider Asai’s classification of Ainu dialects from a statistical point of view. Due to space restrictions, the author deals with this significant issue in another article. Therefore, this paper focuses on issues with the specification of 110 words from the 135 candidates by Asai.

Table 7: An example of similarity data on ‘mother’ in Asai’s (1974: 78) study based on a “relation index” (61-62).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1_Yakumo	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0
2_Oshamambe	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0
3_Horobetsu	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0
4_Biratori	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0
5_Nukibetsu	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0
6_Niikappu	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0
7_Samani	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0
8_Obihiro	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0
9_Kushiro	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1
10_Bihoro	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1
11_Asahikawa	0	0	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	1	0	0	1
12_Nayoro	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1
13_Soya	1	1	1	1	1	1	1	1	1	1	0	0	1	0	0	0	0	0	0	0	0
14_Ochiho	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	1	0	0
15_Tarantomari	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	0	0
16_Maoka	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	0	0
17_Shirauro	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	0	0
18_Raichishka	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0
19_Nairo	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1	0	0
20_North Kuril	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
21_Chitose	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1

Note: The author tentatively assumes that the word forms are not cognate with each other.

Since the calculated values contain $(21*(21-1))/2 = 210$ patterns, it is expected that some of the values in Table 8 will be equal to those maximal values. In this case, the words that do not demonstrate one common word form between the given two dialects are necessarily included in the 110 words and the corresponding non-cognate judgments among the word forms on the words between the given two dialects are also necessarily included in the analysis.

Furthermore, the negative values obtained by subtracting the number of words where both of the given dialects share no common word forms from those maximal values prove that the descriptions of cognacy judgments on the research are insufficient for specifying the words from candidates and the corresponding cognacy judgments.

In this case, any specification on words and the corresponding cognacy judgments does not demonstrate the equal value on the pairs of dialects, on which negative values are calculated by our approach. Thus, the results necessarily lead every specification to contradict Asai (1974: 92; Table 1).

3. Results

Table 9 demonstrates the maximal number of words where both of the given dialects share no common word forms, as explained in Section 2.2, and Table 10 subtracts Table 8 from Table 9.

We can observe that pairs of dialects (i.e., [5_Nukibetsu, 6_Niikappu] and [6_Niikappu, 7_Samani]) demonstrate negative values in Table 10. These results prove that the descriptions by Asai are insufficient for specifying all 110 words and indicate that this property of Asai’s data has prevented Ainu linguists from specifying 110 words and integrating Hattori and Chiri’s (1960) and Asai’s (1974) works for about half a century.⁵⁾

5) In other words, the integration of Hattori and Chiri’s (1960) and Asai’s (1974) works requires

Table 8: The number of words where the Ainu dialects share no common word forms according to Asai (1974).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1_Yakumo	0	6	8	13	14	15	27	22	22	27	16	21	33	70	58	67	71	68	67	56	16
2_Oshamambe	6	0	9	15	16	17	30	26	26	32	18	26	33	73	60	71	74	69	68	60	15
3_Horobetsu	8	9	0	6	12	12	27	19	20	25	14	17	34	69	54	65	69	66	64	51	11
4_Biratori	13	15	6	0	7	5	31	23	24	29	18	21	37	68	52	63	68	65	62	51	6
5_Nukibetsu	14	16	12	7	0	12	35	29	29	36	23	27	38	72	59	69	74	70	69	56	9
6_Niikappu	15	17	12	5	12	0	37	26	26	32	21	27	40	70	56	67	71	68	65	54	9
7_Samani	27	30	27	31	35	37	0	16	18	26	25	29	36	77	61	74	77	77	72	58	30
8_Obihiro	22	26	19	23	29	26	16	0	4	10	15	17	31	72	56	67	72	79	64	51	26
9_Kushiro	22	26	20	24	29	26	18	4	0	9	12	12	27	72	56	68	72	69	65	47	25
10_Bihoro	27	32	25	29	36	32	26	10	9	0	18	19	32	74	58	68	74	71	67	52	31
11_Ashikawa	16	18	14	18	23	21	25	15	12	18	0	8	28	67	52	63	70	65	63	50	17
12_Nayoro	21	26	17	21	27	27	29	17	12	19	8	0	26	66	51	59	68	62	61	49	23
13_Soya	33	33	34	37	38	40	36	31	27	32	28	26	0	63	45	54	62	55	58	59	38
14_Ochiho	70	73	69	68	72	70	77	72	72	74	67	66	63	0	44	20	19	26	50	81	70
15_Tarantomari	58	60	54	52	59	56	61	56	56	58	52	51	45	44	0	32	43	43	36	66	55
16_Maoka	67	71	65	63	69	67	74	67	68	68	63	59	54	20	32	0	18	23	42	78	64
17_Shirauro	71	74	69	68	74	71	77	72	72	74	70	68	62	19	43	18	0	17	42	83	70
18_Raichishka	68	69	66	65	70	68	77	79	69	71	65	62	55	26	43	23	17	0	48	77	69
19_Nairo	67	68	64	62	69	65	72	64	65	67	63	61	58	50	36	42	42	48	0	72	71
20_North_Kuril	56	60	51	51	56	54	58	51	47	52	50	49	59	81	66	78	83	77	72	0	56
21_Chitose	16	15	11	6	9	9	30	26	25	31	17	23	38	70	55	64	70	69	71	56	0

