

Title: Preliminary Proposal to Encode the Bhaiksuki Script in ISO/IEC 10646
Source: Script Encoding Initiative (SEI)
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Action: For consideration by UTC and WG2
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1 Introduction

This is a preliminary proposal to encode the Bhaiksuki script in the Universal Character Set (ISO/IEC 10646). It presents a preliminary code chart and names list for the script, as well as character properties and specimens. Research on the requirements for encoding Bhaiksuki is ongoing and a formal proposal is forthcoming.

Bhaiksuki (Devanangari: भैक्षुकी *bhaikṣukī*) is also known as the ‘Arrow-Headed Script’. It is a Brahmi-based script that was used in the region of present-day Bihar state in India and in parts of Nepal for writing Buddhist texts. It is related to Proto-Bengali; some characters resemble those found in Sharada.

The glyphs of the Bhaiksuki characters shown here are derived from script tables in Dimitrov (2010) and Hanisch (2008).

2 Characters Proposed

A total of 94 characters is required for encoding a basic repertoire for Bhaiksuki. Preliminary versions of a code chart and names list are shown in figures 1 and 2.

Space is reserved in the code chart for *VOCALIC LETTER LL and *VOWEL SIGN VOCALIC LL, which do not appear to be attested; and also for the digits *ZERO and *THREE, which are unidentified in published charts.

2.1 Other Characters Identified

Bhaiksuki manuscripts have several characters that function as punctuation, editorial marks, and ornaments. Some of these characters, with names as given by Dimitrov and Hanisch, are:

•	dot-like punctuation mark	✱ ✱	insertion
≋	deletion and filler symbol	↵	deletion and filler character
≋≋	deletion and filler symbol	✱	<i>akṣara</i> with deletion marks
↻	line-filling symbol	☉	ornament
˘	insertion marks / <i>kakapada</i>		

These are presently not proposed for encoding. The editorial marks (deletion and insertion symbols, etc.) resemble those used in other Indic scripts; it may be practical to unify these characters. Others may be represented using other characters, eg. the ☉ ‘ornament’ resembles ☉ LETTER-NUMERAL NINE.

