

# Revised proposal to encode Nandinagari in Unicode

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October 20, 2016

## 1 Introduction

This is a proposal to encode the Nandinagari script in Unicode. It supersedes the following documents:

- L2/13-002 “Preliminary Proposal to Encode Nandinagari in ISO/IEC 10646”
- L2/16-002 “Proposal to encode the Nandinagari script in Unicode”

It incorporates comments regarding previous proposals made in:

- L2/16-037 “Recommendations to UTC #146 January 2016 on Script Proposals”
- L2/16-057 “Comments on L2/16-002 Proposal to encode Nandinagari”
- L2/16-216 “Recommendations to UTC #148 August 2016 on Script Proposals”

Major changes made to the proposed encoding since the last version include:

- Expanded description of consonant conjuncts
- Clarification of the encoded representation of ‘touching’ conjuncts
- Addition of punctuation and Vedic intonation signs, *anusvāra*-s, and *ardhavisarga*

Of these changes, the model for representing ‘touching’ conjuncts is significant because it may have an impact upon the encoding models of other scripts in Unicode that render conjuncts in a similar fashion, eg. Sinhala.

## 2 Description

Nandinagari is a Brahmi-based script that was used in southern India between the 11th and 19th centuries CE for producing manuscripts and inscriptions in Sanskrit in south Maharashtra, Karnataka and Andhra Pradesh. It was the official script of the Vijayanagara kingdom of southern India (1336–1646). There are numerous manuscripts and inscriptions bearing Nandinagari. Several of these manuscripts are biscriptal with text in the Kannada and Titalari (Tulu) scripts. Nandinagari was also used for writing Kannada in Karnataka.

Nandinagari derives from the central group of ‘Nagari’ scripts and is related to Devanagari. There are several similarities between Nandinagari and Devanagari in terms of character repertoire, glyphic representation, and structure (see comparisons in tables 1–4). However, Nandinagari differs from Devanagari in terms of letterforms, the lack of a connecting headline, and in the rendering of consonant-vowel combinations and consonant conjuncts. There are several styles of Nandinagari, which are properly defined as variants of this particular type of ‘Nagari’ and do not resemble styles of other members of this class. As such, Nandinagari cannot be considered a stylistic variant of Devanagari. The independent status of Nandinagari is articulated by Saraju Rath (2009), who writes:

From statements in various early and recent secondary literature [...] one could infer that Nandināgarī, Nāgarī and Devanāgarī are very close and show only minor distinctions. From a study of the available evidence in manuscripts, however, it is clear that the scripts are indeed related as sister scripts, but that there are significant and systematic differences which justify us in considering them as different scripts. In the case of Nandināgarī the separate status is very clear but because of neglect and misleading statements in secondary literature it is frequently noted that scholars who try to read the script without proper preparation fail and have to give up.

Following the above, despite its similarities to Devanagari, Nandinagari cannot be unified with the ‘Devanagari’ encoding in Unicode. The proper representation of Nandinagari in plain text requires the preservation of the glyphic distinctions of its letterforms, consonant conjuncts, and consonant-vowel ligatures. The script also has its own historical styles and variant forms of letters, which diverge from Devanagari styles. Support for Nandinagari at the character level will provide for representation of the script in plain text. The block will, in turn, offer a means for unifying various styles of the script.

There is an active community of scholars conducting research on Nandinagari in the areas of epigraphy, preservation of manuscripts, and optical-character recognition. The Sri Vadiraja Research Foundation, sponsored jointly by the National Mission for Manuscripts of the Government of India and the Puttige Math in Udupi, Karnataka has been working to preserve Nandinagari palm leaf manuscripts from 2007 to the present (Prabhu 2012). The French Institute of Pondicherry has also digitized its collection of Nandinagari manuscripts and made them available online (see <http://apps.ifpindia.org/manuscripts/>). Study of Nandinagari is also advanced through the work of independent specialists, who have analyzed manuscripts and produced character inventories (see figures 18–27). Moreover, there have been recent attempts to develop technologies for optical-character recognition of Nandinagari (Guruprasad *et al* 2011, 2013). An encoding for Nandinagari in the Unicode will help to advance research, study, and preservation of the script.

### 3 Script Details

#### 3.1 Structure

The general structure (phonetic order, *mātrā* reordering, use of *virāma*, etc.) of Nandinagari is similar to that of Devanagari. Some consonant-vowel combinations are written as ligatures. Consonant clusters are represented as conjuncts.

#### 3.2 Headstroke

Nandinagari letters have headstrokes. However, headstrokes are generally not connected, as in modern Devanagari. The headstrokes of characters that constitute an orthographic syllable may generally connect, eg. those of a base letter and a right-side vowel sign or those of letters in linear or fused conjuncts.

### 3.3 Character repertoire

The proposed repertoire is based upon character inventories in manuscripts (see figures 1 and 2) and those published in secondary sources, such as Grünendahl (2001) and Visalakshy (2003). The representative glyphs are normalizations of forms attested in these sources. Several characters have variant forms, which are to be treated as glyphic variants. The glyphs used here have been designed by the proposal author.

## 4 Proposed Repertoire

### 4.1 Vowel letters

There are 12 vowel letters:

𑌒	NANDINAGARI VOWEL LETTER A
𑌓	NANDINAGARI VOWEL LETTER AA
𑌔	NANDINAGARI VOWEL LETTER I
𑌕	NANDINAGARI VOWEL LETTER II
𑌖	NANDINAGARI VOWEL LETTER U
𑌗	NANDINAGARI VOWEL LETTER UU
𑌘	NANDINAGARI VOWEL LETTER VOCALIC R
𑌙	NANDINAGARI VOWEL LETTER VOCALIC RR
𑌚	NANDINAGARI VOWEL LETTER E
𑌛	NANDINAGARI VOWEL LETTER AI
𑌜	NANDINAGARI VOWEL LETTER O
𑌝	NANDINAGARI VOWEL LETTER AU

Distinctive letters for \*VOWEL LETTER VOCALIC L and \*VOWEL LETTER VOCALIC LL are not attested, but space for them has been reserved in the event that attestations are discovered. See section 5.1 for details.

### 4.2 Vowel signs

There are 11 dependent vowel signs:

𑌞	NANDINAGARI VOWEL SIGN AA
𑌟	NANDINAGARI VOWEL SIGN I
𑌠	NANDINAGARI VOWEL SIGN II

◌̣	NANDINAGARI VOWEL SIGN U
◌̤	NANDINAGARI VOWEL SIGN UU
◌̥	NANDINAGARI VOWEL SIGN VOCALIC R
◌̦	NANDINAGARI VOWEL SIGN VOCALIC RR
◌̧	NANDINAGARI VOWEL SIGN E
◌̨	NANDINAGARI VOWEL SIGN AI
◌̩	NANDINAGARI VOWEL SIGN O
◌̪	NANDINAGARI VOWEL SIGN AU

Distinctive forms for \*VOWEL SIGN VOCALIC L and \*VOWEL SIGN VOCALIC LL are not attested. Space has been reserved for them. The ◌̣ NANDINAGARI VOWEL SIGN I is a top-positioned sign unlike analogous signs of other Indic scripts that are left-positioned. With letters that have headstrokes it attaches to the top-left edge or straddles the headstroke at the midpoint of the sign. For other letters, it hangs above the top-left edge.