Since Table 10 does not demonstrate negative values in any dialects other than 5_Nukibetsu, 6_Niikappu, and 7_Samani, the author assumes that the values in Table 10 are correct in dialects other than 5_Nukibetsu, 6_Niikappu, and 7_Samani. This assumption can be validated as follows: Suppose that the word forms WF1 in A dialect are mistyped as WF2. Then, the word forms are represented in the methods of Asai (1974) as follows: Correct—WF1(other dialects and A dialect), WF2(other dialects). Incorrect—WF1(other dialects), WF2(other dialects and A dialect).

Thus, the mistypes of the word forms do not affect any biases in the similarity data among the dialects other than A dialect according to the definition of the “relation index” by Asai (1974: 61-62). Therefore, the author utilizes the values in Table 10 in dialects other than 5_Nukibetsu, 6_Niikappu, and 7_Samani in the following analyses. (i.e., the white cells other than the grey cells in Table 10)

Pairs of dialects that demonstrate 0 value in Table 10 are as follows: (8_Obihiro, 9_Kushiro), (9_Kushiro, 10_Bihoro), (8_Obihiro, 21_Chitose), and (15_Tarantomari, 16_Maoka). The author summarizes the words, the corresponding cognacy judgment on these words, and the corresponding cognacy judgments on these words by Hattori and Chiri in Table 11.⁶⁾

researchers specifying 110 words and the corresponding cognacy judgments in Asai and comparing the results with that in Hattori and Chiri. However, the negative values in pairs of dialects (i.e., [5_Nukibetsu, 6_Niikappu] and [6_Niikappu, 7_Samani]) demonstrate that every specification of 110 words and the corresponding cognacy judgments in Asai contradicts Asai (1974: 92; Table 1) with no exception.

6) Some cognacy judgments in Table 11 are still disputed in Ainu linguistics. On the word ‘mouth’ in Ainu dialects, Table 11 demonstrates that Asai distinguishes the morpheme /pa/ from the morpheme /ca/, whereas Hattori and Chiri explain that “/p-/ and /c-/ seem to be a significant difference but there are several examples that are parallel with this case (e.g., /pas/ and /cas/ are the same meaning on ‘run’).

Table 9: The maximal number of words where the Ainu dialects share no common word forms according to Asai (1974).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 Yakumo	0	8	10	19	19	20	36	28	28	33	22	27	35	102	87	94	102	97	95	67	19
2 Oshamambe	8	0	12	20	22	22	42	33	34	40	25	32	40	104	92	99	104	100	98	72	22
3 Horobetsu	10	12	0	9	14	12	33	23	24	29	17	22	36	101	84	94	102	97	93	63	16
4 Biratori	19	20	9	0	7	6	36	27	30	35	22	26	39	101	82	92	103	97	92	62	11
5 Nukibetsu	19	22	14	7	0	9	37	31	32	39	26	31	38	103	87	96	106	100	97	66	15
6 Niikappu	20	22	12	6	9	0	36	29	30	36	24	31	41	103	86	96	105	99	94	67	14
7 Samani	36	42	33	36	37	36	0	19	22	32	30	36	42	111	95	106	110	109	100	67	35
8 Obihiro	28	33	23	27	31	29	19	0	4	11	16	20	34	104	85	97	104	102	93	61	26
9 Kushiro	28	34	24	30	32	30	22	4	0	9	13	15	32	105	86	98	104	101	94	58	27
10 Bihoro	33	40	29	35	39	36	32	11	9	0	20	23	39	105	87	98	105	103	94	62	34
11 Asahikawa	22	25	17	22	26	24	30	16	13	20	0	9	32	100	84	94	105	99	94	59	21
12 Nayoro	27	32	22	26	31	31	36	20	15	23	9	0	29	101	81	93	102	96	91	61	28
13 Soya	35	40	36	39	38	41	42	34	32	39	32	29	0	95	74	84	96	91	84	69	42
14 Ochiho	102	104	101	101	103	103	111	104	105	105	100	101	95	0	46	21	24	33	56	109	103
15 Tarantomari	87	92	84	82	87	86	95	85	86	87	84	81	74	46	0	32	48	47	43	94	85
16 Maoka	94	99	94	92	96	96	106	97	98	98	94	93	84	21	32	0	25	27	48	105	94
17 Shiraura	102	104	102	103	106	105	110	104	104	105	105	102	96	24	48	25	0	19	51	110	103
18 Raichishka	97	100	97	97	100	99	109	102	101	103	99	96	91	33	47	27	19	0	54	103	98
19 Nairo	95	98	93	92	97	94	100	93	94	94	94	91	84	56	43	48	51	54	0	100	94
20 North Kuril	67	72	63	62	66	67	67	61	58	62	59	61	69	109	94	105	110	103	100	0	66
21 Chitose	19	22	16	11	15	14	35	26	27	34	21	28	42	103	85	94	103	98	94	66	0

Furthermore, the author notes the words, the corresponding cognacy judgment on these words, and the corresponding cognacy judgments on these words by Hattori and Chiri in Table 12, in the case that the author includes the correction of 76.rain in Table 5. Pairs of dialects that demonstrate 0 value in Table 12 change as follows: (9_Kushiro, 10_Bihoro) and (15_Tarantomari, 16_Maoka).