2.2 Character Properties

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14400;BHAIKSUKI LETTER A;Lo;0;L;;;;N;;;;;
14401;BHAIKSUKI LETTER AA;Lo;0;L;;;;N;;;;;
14402;BHAIKSUKI LETTER I;Lo;0;L;;;;N;;;;;
14403;BHAIKSUKI LETTER II;Lo;0;L;;;;N;;;;;
14404;BHAIKSUKI LETTER U;Lo;0;L;;;;N;;;;;
14405;BHAIKSUKI LETTER UU;Lo;0;L;;;;N;;;;;
14406;BHAIKSUKI LETTER VOCALIC R;Lo;0;L;;;;N;;;;;
14407;BHAIKSUKI LETTER VOCALIC RR;Lo;0;L;;;;N;;;;;
14408;BHAIKSUKI LETTER VOCALIC L;Lo;0;L;;;;N;;;;;
1440A;BHAIKSUKI LETTER E;Lo;0;L;;;;N;;;;;
1440B;BHAIKSUKI LETTER AI;Lo;0;L;;;;N;;;;;
1440C;BHAIKSUKI LETTER O;Lo;0;L;;;;N;;;;;
1440D;BHAIKSUKI LETTER AU;Lo;0;L;;;;N;;;;;
1440E;BHAIKSUKI LETTER KA;Lo;0;L;;;;N;;;;;
1440F;BHAIKSUKI LETTER KHA;Lo;0;L;;;;N;;;;;
14410;BHAIKSUKI LETTER GA;Lo;0;L;;;;N;;;;;
14411;BHAIKSUKI LETTER GHA;Lo;0;L;;;;N;;;;;
14412;BHAIKSUKI LETTER NGA;Lo;0;L;;;;N;;;;;
14413;BHAIKSUKI LETTER CA;Lo;0;L;;;;N;;;;;
14414;BHAIKSUKI LETTER CHA;Lo;0;L;;;;N;;;;;
14415;BHAIKSUKI LETTER JA;Lo;0;L;;;;N;;;;;
14416;BHAIKSUKI LETTER JHA;Lo;0;L;;;;N;;;;;
14417;BHAIKSUKI LETTER NYA;Lo;0;L;;;;N;;;;;
14418;BHAIKSUKI LETTER TTA;Lo;0;L;;;;N;;;;;
14419;BHAIKSUKI LETTER TTHA;Lo;0;L;;;;N;;;;;
1441A;BHAIKSUKI LETTER DDA;Lo;0;L;;;;N;;;;;
1441B;BHAIKSUKI LETTER DDHA;Lo;0;L;;;;N;;;;;
1441C;BHAIKSUKI LETTER NNA;Lo;0;L;;;;N;;;;;
1441D;BHAIKSUKI LETTER TA;Lo;0;L;;;;N;;;;;
1441E;BHAIKSUKI LETTER THA;Lo;0;L;;;;N;;;;;
1441F;BHAIKSUKI LETTER DA;Lo;0;L;;;;N;;;;;
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14423;BHAIKSUKI LETTER PHA;Lo;0;L;;;;N;;;;;
14424;BHAIKSUKI LETTER BA;Lo;0;L;;;;N;;;;;
14425;BHAIKSUKI LETTER BHA;Lo;0;L;;;;N;;;;;
14426;BHAIKSUKI LETTER MA;Lo;0;L;;;;N;;;;;
14427;BHAIKSUKI LETTER YA;Lo;0;L;;;;N;;;;;
14428;BHAIKSUKI LETTER RA;Lo;0;L;;;;N;;;;;
14429;BHAIKSUKI LETTER LA;Lo;0;L;;;;N;;;;;
1442A;BHAIKSUKI LETTER VA;Lo;0;L;;;;N;;;;;
1442B;BHAIKSUKI LETTER SHA;Lo;0;L;;;;N;;;;;
1442C;BHAIKSUKI LETTER SSA;Lo;0;L;;;;N;;;;;
1442D;BHAIKSUKI LETTER SA;Lo;0;L;;;;N;;;;;
1442E;BHAIKSUKI LETTER HA;Lo;0;L;;;;N;;;;;
1442F;BHAIKSUKI VOWEL SIGN AA;Mc;0;L;;;;N;;;;;
14430;BHAIKSUKI VOWEL SIGN I;Mc;0;L;;;;N;;;;;
14431;BHAIKSUKI VOWEL SIGN II;Mc;0;L;;;;N;;;;;
14432;BHAIKSUKI VOWEL SIGN U;Mn;0;NSM;;;;N;;;;;
14433;BHAIKSUKI VOWEL SIGN UU;Mn;0;NSM;;;;N;;;;;
14434;BHAIKSUKI SIGN VOCALIC R;Mn;0;NSM;;;;N;;;;;
14435;BHAIKSUKI SIGN VOCALIC RR;Mn;0;NSM;;;;N;;;;;
14436;BHAIKSUKI SIGN VOCALIC L;Mn;0;NSM;;;;N;;;;;
14438;BHAIKSUKI VOWEL SIGN E;Mn;0;NSM;;;;N;;;;;
14439;BHAIKSUKI VOWEL SIGN AI;Mn;0;NSM;;;;N;;;;;
1443A;BHAIKSUKI VOWEL SIGN O;Mc;0;L;;;;N;;;;;
1443B;BHAIKSUKI VOWEL SIGN AU;Mc;0;L;;;;N;;;;;
1443C;BHAIKSUKI SIGN CANDRABINDU;Mn;0;NSM;;;;N;;;;;