### 4.3 Consonant letters

There are 35 consonant letters:

क	NANDINAGARI LETTER KA
ख	NANDINAGARI LETTER KHA
ग	NANDINAGARI LETTER GA
घ	NANDINAGARI LETTER GHA
ङ	NANDINAGARI LETTER NGA
च	NANDINAGARI LETTER CA
छ	NANDINAGARI LETTER CHA
ज	NANDINAGARI LETTER JA
झ	NANDINAGARI LETTER JHA
ञ	NANDINAGARI LETTER NYA
ट	NANDINAGARI LETTER TTA
ठ	NANDINAGARI LETTER TTHA
ड	NANDINAGARI LETTER DDA
ढ	NANDINAGARI LETTER DDHA



𑌦	NANDINAGARI LETTER NNA
𑌧	NANDINAGARI LETTER TA
𑌨	NANDINAGARI LETTER THA
𑌩	NANDINAGARI LETTER DA
𑌪	NANDINAGARI LETTER DHA
𑌫	NANDINAGARI LETTER NA
𑌬	NANDINAGARI LETTER PA
𑌭	NANDINAGARI LETTER PHA
𑌮	NANDINAGARI LETTER BA
𑌯	NANDINAGARI LETTER BHA
𑌰	NANDINAGARI LETTER MA
𑌱	NANDINAGARI LETTER YA
𑌲	NANDINAGARI LETTER RA
𑌳	NANDINAGARI LETTER LA
𑌴	NANDINAGARI LETTER VA
𑌵	NANDINAGARI LETTER SHA
𑌶	NANDINAGARI LETTER SSA
𑌷	NANDINAGARI LETTER SA
𑌸	NANDINAGARI LETTER HA
𑌹	NANDINAGARI LETTER LLA
𑌺	NANDINAGARI LETTER RRA

The 𑌺 NANDINAGARI LETTER RRA is not part of the traditional repertoire. It appears to have been introduced in the 11th century for transcribing the Kannada letter 𑌺 U+0CB1 KANNADA LETTER RRA (see figure 3).

#### 4.4 Virama

𑌻	NANDINAGARI SIGN VIRAMA
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The 𑌻 NANDINAGARI SIGN VIRAMA has two functions, similar to the corresponding character of Devanagari. It is used as a *halanta* for marking the absence of the inherent vowel of a consonant letter. It is also a control character that is used for producing conjuncts.

## 4.5 Avagraha

ᳵ NANDINAGARI SIGN AVAGRAHA

This sign is used for marking the elision of word-initial *a* in Sanskrit as a result of sandhi (see figure 5).

## 4.6 Vowel modifiers

◌◌ NANDINAGARI SIGN ANUSVARA

◌᳚ NANDINAGARI SIGN VISARGA

The ◌◌ ANUSVARA is used for indicating nasalization. It is placed to the right of a base letter or right-side vowel sign. The ◌᳚ VISARGA is used for representing post-vocalic aspiration in words of Sanskrit origin.

## 4.7 Vedic intonation signs

The following marks for used for Vedic intonation:

◌ᳶ NANDINAGARI SIGN UDATTA

◌᳷ NANDINAGARI SIGN ANUDATTA

◌᳸ NANDINAGARI SIGN SVARITA

Usage of these signs is shown in figures 12 and 13 and is described in section 5.5.

## 4.8 Vedic nasalization signs

ᳵᳶ NANDINAGARI SIGN VEDIC ANUSVARA

ᳵ᳷ NANDINAGARI SIGN DOUBLE VEDIC ANUSVARA

ᳵ᳸ NANDINAGARI SIGN DOUBLE ANUSVARA ANTARGOMUKHA

The ᳵᳶ VEDIC ANUSVARA and ᳵ᳷ DOUBLE VEDIC ANUSVARA are letter-like characters and behave similar to ᳵ U+1135E GRANTHA LETTER VEDIC ANUSVARA, and ᳵ᳷ U+1135F GRANTHA LETTER VEDIC DOUBLE ANUSVARA.

The ᳵ᳸ DOUBLE ANUSVARA ANTARGOMUKHA consists of two ᳵ U+1135E VEDIC SIGN ANUSVARA ANTARGOMUKHA stacked vertically. It is encoded specifically for Nandinagari because it can combine with ◌◌ ANUSVARA (see figure 11).

## 4.9 Ardhavisarga

𑂗 NANDINAGARI SIGN ARDHAVISARGA

The sign 𑂗 ARDHAVISARGA is used for indicating both *jihvāmūlīya* and *upadhmānīya* (see figures 8, 9). It represents contextual pronunciations of ◌ᶞ VISARGA, or post-vocalic aspiration. When *visarga* occurs before the unvoiced velar letters *ka* and *kha* it is realized as a voiceless velar fricative /x/. This sound is called *jihvāmūlīya* “from the base of the tongue” (guttural) and it is often transliterated as *ḥ*. Similarly, when *visarga* occurs before the unvoiced labial letters *pa* and *pha*, it is realized as a voiceless bilabial fricative /ɸ/. This sound is called *upadhmānīya* “blowing” (fricative) and it is often transliterated as *ḥ*.

The Nandinagari ARDHAVISARGA corresponds to similar characters in other blocks, eg. ◌𑂗 U+1CF2 VEDIC SIGN ARDHAVISARGA of the ‘Vedic Extensions’ block. However, it is defined as a letter-like character instead of a combining sign.

## 4.10 Invocation signs

𑂘 NANDINAGARI SIGN SIDDHAM

The sign 𑂘 SIDDHAM is used as an invocation at the beginning of documents (see figure 3).

## 4.11 Punctuation

𑂙 NANDINAGARI GAP FILLER

𑂚 NANDINAGARI HEADSTROKE

The 𑂚 HEADSTROKE is used as a sign of spacing or joining a word. It may be used for connecting a word that is broken on account of imperfections on a writing surface. It is also used as placeholder (see figure 6).

The 𑂙 GAP FILLER is used for marking gaps and spaces in manuscripts (see figure 14). This sign may be interpreted as a ligated || double *daṇḍā*, but its shape and contexts of use suggest that it is a separate character.

Nandinagari uses | *daṇḍā* and || double *daṇḍā* for punctuation. These should be unified with the corresponding Devanagari characters. Script extensions have been specified in section 6.5.

## 4.12 Digits

A full set of digits is used in Nandinagari:

०	NANDINAGARI DIGIT ZERO	५	NANDINAGARI DIGIT FIVE
१	NANDINAGARI DIGIT ONE	६	NANDINAGARI DIGIT SIX
२	NANDINAGARI DIGIT TWO	७	NANDINAGARI DIGIT SEVEN
३	NANDINAGARI DIGIT THREE	८	NANDINAGARI DIGIT EIGHT
४	NANDINAGARI DIGIT FOUR	९	NANDINAGARI DIGIT NINE

Nandinagari digits are similar to Kannada digits (see table 4). However, they are currently included in the proposed repertoire because they are used commonly in Nandinagari environments and are written in a style that matches the Nandinagari handwriting. If the differences between Nandinagari and Kannada forms are truly artificial, then it may be practical to unify these digits with the corresponding Kannada characters.

## 5 Encoded Representations

### 5.1 Vowel letters

Some independent vowel may be represented using a combination of a vowel letter and a dependent vowel sign. This is not recommended. The encoded character for the independent vowel should be used.