We can observe that many of the word forms that Hattori and Chiri judged as cognate are judged as non-cognate in Tables 11 and 12. This result demonstrates that the cognacy judgments on one word among Ainu dialects do not correspond between Hattori and Chiri (1960) and Asai (1974).

Furthermore, Table 12 demonstrates that part of the non-cognate judgments, specified by our approach, differ from a phonetic correspondence on current Ainu linguistics (i.e., Table 2 in this paper). Again, note that “CVw, CVy, CVm, CVn, and CVs agree in both Hokkaido and Sakhalin Ainu dialects. Furthermore, CVp, CVt, and CVk in Hokkaido Ainu dialects correspond to CVh in Sakhalin Ainu dialects and CVr in Hokkaido Ainu dialects to CVrV in Sakhalin Ainu dialects. Note that Cip, Cit, and Cik in Hokkaido Ainu dialects correspond to Cis in Sakhalin Ainu dialects.” (Hattori 1967: 208-209).

However, the non-cognate judgments on 19.fish, 36.feather, 43.tooth, 48.hand, 50.neck, 65.walk, 66.come, 75.water, 76.rain (the rain), 93.hot, 129.wing, 146.wife, 147.salt, 148.ice, 154.wide, 167.smooth, and 198.alive are clearly different from the phonetic correspondence as explained above.⁷⁾

Therefore, we consider the differences on /p-/ and /c-/ as phonetic correspondence” (336). However, as Fukazawa (2017: Ch. 10) states, the distinction between /pa/ and /ca/ itself is a significant topic in Ainu linguistics, concerning the origin of the Ainu language (e.g., Kirikae 1994; Nakagawa 1996).

7) Asai (1974: 85; Footnote 18) stated that “*Similar forms are different from those based on Bright's criterion.*” Bright (1956) has utilized not only phonemic correspondence but also phonetic similarity to the

Table 10: The differences after subtracting Table 8 from Table 9.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1_Yakumo	0	2	2	6	5	5	9	6	6	6	6	6	2	32	29	27	31	29	28	11	3
2_Oshamambe	2	0	3	5	6	5	12	7	8	8	7	6	7	31	32	28	30	31	30	12	7
3_Horobetsu	2	3	0	3	2	0	6	4	4	4	3	5	2	32	30	29	33	31	29	12	5
4_Biratori	6	5	3	0	0	1	5	4	6	6	4	5	2	33	30	29	35	32	30	11	5
5_Nukibetsu	5	6	2	0	0	-3	2	2	3	3	3	4	0	31	28	27	32	30	28	10	6
6_Niikappu	5	5	0	1	-3	0	-1	3	4	4	3	4	1	33	30	29	34	31	29	13	5
7_Samani	9	12	6	5	2	-1	0	3	4	6	5	7	6	34	34	32	33	32	28	9	5
8_Obihiro	6	7	4	4	2	3	3	0	0	1	1	3	3	32	29	30	32	23	29	10	0
9_Kushiro	6	8	4	6	3	4	4	0	0	0	1	3	5	33	30	30	32	32	29	11	2
10_Bihoro	6	8	4	6	3	4	6	1	0	0	2	4	7	31	29	30	31	32	27	10	3
11_Asahikawa	6	7	3	4	3	3	5	1	1	2	0	1	4	33	32	31	35	34	31	9	4
12_Nayoro	6	6	5	5	4	4	7	3	3	4	1	0	3	35	30	34	34	34	30	12	5
13_Soya	2	7	2	2	0	1	6	3	5	7	4	3	0	32	29	30	34	36	26	10	4
14_Ochiho	32	31	32	33	31	33	34	32	33	31	33	35	32	0	2	1	5	7	6	28	33
15_Tarantomari	29	32	30	30	28	30	34	29	30	29	32	30	29	2	0	0	5	4	7	28	30
16_Maoka	27	28	29	29	27	29	32	30	30	30	31	34	30	1	0	0	7	4	6	27	30
17_Shirauro	31	30	33	35	32	34	33	32	32	31	35	34	34	5	5	7	0	2	9	27	33
18_Raichishka	29	31	31	32	30	31	32	23	32	32	34	34	36	7	4	4	2	0	6	26	29
19_Nairo	28	30	29	30	28	29	28	29	27	31	30	26	6	7	6	9	6	0	28	23	
20_North_Kuril	11	12	12	11	10	13	9	10	11	10	9	12	10	28	28	27	27	26	28	0	10
21_Chitose	3	7	10	5	6	5	5	0	2	3	4	5	4	33	30	30	33	29	23	10	0

Note: The values in the grey area in the table correspond to 5_Nukibetsu, 6_Niikappu, and 7_Samani (Nos. 5-7 in Figure 1), for these dialects demonstrate negative values in pairs (i.e., [5_Nukibetsu, 6_Niikappu] and [6_Niikappu, 7_Samani]).