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1443D;BHAIKSUKI SIGN RING ANUSVARA;Mn;0;NSM; ; ; ; ;N; ; ; ; ;
 1443E;BHAIKSUKI SIGN ANUSVARA;Mn;0;NSM; ; ; ; ;N; ; ; ; ;
 1443F;BHAIKSUKI SIGN VISARGA;Mc;0;L; ; ; ; ;N; ; ; ; ;
 14440;BHAIKSUKI SIGN VIRAMA;Mn;9;L; ; ; ; ;N; ; ; ; ;
 14441;BHAIKSUKI SIGN AVAGRAHA;Mn;9;L; ; ; ; ;N; ; ; ; ;
 14442;BHAIKSUKI DANDA;Po;0;L; ; ; ; ;N; ; ; ; ;
 14443;BHAIKSUKI DOUBLE DANDA;Po;0;L; ; ; ; ;N; ; ; ; ;
 14444;BHAIKSUKI SEMI DANDA;Po;0;L; ; ; ; ;N; ; ; ; ;
 14451;BHAIKSUKI DIGIT ONE;Nd;0;L; ; 1;1;1;N; ; ; ; ;
 14452;BHAIKSUKI DIGIT TWO;Nd;0;L; ; 2;2;2;N; ; ; ; ;
 14454;BHAIKSUKI DIGIT FOUR;Nd;0;L; ; 4;4;4;N; ; ; ; ;
 14455;BHAIKSUKI DIGIT FIVE;Nd;0;L; ; 5;5;5;N; ; ; ; ;
 14456;BHAIKSUKI DIGIT SIX;Nd;0;L; ; 6;6;6;N; ; ; ; ;
 14457;BHAIKSUKI DIGIT SEVEN;Nd;0;L; ; 7;7;7;N; ; ; ; ;
 14458;BHAIKSUKI DIGIT EIGHT;Nd;0;L; ; 8;8;8;N; ; ; ; ;
 14459;BHAIKSUKI DIGIT NINE;Nd;0;L; ; 9;9;9;N; ; ; ; ;
 1445A;BHAIKSUKI LETTER-NUMERAL ONE;No;0;L; ; ; ; 1;N; ; ; ; ;
 1445B;BHAIKSUKI LETTER-NUMERAL TWO;No;0;L; ; ; ; 2;N; ; ; ; ;
 1445C;BHAIKSUKI LETTER-NUMERAL THREE;No;0;L; ; ; ; 3;N; ; ; ; ;
 1445D;BHAIKSUKI LETTER-NUMERAL FOUR;No;0;L; ; ; ; 4;N; ; ; ; ;
 1445E;BHAIKSUKI LETTER-NUMERAL FIVE;No;0;L; ; ; ; 5;N; ; ; ; ;
 1445F;BHAIKSUKI LETTER-NUMERAL SIX;No;0;L; ; ; ; 6;N; ; ; ; ;
 14460;BHAIKSUKI LETTER-NUMERAL SEVEN;No;0;L; ; ; ; 7;N; ; ; ; ;
 14461;BHAIKSUKI LETTER-NUMERAL EIGHT;No;0;L; ; ; ; 8;N; ; ; ; ;
 14462;BHAIKSUKI LETTER-NUMERAL NINE;No;0;L; ; ; ; 9;N; ; ; ; ;
 14463;BHAIKSUKI LETTER-NUMERAL TEN;No;0;L; ; ; ; 10;N; ; ; ; ;
 14464;BHAIKSUKI LETTER-NUMERAL TWENTY;No;0;L; ; ; ; 20;N; ; ; ; ;
 14465;BHAIKSUKI LETTER-NUMERAL THIRTY;No;0;L; ; ; ; 30;N; ; ; ; ;
 14466;BHAIKSUKI LETTER-NUMERAL FORTY;No;0;L; ; ; ; 40;N; ; ; ; ;
 14467;BHAIKSUKI LETTER-NUMERAL FIFTY;No;0;L; ; ; ; 50;N; ; ; ; ;
 14468;BHAIKSUKI LETTER-NUMERAL SIXTY;No;0;L; ; ; ; 60;N; ; ; ; ;
 14469;BHAIKSUKI LETTER-NUMERAL SEVENTY;No;0;L; ; ; ; 70;N; ; ; ; ;
 1446A;BHAIKSUKI LETTER-NUMERAL EIGHTY;No;0;L; ; ; ; 80;N; ; ; ; ;
 1446B;BHAIKSUKI LETTER-NUMERAL NINETY;No;0;L; ; ; ; 90;N; ; ; ; ;
 1446C;BHAIKSUKI LETTER-NUMERAL HUNDREDS;No;0;L; ; ; ; 100;N; ; ; ; ;