Recommended	Not recommended
ॠ LETTER AA	ॠ LETTER A + ॠ VOWEL SIGN AA
ॡ LETTER II	ॡ LETTER I + ॡ VOWEL SIGN II
ॢ LETTER UU	ॢ LETTER U + ॢ VOWEL SIGN U
ॣ LETTER AI	ॣ LETTER E + ॣ VOWEL SIGN E
। LETTER AU	। LETTER A + । VOWEL SIGN AU

The ॥ VOWEL LETTER VOCALIC R and ॥ VOWEL LETTER VOCALIC RR are also represented as a consonant-vowel combination with the letter ॥ RA, as:

॥	<॥ RA, ॥ VOWEL SIGN VOCALIC R>
॥	<॥ RA, ॥ VOWEL SIGN VOCALIC RR>

Different representations for independent ॥ are shown in manuscripts (figure 1) and script charts (figure 28).

These are consonant-vowel combinations with the letter ल LA:

ल्र <ल LA, ्र VOWEL SIGN VOCALIC R>

लृ <ल LA, ृ VOWEL SIGN U>

## 5.2 Consonant-vowel combinations

Combinations of consonant and vowel signs and modifiers are represented in encoded text as follows:

cā वा <व CA, ी VOWEL SIGN AA>

ci वी <व CA, ी VOWEL SIGN I>

cī वी <व CA, ी VOWEL SIGN II>

cu वु <व CA, ु VOWEL SIGN U>

cū वु <व CA, ु VOWEL SIGN UU>

cṛ वृ <व CA, ृ VOWEL SIGN VOCALIC R>

cṝ वृ <व CA, ृ VOWEL SIGN VOCALIC RR>

ce वे <व CA, े VOWEL SIGN E>

cai वै <व CA, ै VOWEL SIGN AI>

co वी <व CA, ी VOWEL SIGN O>

cau वी <व CA, ी VOWEL SIGN AU>

caṃ व॰ <व CA, ॰ ANUSVARA>

caḥ वः <व CA, ॰ VISARGA>

Dependent ḷ may be represented using the syllable *klī* (see figure 35). This practice occurs in Grantha and other southern Brahmi scripts.

klī क्ली <क KA, ्र VIRAMA, ल LA, ी VOWEL SIGN II>

Some consonant-vowel combinations may be rendered as ligatures:

ku कु <क KA, ु VOWEL SIGN U>

kū कु <क KA, ु VOWEL SIGN UU>

kṛ कृ <क KA, ृ VOWEL SIGN VOCALIC R>

du दु <द DA, ु VOWEL SIGN U>

### 5.3 Positioning of VIRAMA

The VIRAMA ligates with the base letter at the lower right edge. For letters without an edge at the baseline, it is centered below.

$k$  क्क <क KA, ॠ VIRAMA>

$c$  च्च <च CA, ॠ VIRAMA>

$t$  त्त <त TTA, ॠ VIRAMA>

### 5.4 Consonant Conjuncts

Consonant clusters are represented as conjuncts. These are rendered as ligatures, linear conjuncts, and touching forms. The letters RA and YA are rendered as conjoined forms in certain contexts.

Ligatures and linear conjuncts are the default representations of clusters. They are produced by placing VIRAMA after each letter in a cluster:

regular conjunct  $C_1, ॠ VIRAMA, C_2$

Touching conjuncts are produced by joining the headstrokes of letters or by causing the letters of a cluster to touch. In such conjuncts the constituent letters appear without modification (see section 5.4.6). The conjunct is rendered by eliminating the space between the letters. This is a common method of representing conjuncts in Nandinagari. It is not used in Devanagari, but it is common in other southern Indic scripts, such as Sinhala and Dhives Akuru. Touching conjuncts are to be produced using the  $\text{ZWJ}$  U+200C ZERO WIDTH NON-JOINER (abbreviated as ZWNJ) before VIRAMA:

touching conjunct  $C_1, \text{ZWJ} ZWNJ, ॠ VIRAMA, C_2$

The proposed model also provides for the use of  $\text{ZWJ}$  U+200D ZERO WIDTH JOINER (abbreviated as ZWJ) for producing a conjoined form of  $C_2$ . Its use is limited. This mechanism is used in Oriya, but is not specified for Devanagari.

conjoining form of  $C_2$   $C_1, \text{ZWJ} ZWJ, ॠ VIRAMA, C_2$

The following mechanisms are used in Devanagari for modifying default conjunct formation. They can be applied for use in Nandinagari:

visible virama under  $C_1$   $C_1, ॠ VIRAMA, \text{ZWJ} ZWNJ, C_2$

conjoining form of  $C_1$   $C_1, ॠ VIRAMA, \text{ZWJ} ZWJ, C_2$

The mechanism for requesting a conjoining form of  $C_1$  applies only to the letter RA (see section 5.4.5).

### 5.4.1 Ligatures

Some ligatures are atomic or *akhaṇḍa* in which the constituent letters may not be recognizable. These are always rendered using the forms below:

*kṣa* क्ख <क KA, ् VIRAMA, ष SSA>

*jña* ज्ञ <ज JA, ् VIRAMA, ञ NYA>

Examples of other distinctive ligatures are:

*ccha* च्छ <च CA, ् VIRAMA, छ CHA>

*dda* द्द <द DA, ् VIRAMA, ड DA>

*dma* द्म <द DA, ् VIRAMA, म MA>

*ṣṭa* ष्ट <ष SSA, ् VIRAMA, ट TTA>

Examples of ligatures produced by joining glyphs vertically are shown below:

*kka* क्क <क KA, ् VIRAMA, क KA>

*kla* क्ल <क KA, ् VIRAMA, ल LA>

*kṣṇa* क्ख्ण <क KA, ् VIRAMA, ष SSA, ् VIRAMA, ण NNA>

*gla* ग्ल <ग GA, ् VIRAMA, ल LA>

*ṅga* ङ्ग <ङ NGA, ् VIRAMA, ग GA>

*jjha* ज्ञ्ज <ज JA, ् VIRAMA, ज JHA>

*tva* त्त <ट TTA, ् VIRAMA, व VA>

*dga* द्ग <द DA, ् VIRAMA, ग GA>

*ddha* द्ध <द DA, ् VIRAMA, ध DHA>

*lla* ल्ल <ल LA, ् VIRAMA, ल LA>

*ṣṇa* ष्ण <ष SSA, ् VIRAMA, ण NNA>

*ṣṇva* ष्ण्व <ष SSA, ् VIRAMA, ण NNA, ् VIRAMA, व VA>

*hna* ह्ण <ह HA, ् VIRAMA, ण NA>

*hla* ह्ल <ह HA, ् VIRAMA, ल LA>

The letter TA takes different shapes in conjuncts. When it is conjunct initial its left stroke is truncated: ढ → ढ. When it is conjunct final TA is represented as a semi-circle.

<i>tka</i>	कै	<तै TA, ॠ VIRAMA, कै KA>
<i>tna</i>	नै	<तै TA, ॠ VIRAMA, नै NA>
<i>tta</i>	तै	<तै TA, ॠ VIRAMA, तै TA>
<i>nta</i>	नै	<नै NA, ॠ VIRAMA, तै TA>
<i>pta</i>	पै	<पै PA, ॠ VIRAMA, तै TA>
<i>sta</i>	सै	<सै SA, ॠ VIRAMA, तै TA>

### 5.4.2 Linear conjuncts

A cluster-initial letter may be represented as a conjoined form if its graphical structure provides an opportunity for modification, ie. a half-form can be produced by removing the right descender. This type of conjunct occurs with the following letters: ग → ञ *ga*, तै → तै *ta*, मी → ञ *ma*, री → र *śa*, सी → स *sa*.