As discussed in Section 4, the different view on lexicostatistical data characterizes the classification of Ainu dialects in both Hattori and Chiri (1960) and Asai (1974). Here, the author tentatively applies the phonetic correspondence in Table 2 to Table 6.

Table 13 demonstrates the similarity data among the 21 Ainu dialects obtained by the revisions on these 17 words.⁸⁾ Then, we can observe that Table 6 underestimates the similarity between Tarantomari and Maoka (Nos. 15-16 in Figure 1), compared to Table 13.

Furthermore, Figures 2 and 3 display the results of cluster analysis employed by the Large method and Small method in Asai's work to Tables 6 and 13, respectively.⁹⁾ We confirm that Tarantomari and Maoka form one cluster in Figure 3, whose classification is consistent with previous philological research on the Southwest-Sakhalin Ainu dialects (e.g., Sakaguchi 2019).

glottochronological study of the Hokaltec languages. Thus, Asai's cognacy judgments in Tables 11 and 12 might be reflected in his description.

8) The author tentatively assumes that *tek* (1-13, 15, 19-21) and *parakita* (17, 18) on 48.hand (Asai 1974: 71) and *rap* (1, 2, 5, 7, 9, 11, 13, 21) and *tehkuh* (16, 18) on 129.wing (Asai 1974: 76) are non-cognate, respectively. Since the other non-cognate judgments on the 15 words are mutually exclusive on the numbers in parentheses following the specified word form on the words, which correspond to the places in Figure 1, the tentative assumption precludes a possibility on doubly counting the presence on the common word form in given two dialects by the revisions.

9) "Large method" and "Small method" correspond to the single method (or nearest-neighbor method) and the complete linkage method (Sørensen 1948), respectively. For the sake of convenience, the single method and complete linkage method were utilized to the data obtained by subtracting the similarity data from the number of words (i.e., 110 words in Table 6).

Table 11: The specified 57 words and the corresponding non-cognate judgments by Asai (1974).

(1)

specified_word_names	specified non-cognate judgments in Asai (1974)	Hattori and Chiri's (1960) cognacy judgments
6.who	nen(1-3, 7-13)/hunna(4-6, 21)	non-cognate
7.what	nep(1-3, 7-13)/hemanta(3, 4, 6, 21)	non-cognate
17.man	ohkajo(14,16-19)/okkaw(15)	cognate
19.fish	cep(3-13, 15, 19-21)/ceh(14, 16-18)	cognate
21.dog	seta(1-6, 11-21)/sita(7-10)	cognate
23.tree	ni(1, 3, 4, 7-13, 20)/cikuni(1-6, 13, 21)	cognate
24.seed	pi(1-9, 11-13, 21)/pije(10)	cognate
24.seed	pi(1-9, 11-13, 21)/epujke(10)	cognate
24.seed	epuj(9)/pije(10)	unknown1
24.seed	epuj(9)/epujke(10)	unknown1
36.feather	rap(1-13, 15, 20, 21)/rah(14, 16-18)	cognate
38.head	sapa(1-6, 14-19, 21)/pake(7-13, 20)	cognate
39.ear	kisara(14, 16, 17, 19)/kisaru(15, 18)	cognate
42.mouth	paro(1-6, 11, 21)/caro(7-10, 12, 13, 20)	cognate
42.mouth	cara(14, 16, 17)/caru(15, 18, 19, 20)	cognate
43.tooth	nimak-i(2, 4, 11, 12, 21)/imak(7-10, 13, 15, 19, 20)	cognate
43.tooth	imak(7-10, 13, 15, 19, 20)/imah(14, 16-18)	cognate
45.claw	am(1-9, 11-21)/ham(10)	cognate
47.knee	kokkasapa(1-6, 11, 13, 21)/kokkapake(7, 8)	cognate
47.knee	kokka(9-12, 20)/kokkapake(7, 8)	cognate
48.hand	tek(1-13, 15, 19-21)/teh(14, 16, 18)	cognate
50.neck	rekut(1-13, 15, 20, 21)/rekuh(14, 16-18)	cognate
53.liver	ra(1, 7-13)/hujpe(2, 4-6, 21)	non-cognate
62.kill	rajke(1-6, 10-16, 21)/ronno(7-9, 21)	non-cognate
63.swim	maa(14, 15, 17-19)/sus(16)	non-cognate
64.fly	ojupu(8-11)/hopunpa(21)	unknown2
64.fly	tusse(15)/paarase(14, 16, 19)	non-cognate
65.walk	ahkas(14, 16-18)/akkas(15, 19)	cognate
66.come	ek(1-13, 15, 19-21)/eh(14, 16-18)	cognate
72.sun	cuh(14, 16-18)/toonotonpi(15)	non-cognate
74.star	nociw(1-9, 11, 12, 21)/rikop(10)	non-cognate
74.star	nocuj(9)/rikop(10)	non-cognate
75.water	wakka(1-13, 15, 19, 21)/wahka(14, 16-18)	cognate
76.rain(the rain)	apto(3-6, 21)/rujapnpe(7-9, 11-13)	non-cognate
76.rain(the rain)	ahto(14, 16-18)/atto(15, 19)	cognate
79.earth	tojtoj(1-7, 21)/toj(8-20)	cognate
84.burn	uhuj(1-9, 11-13, 21)/ujuj(10)	non-cognate
93.hot	sese(1-13, 15, 19-21)/seseh(14, 16-18)	cognate
101.ye	eani utara(14, 16)/ecookaj utari(15)	non-cognate
101.ye	ecookaj utara(16, 19)/ecookaj utari(15)	cognate
104.how	nekon(7-13)/manak, makanak(21)	unknown2
105.when	henpara(1-6, 11, 12, 14-16, 18, 21)/nenpara(7-10, 13)	non-cognate
106.where	nejta(1-3, 7-13)/hunakta(4, 6, 21)	non-cognate
106.where	nejta(1-3, 7-13)/hunakun(5, 21)	non-cognate
107.here	taanta(7, 8)/tanta(9, 12)	cognate
107.here	tanta(9, 12)/temana(10)	non-cognate
107.here	teta(1-5, 11-13, 21)/taanta(7, 8)	non-cognate