3 References

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



































































































	1440	1441	1442	1443	1444	1445	1446
0	 14400	 14410	 14420	 14430	 14440		 14460
1	 14401	 14411	 14421	 14431	 14441	 14451	 14461
2	 14402	 14412	 14422	 14432	 14442	 14452	 14462
3	 14403	 14413	 14423	 14433	 14443		 14463
4	 14404	 14414	 14424	 14434	 14444	 14454	 14464
5	 14405	 14415	 14425	 14435		 14455	 14465
6	 14406	 14416	 14426	 14436		 14456	 14466
7	 14407	 14417	 14427			 14457	 14467
8	 14408	 14418	 14428	 14438		 14458	 14468
9		 14419	 14429	 14439		 14459	 14469
A	 1440A	 1441A	 1442A	 1443A		 1445A	 1446A
B	 1440B	 1441B	 1442B	 1443B		 1445B	 1446B
C	 1440C	 1441C	 1442C	 1443C		 1445C	 1446C
D	 1440D	 1441D	 1442D	 1443D		 1445D	
E	 1440E	 1441E	 1442E	 1443E		 1445E	
F	 1440F	 1441F	 1442F	 1443F		 1445F	

Figure 1: Preliminary code chart for Bhaiksuki.

Independent vowels

14400	𑂀	BHAIKSUKI LETTER A
14401	𑂁	BHAIKSUKI LETTER AA
14402	𑂂	BHAIKSUKI LETTER I
14403	𑂃	BHAIKSUKI LETTER II
14404	𑂄	BHAIKSUKI LETTER U
14405	𑂅	BHAIKSUKI LETTER UU
14406	𑂆	BHAIKSUKI LETTER VOCALIC R
14407	𑂇	BHAIKSUKI LETTER VOCALIC RR
14408	𑂈	BHAIKSUKI LETTER VOCALIC L
14409	𑂉	<reserved>
1440A	𑂊	BHAIKSUKI LETTER E
1440B	𑂋	BHAIKSUKI LETTER AI
1440C	𑂌	BHAIKSUKI LETTER O
1440D	𑂍	BHAIKSUKI LETTER AU

Consonants

1440E	𑂎	BHAIKSUKI LETTER KA
1440F	𑂏	BHAIKSUKI LETTER KHA
14410	𑂐	BHAIKSUKI LETTER GA
14411	𑂑	BHAIKSUKI LETTER GHA
14412	𑂒	BHAIKSUKI LETTER NGA
14413	𑂓	BHAIKSUKI LETTER CA
14414	𑂔	BHAIKSUKI LETTER CHA
14415	𑂕	BHAIKSUKI LETTER JA
14416	𑂖	BHAIKSUKI LETTER JHA
14417	𑂗	BHAIKSUKI LETTER NYA
14418	𑂘	BHAIKSUKI LETTER TTA
14419	𑂙	BHAIKSUKI LETTER TTHA
1441A	𑂚	BHAIKSUKI LETTER DDA
1441B	𑂛	BHAIKSUKI LETTER DDHA
1441C	𑂜	BHAIKSUKI LETTER NNA
1441D	𑂝	BHAIKSUKI LETTER TA
1441E	𑂞	BHAIKSUKI LETTER THA
1441F	𑂟	BHAIKSUKI LETTER DA
14420	𑂠	BHAIKSUKI LETTER DHA
14421	𑂡	BHAIKSUKI LETTER NA
14422	𑂢	BHAIKSUKI LETTER PA
14423	𑂣	BHAIKSUKI LETTER PHA
14424	𑂤	BHAIKSUKI LETTER BA
14425	𑂥	BHAIKSUKI LETTER BHA
14426	𑂦	BHAIKSUKI LETTER MA
14427	𑂧	BHAIKSUKI LETTER YA
14428	𑂨	BHAIKSUKI LETTER RA
14429	𑂩	BHAIKSUKI LETTER LA
1442A	𑂪	BHAIKSUKI LETTER VA
1442B	𑂫	BHAIKSUKI LETTER SHA
1442C	𑂬	BHAIKSUKI LETTER SSA
1442D	𑂭	BHAIKSUKI LETTER SA
1442E	𑂮	BHAIKSUKI LETTER HA