<i>gga</i>	गग	<ग GA, ॠ VIRAMA, ग GA>
<i>gda</i>	गद	<ग GA, ॠ VIRAMA, द DA>
<i>mpa</i>	मप	<मी MA, ॠ VIRAMA, प PA>
<i>śca</i>	रव	<री SHA, ॠ VIRAMA, व CA>
<i>ska</i>	स्क	<सी SA, ॠ VIRAMA, कै KA>
<i>spa</i>	स्प	<सी TA, ॠ VIRAMA, प PA>

### 5.4.3 Special case: YA

The letter य YA is generally represented using the post-base form य when it is final in a cluster. It is produced by default using the sequence <C, ॠ VIRAMA, य YA>:

<i>kya</i>	कै	<कै KA, ॠ VIRAMA, य YA>
<i>kśya</i>	कै	<कै KA, ॠ VIRAMA, ष SSA, ॠ VIRAMA, य YA>
<i>gya</i>	गै	<गै GA, ॠ VIRAMA, य YA>
<i>tmya</i>	तै	<तै TA, ॠ VIRAMA, मी MA, ॠ VIRAMA, य YA>
<i>tya</i>	तै	<तै TA, ॠ VIRAMA, य YA>
<i>dmya</i>	दै	<दै DA, ॠ VIRAMA, मी MA, ॠ VIRAMA, य YA>
<i>yya</i>	यै	<यै YA, ॠ VIRAMA, य YA>
<i>śya</i>	रै	<रै SSA, ॠ VIRAMA, य YA>



The post-base YA can connect to the preceding letter at different positions:

*tya* त्‍य‍्‍ <ट TTA, ॠ VIRAMA, य YA>

#### 5.4.4 Special case: RA

When ऱ RA is C<sub>1</sub> it is rendered by default as <sup>◌</sup>*repha* using the sequence <ऱ RA, ॠ VIRAMA, C>:

*rka* र्क <ऱ RA, ॠ VIRAMA, क KA>

*rra* र्र <ऱ RA, ॠ VIRAMA, ऱ RA>

*rṣa* र्ष <ऱ RA, ॠ VIRAMA, ष SSA>

Non-initial RA has the default form <sup>◌</sup>*ra-kāra* that is produced using the sequence <C, ॠ VIRAMA, ऱ RA>. The *ra-kāra* attaches to the right descender. It attaches to a stem with letters that do not have a descender.

*tra* त्र <ट TTA, ॠ VIRAMA, ऱ RA>

*tra* त्र <त TA, ॠ VIRAMA, ऱ RA>

*pra* प्र <प PA, ॠ VIRAMA, ऱ RA>

*śra* श्र <श SHA, ॠ VIRAMA, ऱ RA>

*sra* श्र <स SA, ॠ VIRAMA, ऱ RA>

#### 5.4.5 Special case: YA + RA

When cluster-initial ऱ RA is immediately followed by य YA, it takes precedence over the latter. The RA is rendered as *repha* and YA takes its regular form:

*rya* र्य <ऱ RA, ॠ VIRAMA, य YA>

*rṣya* र्ष्य <ऱ RA, ॠ VIRAMA, ष SSA, ॠ VIRAMA, य YA>

When cluster-medial RA is followed immediately by a final YA, it takes the *ra-kāra* form and combines with the preceding consonant, while YA takes its post-base form.

*prya* प्र्य <प PA, ॠ VIRAMA, ऱ RA, ॠ VIRAMA, य YA>

The post-base form of YA is not used with initial RA. However, this combination can be produced by using ZWJ to request the post-base form:

*rya* र्या <ऱ RA, ZWJ ZWJ, ॠ VIRAMA, य YA>

### 5.4.6 Touching conjuncts

A common method of representing clusters is to join letters together without modification. All clusters can be rendered as fused conjuncts. These are produced using  $\langle C_1, \text{ZWJ}, \text{VIRAMA}, C_2 \rangle$ . Fused conjuncts can be formed by joining letters together such that their bodies touch:

*ḍḍa* ङ्ङ <ङ DDA, ZWJ, VIRAMA, ङ DDA>  
*dda* ङ <ङ DA, ZWJ, VIRAMA, ङ DA>  
*tpa* त्पा <त TA, ZWJ, VIRAMA, पा PA>  
*bda* ब्द <ब BA, ZWJ, VIRAMA, दा DA>  
*yya* य्य <य YA, ZWJ, VIRAMA, य YA>  
*stha* स्था <स SA, ZWJ, VIRAMA, था THA>

Fused forms may also be produced by joining headstrokes. This method of conjunct formation is meaningful in Nandinagari as letters of a word do not typically connect.

*tpa* त्पा <त TA, ZWJ, VIRAMA, पा PA>  
*bda* ब्द <ब BA, ZWJ, VIRAMA, दा DA>

The headstroke is elongated for letters without a full-width headstroke so that the connection extends fully above all letters. This pertains particularly to क KA, which has a half-width headstroke.

*kśa* कर <क KA, ZWJ, VIRAMA, र SHA>

Fused conjuncts may contain atomic ligatures. In such cases, the atomic ligature is produced first then fused with the adjacent letter. The headstrokes are joined as necessary.

*kṣma* क्श्म <क KA, VIRAMA, श SA, ZWJ, VIRAMA, म MA>

### 5.4.7 Glyph requirements for conjuncts

In the event that a font lacks ligatures for certain conjuncts, a visible VIRAMA may be placed beneath each letter in the cluster. This approach follows that of Devanagari. Another approach that is more suitable for Nandinagari is to use fused conjuncts. This removes the need to use visible VIRAMA and offers a more natural alternative that aligns with the orthography for conjuncts in the script.

### 5.4.8 Modifying conjunct formation

As is the case in Devanagari and other Indic scripts, default conjunct formation may be modified using the following sequences:

*kṣa* क्‍ष ३ <क KA, ३ VIRAMA, ष SSA>

*kṣa* क्‍ष ३ <क KA, ३ VIRAMA, ३ ZWNJ, ष SSA>

## 5.5 Vedic intonation signs

The Vedic intonation signs are used as follows:

*ka* क॑ <क KA, ॑ UDATTA>

*ka* क॒ <क KA, ॒ ANUDATTA>

*ka* क̣॑ <क KA, ̣॑ SVARITA>

## 5.6 Vedic *anusvāra*-s and *ardhavisarga*

The Vedic nasalization and aspiration signs are placed after a syllable:

*ham* ह॑म् <ह HA, ॑ DOUBLE ANUSVARA ANTARGOMUKHA, ॑ ANUSVARA>

*taḥka* त॑ह॒क <त TA, ॑ ARDHAVISARGA, क KA>

*taḥpa* त॑ह॒प <त TA, ॑ ARDHAVISARGA, प PA>

The ॑ Vedic *anusvāra* is used in Nandinagari (see figure 10). It is not proposed for encoding as a Nandinagari character. Instead, it may be unified with ॑ U+1CE9 VEDIC SIGN ANUSVARA ANTARGOMUKHA.

## 5.7 Invocation signs

In addition to ॑ NANDINGARI SIGN SIDDHAM, the syllable ॑ om̐ is used frequently. The om̐ is not encoded as a distinctive character for Nandinagari. It is to be represented using the sequence:

*om̐* ॑॑ <॑ O, ॑ ANUSVARA>

## 5.8 Punctuation

A sequence of multiple headstrokes are generally unconnected.