(Continue)

(2)

specified_word_names	specified non-cognate judgments in Asai (1974)	Hattori and Chiri's (1960) cognacy judgments
108.there	toonta(2-4, 8)/tuanta(9,10)	cognate
108.there	toanta(1, 3-7, 12, 13, 21)/toonta(2-4, 8)	cognate
108.there	tarata(16, 19)/ukita(15)	unknown3
115.day	tokap(1-6, 21)/sirpeker(8-10, 12)	non-cognate
123.wash	huraje(1-7, 13-19, 21)/uraje(8-12)	cognate
126.back	seturu(14, 16-20)/seturi(15)	cognate
129.wing	tekkup(3, 4, 6, 8-12, 15, 19, 20)/tehkuh(16, 18)	cognate
130.lip	capus(7-13)/patoje(4-6, 12, 21)	non-cognate
132.navel	hankapuj(7-10, 13-17, 19)/hanku(1-6, 12, 18, 21)	cognate
143.mother	hapo(1-10, 13)/totto(9-12, 21)	non-cognate
144.father	hapo(21)/mici(3-6, 8-10, 20)	unknown2
146.wife	mat(1-13, 15, 19-21)/mah(14, 16-18)	cognate
147.salt	sippo(1-13, 15, 19, 21)/sispo(14, 16-18)	cognate
148.ice	rup(12, 13, 15)/ruh(14, 16-18)	cognate
150.freeze	rupus(1-14, 16-18, 20, 21)/rupkoro(15)	cognate
151.child	hekaci(1, 13, 15-19, 21)/ekaci(8-11)	cognate
153.cut	tuje(1-6, 8-14, 16-19, 21)/tuwe(15)	cognate
154.wide	osep(13, 15, 19)/oseh(14, 16-18)	cognate
155.narrow	hutne(1-8, 10, 21)/hupne(9, 11, 12, 20)	cognate
155.narrow	ohohne(14, 16)/ohne(15)	cognate
163.sharp	eenke(13, 14, 16, 19)/enke(15, 17)	cognate
164.dirty	icakere(14, 15)/icahkere(16)	cognate
166.rotten	munin(1-16, 18-20)/nipopke, horse(21)	unknown2
166.rotten	munin(1-16, 18-20)/potce(9)	unknown4
167.smooth	rarak(1-7, 11, 13, 20, 21)/testek(8-10, 12)	non-cognate
167.smooth	raarak(15)/raarah(14, 16-18)	cognate
171.right	simon(1-9, 11, 13, 21)/simojsam(10)	cognate
171.right	siimon(14, 15, 17, 18)/siwmon(16)	cognate
198.alive	siknu(3-9, 11, 12, 15, 20, 21)/sitnu(10)	cognate
198.alive	siknu(3-9, 11, 12, 15, 20, 21)/sisnu(14, 16-19)	cognate

Note: unknown1: Hattori and Chiri (1960) did not record *epuj* in Kushiro (No. 9 in Figure 1); unknown2: Hattori and Chiri (1960) did not record the word forms in Chitose (No. 21 in Figure 1); unknown3: Hattori and Chiri (1960: 336) assumed /tarata/-type in Tarantomari; unknown4: Hattori and Chiri (1960) did not record *potce* in Kushiro (No. 9 in Figure 1).

4. Discussions and Conclusion

This Section discusses the implications of the main results in this paper for current research on the Ainu language from the viewpoint of linguistics.