Dependent vowel signs

1442F	𑂯	BHAIKSUKI VOWEL SIGN AA
14430	𑂰	BHAIKSUKI VOWEL SIGN I
14431	𑂱	BHAIKSUKI VOWEL SIGN II
14432	𑂲	BHAIKSUKI VOWEL SIGN U
14433	𑂳	BHAIKSUKI VOWEL SIGN UU
14434	𑂴	BHAIKSUKI SIGN VOCALIC R
14435	𑂵	BHAIKSUKI SIGN VOCALIC RR
14436	𑂶	BHAIKSUKI SIGN VOCALIC L
14437	𑂷	<reserved>
14438	𑂸	BHAIKSUKI VOWEL SIGN E
14439	𑂹	BHAIKSUKI VOWEL SIGN AI
1443A	𑂺	BHAIKSUKI VOWEL SIGN O
1443B	𑂻	BHAIKSUKI VOWEL SIGN AU

Various signs

1443C	𑂼	BHAIKSUKI SIGN CANDRABINDU
1443D	𑂽	BHAIKSUKI SIGN RING ANUSVARA

1443E	𑂾	BHAIKSUKI SIGN ANUSVARA
1443F	𑂿	BHAIKSUKI SIGN VISARGA
14440	𑃀	BHAIKSUKI SIGN VIRAMA
14441	𑃁	BHAIKSUKI SIGN AVAGRAHA

Punctuation

14442	𑃂	BHAIKSUKI DANDA
14443	𑃃	BHAIKSUKI DOUBLE DANDA
14444	𑃄	BHAIKSUKI SEMI DANDA

Digits

14450	𑃅	<reserved>
14451	𑃆	BHAIKSUKI DIGIT ONE
14452	𑃇	BHAIKSUKI DIGIT TWO
14453	𑃈	<reserved>
14454	𑃉	BHAIKSUKI DIGIT FOUR
14455	𑃊	BHAIKSUKI DIGIT FIVE
14456	𑃋	BHAIKSUKI DIGIT SIX
14457	𑃌	BHAIKSUKI DIGIT SEVEN
14458	𑃍	BHAIKSUKI DIGIT EIGHT
14459	𑃎	BHAIKSUKI DIGIT NINE


Letter-Numerals

1445A	𑃏	BHAIKSUKI LETTER-NUMERAL ONE
1445B	𑃐	BHAIKSUKI LETTER-NUMERAL TWO
1445C	𑃑	BHAIKSUKI LETTER-NUMERAL THREE
1445D	𑃒	BHAIKSUKI LETTER-NUMERAL FOUR
1445E	𑃓	BHAIKSUKI LETTER-NUMERAL FIVE
1445F	𑃔	BHAIKSUKI LETTER-NUMERAL SIX
14460	𑃕	BHAIKSUKI LETTER-NUMERAL SEVEN
14461	𑃖	BHAIKSUKI LETTER-NUMERAL EIGHT
14462	𑃗	BHAIKSUKI LETTER-NUMERAL NINE
14463	𑃘	BHAIKSUKI LETTER-NUMERAL TEN
14464	𑃙	BHAIKSUKI LETTER-NUMERAL TWENTY
14465	𑃚	BHAIKSUKI LETTER-NUMERAL THIRTY
14466	𑃛	BHAIKSUKI LETTER-NUMERAL FORTY
14467	𑃜	BHAIKSUKI LETTER-NUMERAL FIFTY
14468	𑃝	BHAIKSUKI LETTER-NUMERAL SIXTY
14469	𑃞	BHAIKSUKI LETTER-NUMERAL SEVENTY
1446A	𑃟	BHAIKSUKI LETTER-NUMERAL EIGHTY
1446B	𑃠	BHAIKSUKI LETTER-NUMERAL NINETY
1446C	𑃡	BHAIKSUKI LETTER-NUMERAL HUNDREDS

Figure 2: Preliminary names list for Bhaiksuki.