भ॑भ॑भ॑ <भ BHA, ॑ HEADSTROKE, ॑ HEADSTROKE, ॑ JHA>

The HEADSTROKE may also occur between *daṇḍā*-s at the end of a section:

॥ ¯ ¯ ॥ < ॥ U+0965 DEVANAGARI DOUBLE DANDA, ¯ HEADSTROKE, ¯ HEADSTROKE,  
 ॥ U+0965 DEVANAGARI DOUBLE DANDA >

It is also used in combination with ॥ GAP FILLER:

॥ ¯ ¯ ॥ < ॥ GAP FILLER, ¯ HEADSTROKE, ¯ HEADSTROKE, ॥ GAP FILLER >

The control character ZW ZWJ may be used for fusing a headstroke to adjacent letters or to other headstrokes (see figure 14):

॥ ¯ ¯ ॥ < ॥ GAP FILLER, ¯ HEADSTROKE, ZW ZWJ, ¯ HEADSTROKE, ॥ GAP FILLER >

## 5.9 Number forms

Fraction signs occur in Nandinagari sources (see figure 7; also L2/15-243: 22). These may be represented using characters already encoded in the ‘Common Indic Number Forms’ block (U+A830):

---

¼	I U+A830 NORTH INDIC FRACTION ONE QUARTER
½	II U+A831 NORTH INDIC FRACTION ONE HALF
¾	III U+A832 NORTH INDIC FRACTION THREE QUARTERS
⅙	𑂀 U+A833 NORTH INDIC FRACTION ONE SIXTEENTH
⅙	𑂁 U+A834 NORTH INDIC FRACTION ONE EIGHTH
⅓	𑂂 U+A835 NORTH INDIC FRACTION THREE SIXTEENTHS

---

These characters are specified as script extensions for Nandinagari. The ‘Common Indic Number Forms’ are described briefly in *The Unicode Standard* (chapter 22.3 ‘Numerals’, pp. 770–771) and in more detail in the original encoding proposal (L2/07-354).

## 5.10 Collation

The sort order for Nandinagari is as follows:

अ A < आ AA < इ I < ई II < उ U < ऊ UU < ॠ VOCALIC R < ॡ VOCALIC RR <  
 ए E < ऐ AI < ॢ O < औ AU < क KA < ख KHA < ग GA < घ GHA < ङ NGA <  
 च CA < छ CHA < ज JA < ङ NYA < ट TTA < ठ TTHA < ड DDA < ढ DDHA <  
 ण NNA < त TA < थ THA < द DA < ध DHA < न NA < प PA < फ PHA < ब BA <  
 भ BHA < म MA < य YA < र RA < ल LA < व VA < श SHA < ष SSA < स SA <

ॠ HA < ॡ LLA < ॢ RRA < ॣ VOWEL SIGN I < । VOWEL SIGN II < ॥ VOWEL SIGN U <  
 ० VOWEL SIGN UU < ० VOWEL SIGN VOCALIC R < ० VOWEL SIGN VOCALIC RR <  
 ० VOWEL SIGN E < ० VOWEL SIGN AI < ० VOWEL SIGN O < ० VOWEL SIGN AU <  
 ० VIRAMA

The letter ॢ RRA does not have a position in the traditional order. It is to be sorted after ॡ LLA. The following characters have secondary weights:

० ANUSVARA, ० VISARGA, ० UDATTA, ० ANUDATTA, ० SVARITA.

## 6 Character Data

### 6.1 Character Properties

In the format of UnicodeData.txt:

```

11B90;NANDINAGARI LETTER A;Lo;0;L;;;;N;;;;;
11B91;NANDINAGARI LETTER AA;Lo;0;L;;;;N;;;;;
11B92;NANDINAGARI LETTER I;Lo;0;L;;;;N;;;;;
11B93;NANDINAGARI LETTER II;Lo;0;L;;;;N;;;;;
11B94;NANDINAGARI LETTER U;Lo;0;L;;;;N;;;;;
11B95;NANDINAGARI LETTER UU;Lo;0;L;;;;N;;;;;
11B96;NANDINAGARI LETTER VOCALIC R;Lo;0;L;;;;N;;;;;
11B97;NANDINAGARI LETTER VOCALIC RR;Lo;0;L;;;;N;;;;;
11B98;<reserved>
11B99;<reserved>
11B9A;NANDINAGARI LETTER E;Lo;0;L;;;;N;;;;;
11B9B;NANDINAGARI LETTER AI;Lo;0;L;;;;N;;;;;
11B9C;NANDINAGARI LETTER O;Lo;0;L;;;;N;;;;;
11B9D;NANDINAGARI LETTER AU;Lo;0;L;;;;N;;;;;
11B9E;NANDINAGARI LETTER KA;Lo;0;L;;;;N;;;;;
11B9F;NANDINAGARI LETTER KHA;Lo;0;L;;;;N;;;;;
11BA0;NANDINAGARI LETTER GA;Lo;0;L;;;;N;;;;;
11BA1;NANDINAGARI LETTER GHA;Lo;0;L;;;;N;;;;;
11BA2;NANDINAGARI LETTER NGA;Lo;0;L;;;;N;;;;;
11BA3;NANDINAGARI LETTER CA;Lo;0;L;;;;N;;;;;
11BA4;NANDINAGARI LETTER CHA;Lo;0;L;;;;N;;;;;
11BA5;NANDINAGARI LETTER JA;Lo;0;L;;;;N;;;;;
11BA6;NANDINAGARI LETTER JHA;Lo;0;L;;;;N;;;;;
11BA7;NANDINAGARI LETTER NYA;Lo;0;L;;;;N;;;;;
11BA8;NANDINAGARI LETTER TTA;Lo;0;L;;;;N;;;;;
11BA9;NANDINAGARI LETTER TTHA;Lo;0;L;;;;N;;;;;
11BAA;NANDINAGARI LETTER DDA;Lo;0;L;;;;N;;;;;
11BAB;NANDINAGARI LETTER DDHA;Lo;0;L;;;;N;;;;;
11BAC;NANDINAGARI LETTER NNA;Lo;0;L;;;;N;;;;;
11BAD;NANDINAGARI LETTER TA;Lo;0;L;;;;N;;;;;
11BAE;NANDINAGARI LETTER THA;Lo;0;L;;;;N;;;;;
11BAF;NANDINAGARI LETTER DA;Lo;0;L;;;;N;;;;;
11BB0;NANDINAGARI LETTER DHA;Lo;0;L;;;;N;;;;;
11BB1;NANDINAGARI LETTER NA;Lo;0;L;;;;N;;;;;
11BB2;NANDINAGARI LETTER PA;Lo;0;L;;;;N;;;;;