First, our analyses demonstrate that Hattori and Chiri (1960) and Asai (1974) assumed different data and different cognacy judgments, which resulted in difficulties when researchers compared the two classifications of Ainu dialects as they were. As the main results in this paper illustrate, the specification of 110 words from the 135 candidates by Asai was the obstacle that had prevented researchers from comparing Hattori and Chiri (1960) with Asai (1974) on their substantive knowledge of the Ainu language and conducting further lexicostatistical research based on the

Table 12: The specified 39 words and the corresponding non-cognate judgments by Asai (1974).

specified_word_names	specified non-cognate judgments in Asai (1974)	Hattori and Chiri's (1960) cognacy judgments
17.man	ohkajo(14,16-19)/okkaw(15)	cognate
19.fish	cep(3-13, 15, 19-21)/ceh(14, 16-18)	cognate
24.seed	pi(1-9, 11-13, 21)/pije(10)	cognate
24.seed	pi(1-9, 11-13, 21)/epujke(10)	cognate
24.seed	epuj(9)/pije(10)	unknown1
24.seed	epuj(9)/epujke(10)	unknown1
36.feather	rap(1-13, 15, 20, 21)/rah(14, 16-18)	cognate
39.ear	kisara(14, 16, 17, 19)/kisaruru(15, 18)	cognate
42.mouth	cara(14, 16, 17)/caru(15, 18, 19, 20)	cognate
43.tooth	imak(7-10, 13, 15, 19, 20)/imah(14, 16-18)	cognate
45.claw	am(1-9, 11-21)/ham(10)	cognate
48.hand	tek(1-13, 15, 19-21)/teh(14, 16, 18)	cognate
50.neck	rekut(1-13, 15, 20, 21)/rekuh(14, 16-18)	cognate
62.kill	rajke(1-6, 10-16, 21)/ronno(7-9, 21)	non-cognate
63.swim	maa(14, 15, 17-19)/sus(16)	non-cognate
64.fly	tusse(15)/paarase(14, 16, 19)	non-cognate
65.walk	ahkas(14, 16-18)/akkas(15, 19)	cognate
66.come	ek(1-13, 15, 19-21)/eh(14, 16-18)	cognate
72.sun	cuh(14, 16-18)/toonotonpi(15)	non-cognate
74.star	nociw(1-9, 11, 12, 21)/rikop(10)	non-cognate
74.star	nocuj(9)/rikop(10)	non-cognate
75.water	wakka(1-13, 15, 19, 21)/wahka(14, 16-18)	cognate
76.rain(the rain)	ahto(14, 16-18)/atto(15, 19)	cognate
84.burn	uhuj(1-9, 11-13, 21)/ujuj(10)	non-cognate
93.hot	sese(1-13, 15, 19-21)/seseh(14, 16-18)	cognate
101.ye	eani utara(14, 16)/ecookaj utari(15)	non-cognate
101.ye	ecookaj utara(16, 19)/ecookaj utari(15)	cognate
107.here	tanta(9, 12)/temana(10)	non-cognate
108.there	tarata(16, 19)/ukita(15)	unknown2
126.back	seturu(14, 16-20)/seturi(15)	cognate
129.wing	tekkup(3, 4, 6, 8-12, 15, 19, 20)/tehkuh(16, 18)	cognate
146.wife	mat(1-13, 15, 19-21)/mah(14, 16-18)	cognate
147.salt	sippo(1-13, 15, 19, 21)/sispo(14, 16-18)	cognate
148.ice	rup(12, 13, 15)/ruh(14, 16-18)	cognate
150.freeze	rupus(1-14, 16-18, 20, 21)/rupkoro(15)	cognate
153.cut	tuje(1-6, 8-14, 16-19, 21)/tuwe(15)	cognate
154.wide	osep(13, 15, 19)/oseh(14, 16-18)	cognate
155.narrow	hutne(1-8, 10, 21)/hupne(9, 11, 12, 20)	cognate
155.narrow	ohohne(14, 16)/ohne(15)	cognate
163.sharp	eenke(13, 14, 16, 19)/enke(15, 17)	cognate
164.dirty	icakere(14, 15)/icahkere(16)	cognate
166.rotten	munin(1-16, 18-20)/potce(9)	unknown3
167.smooth	raarak(15)/raarah(14, 16-18)	cognate
171.right	simon(1-9, 11, 13, 21)/simojsam(10)	cognate
171.right	siimon(14, 15, 17, 18)/siwmon(16)	cognate
198.alive	siknu(3-9, 11, 12, 15, 20, 21)/sitnu(10)	cognate
198.alive	siknu(3-9, 11, 12, 15, 20, 21)/sisnu(14, 16-19)	cognate

Note: unknown1: Hattori and Chiri (1960) did not record *epuj* in Kushiro (No. 9 in Figure 1); unknown2: Hattori and Chiri (1960: 336) assumed /tarata/-type in Tarantomari; unknown3: Hattori and Chiri (1960) did not record *potce* in Kushiro (No. 9 in Figure 1).