3.1.1 Basic letters

3.1.1.1 Initial vowels



 a ā i ī u ū ṛ ṝ ḷ e ai o au

3.1.1.2 Consonants




				
ka	kha	ga	gha	ṅa
				
ca	cha	ja	jha	ña
				
ṭa	ṭha	ḍa	ḍha	ṇa
				
ta	tha	da	dha	na
				
pa	pha	ba	bha	ma
				
ya	ra	la	va	
				
śa	ṣa	sa	ha	

Figure 3: Bhaiksuki vowels and consonants (from Dimitrov 2010: 75).

3.1.3.5 -ū

<i>gū</i>	<i>cū</i>	<i>jū</i>	<i>tū</i>	<i>dū</i>	<i>dhū</i>	<i>nū</i>	<i>pū</i>	<i>bhū</i>	<i>mū</i>
<i>yū</i>	<i>rū</i>	<i>lū</i>	<i>śū</i>	<i>sū</i>	<i>hū</i>				

3.1.3.6 -ṛ

<i>kṛ</i>	<i>gṛ</i>	<i>jṛ</i>	<i>tṛ</i>	<i>dṛ</i>	<i>nṛ</i>	<i>pṛ</i>	<i>bhṛ</i>	<i>mṛ</i>	<i>ṛ</i>
<i>vṛ</i>	<i>śṛ</i>	<i>śṛ</i>	<i>hṛ</i>						

3.1.3.7 -ṝ

<i>kṝ</i>	<i>gṝ</i>	<i>nṝ</i>

3.1.3.8 -ḷ

<i>ḷ</i>

3.1.3.9 -e

<i>ke</i>	<i>ge</i>	<i>ce</i>	<i>che</i>	<i>je</i>	<i>te</i>	<i>the</i>	<i>dhe</i>	<i>ne</i>	<i>te</i>
<i>the</i>	<i>de</i>	<i>dhe</i>	<i>ne</i>	<i>pe</i>	<i>bhe</i>	<i>me</i>	<i>ye</i>	<i>re</i>	<i>le</i>
<i>ve</i>	<i>śe</i>	<i>še</i>	<i>se</i>	<i>he</i>					

Figure 4: Some Bhaiksuki consonant-vowel combinations (from Dimitrov 2010: 87).