```

```

11BB3;NANDINAGARI LETTER PHA;Lo;0;L;;;;N;;;;;
11BB4;NANDINAGARI LETTER BA;Lo;0;L;;;;N;;;;;
11BB5;NANDINAGARI LETTER BHA;Lo;0;L;;;;N;;;;;
11BB6;NANDINAGARI LETTER MA;Lo;0;L;;;;N;;;;;
11BB7;NANDINAGARI LETTER YA;Lo;0;L;;;;N;;;;;
11BB8;NANDINAGARI LETTER RA;Lo;0;L;;;;N;;;;;
11BB9;NANDINAGARI LETTER LA;Lo;0;L;;;;N;;;;;
11BBA;NANDINAGARI LETTER VA;Lo;0;L;;;;N;;;;;
11BBB;NANDINAGARI LETTER SHA;Lo;0;L;;;;N;;;;;
11BBC;NANDINAGARI LETTER SSA;Lo;0;L;;;;N;;;;;
11BBD;NANDINAGARI LETTER SA;Lo;0;L;;;;N;;;;;
11BBE;NANDINAGARI LETTER HA;Lo;0;L;;;;N;;;;;
11BBF;NANDINAGARI LETTER LLA;Lo;0;L;;;;N;;;;;
11BC0;NANDINAGARI LETTER RRA;Lo;0;L;;;;N;;;;;
11BC1;NANDINAGARI VOWEL SIGN AA;Mc;0;L;;;;N;;;;;
11BC2;NANDINAGARI VOWEL SIGN I;Mn;0;NSM;;;;N;;;;;
11BC3;NANDINAGARI VOWEL SIGN II;Mc;0;L;;;;N;;;;;
11BC4;NANDINAGARI VOWEL SIGN U;Mn;0;NSM;;;;N;;;;;
11BC5;NANDINAGARI VOWEL SIGN UU;Mn;0;NSM;;;;N;;;;;
11BC6;NANDINAGARI VOWEL SIGN VOCALIC R;Mn;0;NSM;;;;N;;;;;
11BC7;NANDINAGARI VOWEL SIGN VOCALIC RR;Mn;0;NSM;;;;N;;;;;
11BC8;<reserved>
11BC9;<reserved>
11BCA;NANDINAGARI VOWEL SIGN E;Mn;0;NSM;;;;N;;;;;
11BCB;NANDINAGARI VOWEL SIGN AI;Mn;0;NSM;;;;N;;;;;
11BCC;NANDINAGARI VOWEL SIGN O;Mc;0;L;;;;N;;;;;
11BCD;NANDINAGARI VOWEL SIGN AU;Mc;0;L;;;;N;;;;;
11BCE;NANDINAGARI SIGN ANUSVARA;Mc;0;L;;;;N;;;;;
11BCF;NANDINAGARI SIGN VISARGA;Mc;0;L;;;;N;;;;;
11BD0;NANDINAGARI SIGN VIRAMA;Mc;9;L;;;;N;;;;;
11BD1;NANDINAGARI SIGN AVAGRAHA;Lo;0;L;;;;N;;;;;
11BD2;NANDINAGARI SIGN SIDDHAM;Lo;0;L;;;;N;;;;;
11BD3;NANDINAGARI GAP FILLER;Lo;0;L;;;;N;;;;;
11BD4;NANDINAGARI HEADSTROKE;Lo;0;L;;;;N;;;;;
11BD5;NANDINAGARI SIGN UDATTA;Mn;1;NSM;;;;N;;;;;
11BD6;NANDINAGARI SIGN ANUDATTA;Mn;1;NSM;;;;N;;;;;
11BD7;NANDINAGARI SIGN SVARITA;Mn;1;NSM;;;;N;;;;;
11BD8;NANDINAGARI SIGN VEDIC ANUSVARA;Lo;0;L;;;;N;;;;;
11BD9;NANDINAGARI SIGN DOUBLE VEDIC ANUSVARA;Lo;0;L;;;;N;;;;;
11BDA;NANDINAGARI SIGN DOUBLE ANUSVARA ANTARGOMUKHA;Lo;0;L;;;;N;;;;;
11BDB;NANDINAGARI SIGN ARDHA VISARGA;Lo;0;L;;;;N;;;;;
11BE0;NANDINAGARI DIGIT ZERO;Nd;0;L;0;0;0;N;;;;;
11BE1;NANDINAGARI DIGIT ONE;Nd;0;L;1;1;1;N;;;;;
11BE2;NANDINAGARI DIGIT TWO;Nd;0;L;2;2;2;N;;;;;
11BE3;NANDINAGARI DIGIT THREE;Nd;0;L;3;3;3;N;;;;;
11BE4;NANDINAGARI DIGIT FOUR;Nd;0;L;4;4;4;N;;;;;
11BE5;NANDINAGARI DIGIT FIVE;Nd;0;L;5;5;5;N;;;;;
11BE6;NANDINAGARI DIGIT SIX;Nd;0;L;6;6;6;N;;;;;
11BE7;NANDINAGARI DIGIT SEVEN;Nd;0;L;7;7;7;N;;;;;
11BE8;NANDINAGARI DIGIT EIGHT;Nd;0;L;8;8;8;N;;;;;
11BE9;NANDINAGARI DIGIT NINE;Nd;0;L;9;9;9;N;;;;;

```

## 6.2 Linebreaking

In the format of LineBreak.txt:

```

11B90..11B97; AL # NANDINAGARI LETTER A .. NANDINAGARI LETTER VOCALIC RR
11B9A..11BC0; AL # NANDINAGARI LETTER E .. NANDINAGARI LETTER RRA
11BC1..11BC7; CM # NANDINAGARI VOWEL SIGN AA .. NANDINAGARI VOWEL SIGN VOCALIC RR

```

```

11BCA..11BD0; CM # NANDINAGARI VOWEL SIGN E .. NANDINAGARI SIGN VIRAMA
11BD1..11BD4; AL # NANDINAGARI SIGN AVAGRAHA .. NANDINAGARI HEADSTROKE
11BD5..11BD7; CM # NANDINAGARI SIGN UDATTA .. NANDINAGARI SIGN CANDRABINDU
11BD8..11BDB; AL # NANDINAGARI SIGN VEDIC ANUSVARA .. NANDINAGARI SIGN ARDHAVISARGA
11BE0..11BE9; NU # NANDINAGARI DIGIT ZERO .. NANDINAGARI DIGIT NINE

```

### 6.3 Syllabic Categories

in the format of IndicSyllabicCategory.txt:

```

# Indic_Syllabic_Category=Bindu
11BCE          ; Bindu          # Mc          NANDINAGARI SIGN ANUSVARA

# Indic_Syllabic_Category=Visarga
11BCF          ; Visarga        # Mc          NANDINAGARI SIGN VISARGA

# Indic_Syllabic_Category=Virama
11BD0          ; Virama          # Mn          NANDINAGARI SIGN VIRAMA

# Indic_Syllabic_Category=Vowel_Independent
11B90..11B97  ; Vowel_Independent # Lo          [9] NANDINAGARI LETTER A ..
                                     NANDINAGARI LETTER VOCALIC RR
11B9A..11BC0  ; Vowel_Independent # Lo          [4] NANDINAGARI LETTER E ..
                                     NANDINAGARI LETTER AU

# Indic_Syllabic_Category=Vowel_Dependent
11BC1          ; Vowel_Dependent  # Mc          NANDINAGARI VOWEL SIGN AA
11BC2          ; Vowel_Dependent  # Mn          NANDINAGARI VOWEL SIGN I
11BC3          ; Vowel_Dependent  # Mc          NANDINAGARI VOWEL SIGN II
11BC4..11BC7  ; Vowel_Dependent  # Mn          [4] NANDINAGARI VOWEL SIGN U ..
                                     NANDINAGARI VOWEL SIGN VOCALIC RR
11BCA..11BCB  ; Vowel_Dependent  # Mn          [2] NANDINAGARI VOWEL SIGN E ..
                                     NANDINAGARI VOWEL SIGN AI
11BCC..11BCD  ; Vowel_Dependent  # Mc          [2] NANDINAGARI VOWEL SIGN O ..
                                     NANDINAGARI VOWEL SIGN AU

# Indic_Syllabic_Category=Consonant
11B9E..11BC0  ; Consonant        # Lo          [35] NANDINAGARI LETTER KA ..
                                     NANDINAGARI LETTER RRA

```

### 6.4 Positional Categories

In the format of IndicPositionalCategory.txt:

```

# Indic_Positional_Category=Top
11BC2          ; Top          # Mn          NANDINAGARI VOWEL SIGN I
11BCA..11BCB  ; Top          # Mn          [2] NANDINAGARI VOWEL SIGN E ..
                                     NANDINAGARI VOWEL SIGN AI

# Indic_Positional_Category=Bottom
11BC4..11BC7  ; Bottom       # Mn          [4] NANDINAGARI VOWEL SIGN U ..
                                     NANDINAGARI VOWEL SIGN VOCALIC RR
11BD0          ; Bottom       # Mn          NANDINAGARI SIGN VIRAMA
11BD5          ; Bottom       # Mn          NANDINAGARI SIGN ANUDATTA

# Indic_Positional_Category=Right