Table 13: Similarity data among the 21 Ainu dialects obtained from Table 6 by the revisions on 19.fish, 36.feather, 43.tooth, 48.hand, 50.neck, 65.walk, 66.come, 75.water, 76.rain (the rain), 93.hot, 129.wing, 146.wife, 147.salt, 148.ice, 154.wide, 167.smooth, and 198.alive. The numbers in the first row correspond to the dialects in the first column.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1 Yakumo	110	104	102	97	96	95	83	88	88	83	94	89	77	48	52	51	46	50	43	54	94
2 Oshamambe	104	110	101	95	94	93	80	84	84	78	92	84	77	45	50	47	43	49	42	50	95
3 Horobetsu	102	101	110	104	98	98	83	91	90	85	96	93	76	51	56	56	50	55	47	59	99
4 Biratori	97	95	104	110	103	105	79	87	86	81	92	89	73	52	58	58	51	56	49	59	104
5 Nukibetsu	96	94	98	103	110	98	75	81	81	74	87	83	72	48	51	51	45	50	42	54	101
6 Niikappu	95	93	98	105	98	110	73	84	84	78	89	83	70	50	54	54	48	53	46	56	101
7 Samani	83	80	83	79	75	73	110	94	92	84	85	81	74	44	49	47	43	44	39	52	80
8 Obihiro	88	84	91	87	81	84	94	110	106	100	95	93	79	49	54	55	48	43	47	59	84
9 Kushiro	88	84	90	86	81	84	92	106	110	101	98	98	83	49	54	54	48	53	46	63	85
10 Bihoro	83	78	85	81	74	78	84	100	101	110	92	91	78	46	52	53	45	50	43	58	79
11 Asahikawa	94	92	96	92	87	89	85	95	98	92	110	102	82	53	58	58	49	56	48	60	93
12 Nayoro	89	84	93	89	83	83	81	93	98	91	102	110	84	55	59	63	52	60	50	61	87
13 Soya	77	77	76	73	72	70	74	79	83	78	82	84	110	59	65	68	59	67	52	51	72
14 Ochiho	48	45	51	52	48	50	44	49	49	46	53	55	59	110	82	90	91	84	71	38	50
15 Tarantomari	52	50	56	58	51	54	49	54	54	52	58	59	65	82	110	95	82	84	75	44	55
16 Maoka	51	47	56	58	51	54	47	55	54	53	58	63	68	90	95	110	92	87	80	42	56
17 Shiraura	46	43	50	51	45	48	43	48	48	45	49	52	59	91	82	92	110	93	78	35	49
18 Raichishka	50	49	55	56	50	53	44	43	53	50	56	60	67	84	84	87	93	110	74	43	51
19 Nairo	43	42	47	49	42	46	39	47	46	43	48	50	52	71	75	80	78	74	110	39	40
20 North Kuril	54	50	59	59	54	56	52	59	63	58	60	61	51	38	44	42	35	43	39	110	54
21 Chitose	94	95	99	104	101	101	80	84	85	79	93	87	72	50	55	56	49	51	40	54	110

integration of Hattori and Chiri's (1960) and Asai's (1974) works.

Second, our approach opened up the possibility for researchers to verify the different assumptions on the data in Hattori and Chiri's (1960) and Asai's (1974) works in current Ainu linguistics. Thus, part of the non-cognate judgments in Asai, specified by our approach, demonstrate that the similarity between Tarantomari and Maoka (Nos. 15-16 in Figure 1) was underestimated from the viewpoints of Hattori and Chiri (1960). These facts indicate a need for reconsideration on the classification of Sakhalin Ainu dialects.

Moreover, Sakaguchi (2019: 136) states a cluster on the Southwest-Sakhalin Ainu in Sakhalin Ainu dialects from the lexical analysis of two words in a folktale text (i.e., *ohkaw* or *ohkao* and *imiki* in Ainu, which correspond to 'man' and 'all' in English, respectively). However, Sakaguchi (2019: 136; Footnote 16) notes that Asai's classification on Sakhalin Ainu dialects does not classify Tarantomari and Maoka dialects into one cluster. Thus, the statistical findings in this paper partly demonstrated that the assumption on lexicostatistical data in Asai (1974) classified Tarantomari and Maoka into different clusters, and Tarantomari and Maoka form one cluster from the viewpoints of Hattori and Chiri (1960), which was consistent to linguistic and philological studies.

Finally, the author suggests further studies on Ainu linguistics as a conclusion. The main results of this paper demonstrate that (1) the descriptions by Asai (1974) are insufficient for specifying all 110 words and (2) part of the non-cognate judgments, specified by our approach, differ from a phonetic correspondence on current Ainu linguistics. These two facts suggest a need for reconsideration on the previous classification and cognacy judgments of Ainu dialects in current Ainu linguistics.