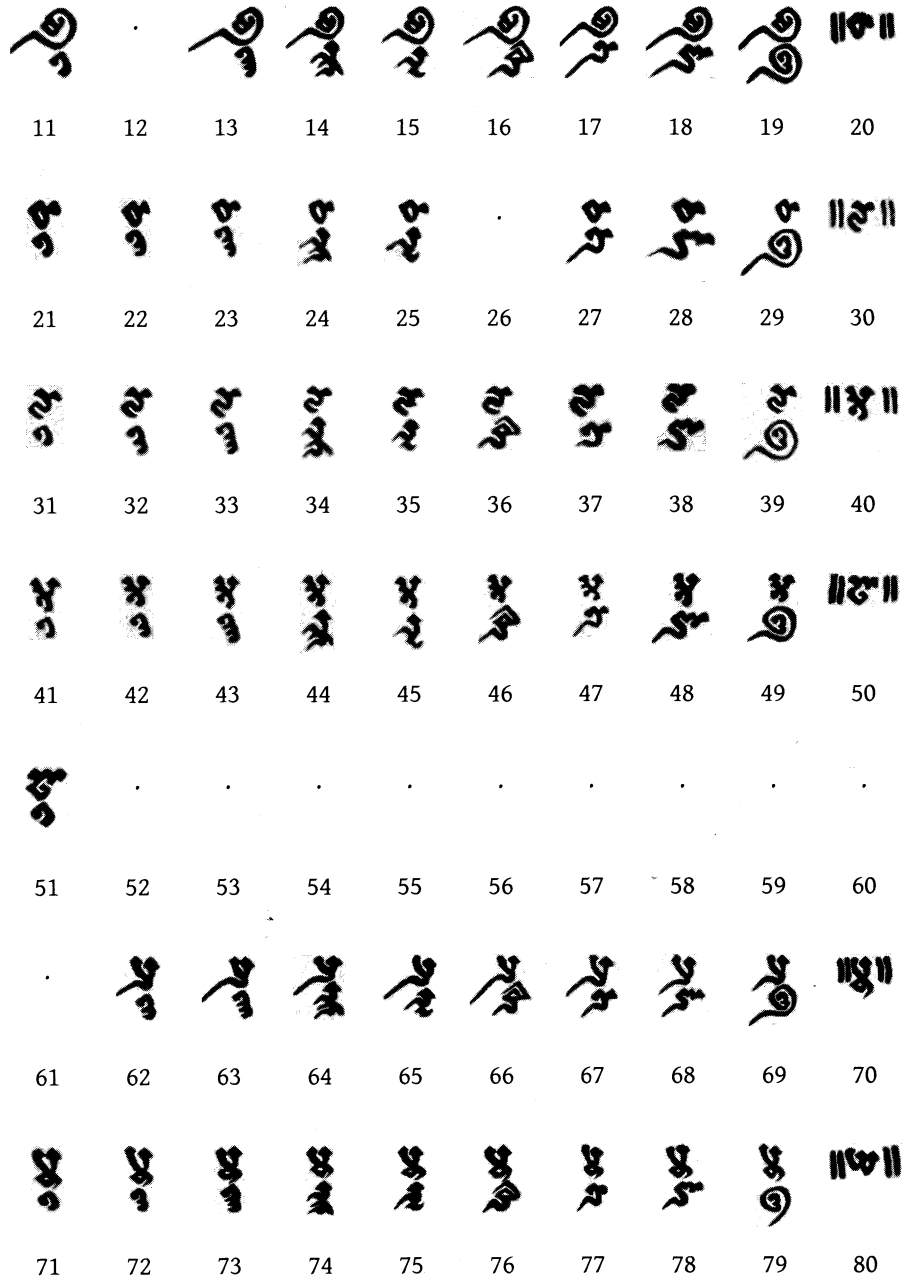


Figure 5: Some Bhaiksuki letter-numerals (from Dimitrov 2010: 54).

3.1.4 Anusvāra, visarga, avagraha, virāma, and other symbols



Figure 6: Bhaiksuki digits and various signs (from Dimitrov 2010: 89).

7.5. Avagraha, daṇḍa and other symbols

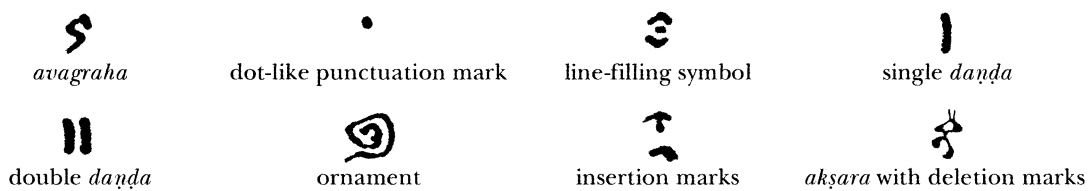
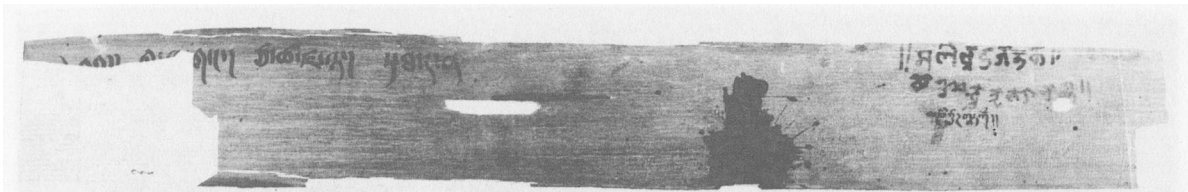
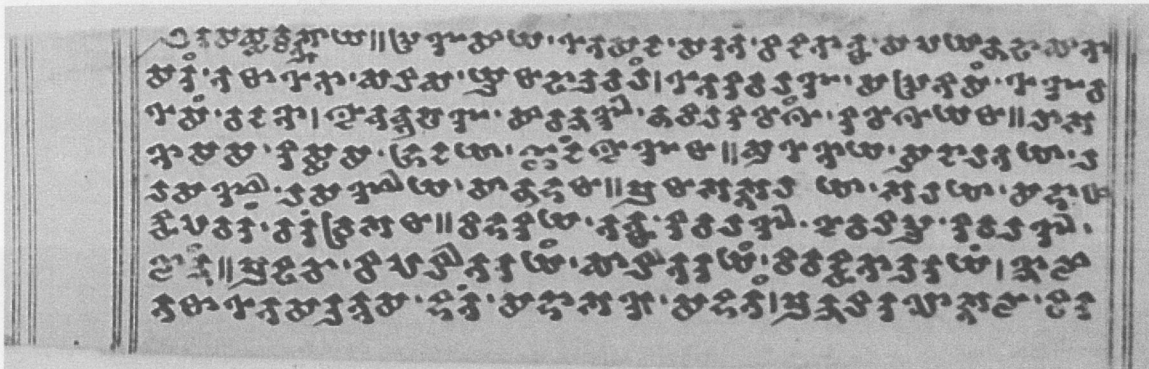