```

11BC1	;	Right	#	Mc		NANDINAGARI VOWEL SIGN AA
11BC3	;	Right	#	Mc		NANDINAGARI VOWEL SIGN II
11BCC..11BCD	;	Right	#	Mc	[2]	NANDINAGARI VOWEL SIGN O .. NANDINAGARI VOWEL SIGN AU
11BCE..11BCF	;	Right	#	Mc	[2]	NANDINAGARI SIGN ANUSVARA .. NANDINAGARI SIGN VISARGA
11BD4	;	Right	#	Mn		NANDINAGARI SIGN UDATTA
11BD6	;	Right	#	Mn		NANDINAGARI SIGN SVARITA

## 6.5 Script Extensions

The following characters should be extended for use with Nandinagari in `ScriptExtensions.txt`:

0964	;	#	Po		DEVANAGARI DANDA
0965	;	#	Po		DEVANAGARI DOUBLE DANDA
A830..A835	;	#	No	[6]	NORTH INDIC FRACTION ONE QUARTER.. NORTH INDIC FRACTION THREE SIXTEENTHS
1CE9	;	#	Lo		VEDIC SIGN ANUSVARA ANTARGOMUKHA

## 7 References

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## 8 Acknowledgments

I am very grateful to Srinidhi A. of Tumkur, Karnataka for discussions on Nandinagari, for sharing source materials, and for reviewing earlier versions of this proposal. I would also like to thank Shriramana Sharma for providing comments on the encoding model. Jean-Luc Chevillard (Centre national de la recherche scientifique (CNRS), Paris) put me into contact with experts and provides images of manuscripts. Several folios shown here are from the digitized collections of the French Institute of Pondicherry (IFP).

The present proposal was funded in part by the Adopt-A-Character Program of the Unicode Consortium. A previous version was made possible in part through a Google Research Award, granted to Deborah Anderson for the Script Encoding Initiative, which funded a post-doctoral research position for me in the Department of Linguistics, University of California, Berkeley during 2015–2016. Preliminary research was made possible through the Script Encoding Initiative at Berkeley. Any views, findings, conclusions or recommendations expressed in this publication do not necessarily reflect those of the Unicode Consortium; the University of California, Berkeley; or Google.

	11B9	11BA	11BB	11BC	11BD	11BE
0	𑌘 11B90	𑌙 11BA0	𑌚 11BB0	𑌛 11BC0	𑌜 11BD0	𑌝 11BE0
1	𑌞 11B91	𑌟 11BA1	𑌠 11BB1	𑌡 11BC1	𑌢 11BD1	𑌣 11BE1
2	𑌤 11B92	𑌥 11BA2	𑌦 11BB2	𑌧 11BC2	𑌨 11BD2	𑌩 11BE2
3	𑌪 11B93	𑌫 11BA3	𑌬 11BB3	𑌭 11BC3	𑌮 11BD3	𑌯 11BE3
4	𑌱 11B94	𑌲 11BA4	𑌳 11BB4	𑌴 11BC4	𑌵 11BD4	𑌶 11BE4
5	𑌷 11B95	𑌸 11BA5	𑌹 11BB5	𑌺 11BC5	𑌻 11BD5	𑌼 11BE5
6	𑌽 11B96	𑌾 11BA6	𑌿 11BB6	𑍀 11BC6	𑍁 11BD6	𑍂 11BE6
7	𑍃 11B97	𑍄 11BA7	𑍅 11BB7	𑍆 11BC7	𑍇 11BD7	𑍈 11BE7
8		𑍉 11BA8	𑍊 11BB8		𑍋 11BD8	𑍌 11BE8
9		𑍍 11BA9	𑍎 11BB9		𑍏 11BD9	𑍐 11BE9
A	𑍑 11B9A	𑍒 11BAA	𑍓 11BBA	𑍔 11BCA	𑍕 11BDA	
B	𑍖 11B9B	𑍗 11BAB	𑍘 11BBB	𑍙 11BCB	𑍚 11BDB	
C	𑍛 11B9C	𑍜 11BAC	𑍝 11BBC	𑍞 11BCC		
D	𑍟 11B9D	𑍠 11BAD	𑍡 11BBD	𑍢 11BCD		
E	𑍣 11B9E	𑍤 11BAE	𑍥 11BBE	𑍦 11BCE		
F	𑍧 11B9F	𑍨 11BAF	𑍩 11BBF	𑍪 11BCF		

**Independent vowels**

11B90	अ	NANDINAGARI LETTER A
11B91	आ	NANDINAGARI LETTER AA
11B92	इ	NANDINAGARI LETTER I
11B93	ई	NANDINAGARI LETTER II
11B94	उ	NANDINAGARI LETTER U
11B95	ऊ	NANDINAGARI LETTER UU
11B96	ऋ	NANDINAGARI LETTER VOCALIC R
11B97	ॠ	NANDINAGARI LETTER VOCALIC RR
11B98	◻	<reserved>
11B99	◻	<reserved>
11B9A	ए	NANDINAGARI LETTER E
11B9B	ऐ	NANDINAGARI LETTER AI
11B9C	ऒ	NANDINAGARI LETTER O
11B9D	औ	NANDINAGARI LETTER AU

**Consonants**

11B9E	क	NANDINAGARI LETTER KA
11B9F	ख	NANDINAGARI LETTER KHA
11BA0	ग	NANDINAGARI LETTER GA
11BA1	घ	NANDINAGARI LETTER GHA
11BA2	ङ	NANDINAGARI LETTER NGA
11BA3	च	NANDINAGARI LETTER CA
11BA4	छ	NANDINAGARI LETTER CHA
11BA5	ज	NANDINAGARI LETTER JA
11BA6	झ	NANDINAGARI LETTER JHA
11BA7	ञ	NANDINAGARI LETTER NYA
11BA8	ट	NANDINAGARI LETTER TTA
11BA9	ठ	NANDINAGARI LETTER TTHA
11BAA	ड	NANDINAGARI LETTER DDA
11BAB	ड्ह	NANDINAGARI LETTER DDHA
11BAC	ण	NANDINAGARI LETTER NNA
11BAD	त	NANDINAGARI LETTER TA
11BAE	थ	NANDINAGARI LETTER THA
11BAF	द	NANDINAGARI LETTER DA
11BB0	ध	NANDINAGARI LETTER DHA
11BB1	न	NANDINAGARI LETTER NA
11BB2	प	NANDINAGARI LETTER PA
11BB3	फ	NANDINAGARI LETTER PHA
11BB4	ब	NANDINAGARI LETTER BA
11BB5	भ	NANDINAGARI LETTER BHA
11BB6	म	NANDINAGARI LETTER MA
11BB7	य	NANDINAGARI LETTER YA
11BB8	र	NANDINAGARI LETTER RA
11BB9	ल	NANDINAGARI LETTER LA
11BBA	व	NANDINAGARI LETTER VA
11BBB	श	NANDINAGARI LETTER SHA
11BBC	ष	NANDINAGARI LETTER SSA
11BBD	स	NANDINAGARI LETTER SA
11BBE	ह	NANDINAGARI LETTER HA
11BBF	ळ	NANDINAGARI LETTER LLA
11BC0	ॠ	NANDINAGARI LETTER RRA