Notably, the latter clarifies that the two classifications of Ainu dialects result from the different

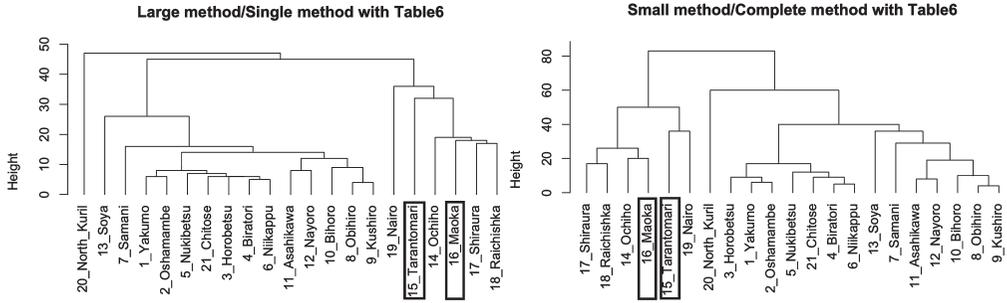


Figure 2: The results of cluster analysis applied to Table 6. Left: Large method in Asai (1974). Right: Small method in Asai (1974). Tarantomari and Maoka dialect (Nos. 15-16 in Figure 1) are surrounded by rectangle, respectively.

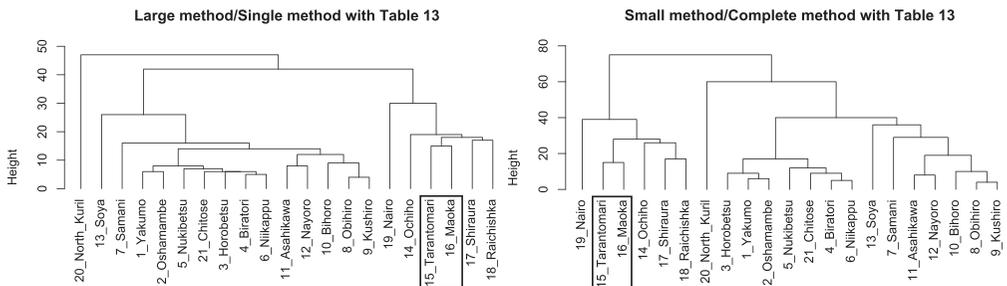


Figure 3: The results of cluster analysis applied to Table 13. Left: Large method in Asai (1974). Right: Small method in Asai (1974). Tarantomari and Maoka dialect (Nos. 15-16 in Figure 1) are surrounded by rectangle.

view on lexicostatistical data in both Hattori and Chiri (1960) and Asai (1974): divergence time of the Ainu language is of concern in Hattori and Chiri (1960), which resulted in utilizing the phonetic correspondence to their cognacy judgments and classifying the Ainu dialects in terms of remaining words; Asai (1974) might focus on illustrating the classification of Ainu dialects with some objective approach, which resulted in paying more attention to the differences among word forms in Ainu dialects. Thus, the author will leave the problem to Ainu linguists: on which view the Ainu dialects should be classified.

The result might indicate a possibility that researchers could consider the cognacy judgments in accordance with the purpose of the study, which results in bringing a new insight into dialectology.

The author ends this paper with the hope that the findings on cognacy judgments of Ainu dialects in this paper will contribute to further developments on Ainu linguistics in the future.

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Abstract

There are two lexicostatistical studies on Ainu dialects that still have a great influence on current Ainu linguistics: they are by Hattori and Chiri (1960) and Asai (1974).

However, Hattori and Chiri (1960) and Asai (1974) analyzed different parts of lexicostatistical data based on different cognacy judgments. This led to an inconsistency in the classification of Ainu dialects in recent studies. Furthermore, the difficulties in the specification of 110 words and the corresponding cognacy judgments by Asai have prevented researchers from examining, comparing, and integrating the works of Hattori and Chiri (1960) and Asai (1974).

This paper is an attempt to identify 110 words from 135 candidates and the corresponding cognacy judgments by Asai, and adopt an approach that enables Ainu linguists to discuss the validation of the cognacy judgments by Asai.

The approach can identify the assumptions on Asai's data with the results on the specification of the words and the corresponding cognacy judgments. Therefore, the properties of the approach enable the author to examine the specification of the words and the corresponding cognacy judgments from a linguistic perspective and revise the assumptions on Asai's data from the viewpoints of Hattori and Chiri (1960).

The primary results in this paper demonstrate that (1) the descriptions by Asai are insufficient for specifying all 110 words and (2) part of the non-cognate judgments in Asai, specified by our approach, differ from a phonetic correspondence among Hokkaido Ainu dialects and Sakhalin Ainu dialects on Ainu linguistics (Hattori 1967: 209).

Furthermore, the statistical findings demonstrate that the view on lexicostatistical data in Asai (1974) classifies Tarantomari and Maoka into different clusters, and Tarantomari and Maoka form one cluster from the viewpoints of Hattori and Chiri (1960), which is consistent to linguistic and philological studies (e.g., Sakaguchi 2019). This suggests a need for the classification of Ainu dialects through the integration of Hattori and Chiri's (1960) and Asai's (1974) works.