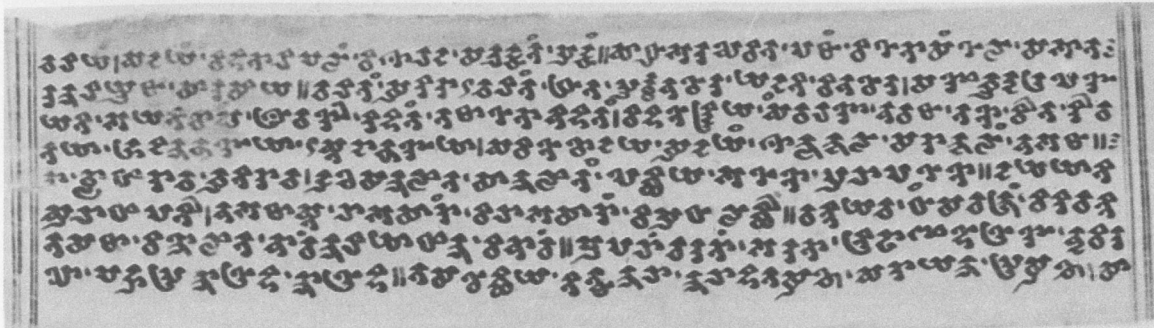
Figure 7: Various signs used in Bhaiksuki (from Hanisch 2008: 292).



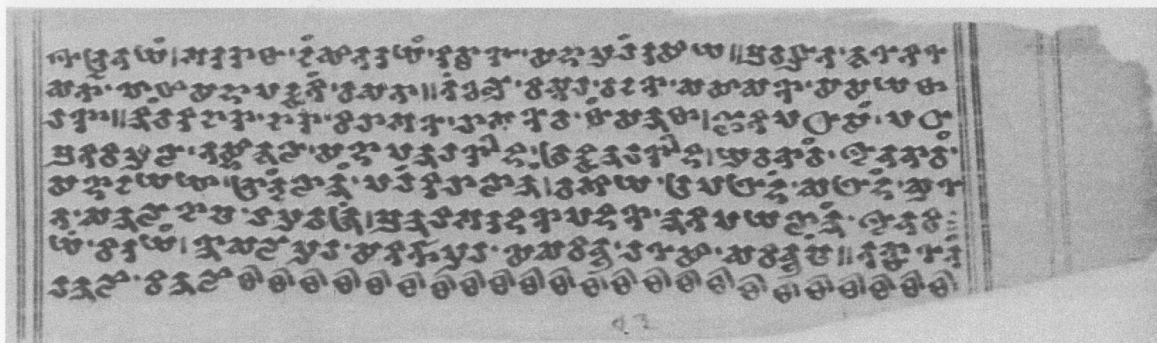
Cover leaf



Fol. 1v (left part)



Fol. 1v (middle part)



Fol. 1v (right part)

Figure 8: A folio of Sarvarakṣita's *Manicūḍajātaka* in Bhaiksuki (from Hanisch 2008: 321).