**Dependent vowel signs**

11BC1	◌ा	NANDINAGARI VOWEL SIGN AA
11BC2	◌ि	NANDINAGARI VOWEL SIGN I
11BC3	◌ी	NANDINAGARI VOWEL SIGN II
11BC4	◌ु	NANDINAGARI VOWEL SIGN U
11BC5	◌ू	NANDINAGARI VOWEL SIGN UU
11BC6	◌ॠ	NANDINAGARI VOWEL SIGN VOCALIC R
11BC7	◌ॡ	NANDINAGARI VOWEL SIGN VOCALIC RR
11BC8	◻	<reserved>
11BC9	◻	<reserved>
11BCA	◌े	NANDINAGARI VOWEL SIGN E
11BCB	◌ै	NANDINAGARI VOWEL SIGN AI
11BCC	◌ो	NANDINAGARI VOWEL SIGN O
11BCD	◌ौ	NANDINAGARI VOWEL SIGN AU

**Various signs**

11BCE	◌◌	NANDINAGARI SIGN ANUSVARA
11BCF	◌ः	NANDINAGARI SIGN VISARGA
11BD0	◌्	NANDINAGARI SIGN VIRAMA

**Additional signs**

11BD1	◌ऽ	NANDINAGARI SIGN AVAGRAHA
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**Invocation sign**

11BD2	ॐ	NANDINAGARI SIGN SIDDHAM
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**Punctuation**

11BD3	◌	NANDINAGARI GAP FILLER
11BD4	◌	NANDINAGARI HEADSTROKE
		• used as a spacing or filler mark

**Vedic intonation signs**

11BD5	◌॑	NANDINAGARI SIGN UDATTA
11BD6	◌॒	NANDINAGARI SIGN ANUDATTA
11BD7	◌॑	NANDINAGARI SIGN SVARITA

**Vedic nasalization signs**

11BD8	◌ं	NANDINAGARI SIGN VEDIC ANUSVARA
11BD9	◌ँ	NANDINAGARI SIGN DOUBLE VEDIC ANUSVARA
11BDA	◌ं	NANDINAGARI SIGN DOUBLE ANUSVARA ANTARGOMUKHA

**Ardhavisarga**

11BDB	◌॑	NANDINAGARI SIGN ARDHAVISARGA
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**Digits**

11BE0	०	NANDINAGARI DIGIT ZERO
11BE1	१	NANDINAGARI DIGIT ONE
11BE2	२	NANDINAGARI DIGIT TWO
11BE3	३	NANDINAGARI DIGIT THREE
11BE4	४	NANDINAGARI DIGIT FOUR
11BE5	५	NANDINAGARI DIGIT FIVE
11BE6	६	NANDINAGARI DIGIT SIX
11BE7	७	NANDINAGARI DIGIT SEVEN
11BE8	८	NANDINAGARI DIGIT EIGHT
11BE9	९	NANDINAGARI DIGIT NINE

	Nandinagari	Devanagari		Nandinagari	Devanagari
KA	क	क	DHA	ध	ध
KHA	ख	ख	NA	न	न
GA	ग	ग	PA	प	प
GHA	घ	घ	PHA	फ	फ
NGA	ङ	ङ	BA	ब	ब
CA	च	च	BHA	भ	भ
CHA	छ	छ	MA	म	म
JA	ज	ज	YA	य	य
JHA	झ	झ	RA	र	र
NYA	ञ	ञ	LA	ल	ल
TTA	ट	ट	VA	व	व
TTHA	ठ	ठ	SHA	श	श
DDA	ड	ड	SSA	ष	ष
DDHA	ढ	ढ	SA	स	स
NNA	ण	ण	HA	ह	ह
TA	त	त	LLA	ळ	ळ
THA	थ	थ	RRA	र	र
DA	द	द			

Table 1: Comparison of basic letters and signs of Nandinagari and Devanagari.

	Nandinagari	Devanagari		Nandinagari	Devanagari
A	अ	अ		Inherent vowel	
AA	आ	आ	SIGN AA	ा	ा
I	इ	इ	SIGN I	ि	ि
II	ई	ई	SIGN II	ी	ी
U	उ	उ	SIGN U	ु	ु
UU	ऊ	ऊ	SIGN UU	ू	ू
VOCALIC R	ऋ	ऋ	SIGN VOCALIC R	्र	्र
VOCALIC RR	ॠ	ॠ	SIGN VOCALIC RR	्र	्र
E	ए	ए	SIGN E	े	े
AI	ऐ	ऐ	SIGN AI	ै	ै
O	ओ	ओ	SIGN O	ो	ो
AU	औ	औ	SIGN AU	ौ	ौ

Table 2: Comparison of basic letters and signs of Nandinagari and Devanagari.

	Nandinagari	Devanagari
ANUSVARA	◌ं	◌ं
VISARGA	◌ः	◌ः
VIRAMA	◌्	◌्
AVAGRAHA	◌ः	◌ः

Table 3: Comparison of various signs of Nandinagari and Devanagari.

	Nandinagari	Kannada	Devanagari
ZERO	೦	೦	०
ONE	೧	೧	१
TWO	೨	೨	२
THREE	೩	೩	३
FOUR	೪	೪	४
FIVE	೫	೫	५
SIX	೬	೬	६
SEVEN	೭	೭	७
EIGHT	೮	೮	८
NINE	೯	೯	९

Table 4: Comparison of digits of Nandinagari, Kannada, and Devanagari.

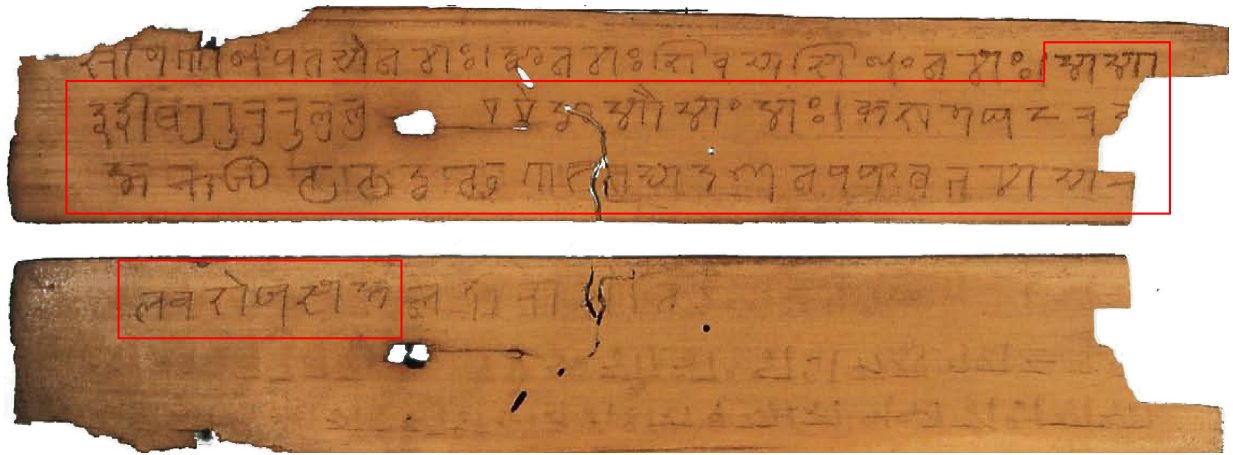


Figure 1: Nandinagari character inventory in a manuscript. Note the representation of the vocalic letters *r̥*, *r̄*, *l̥*, *l̄* using ॠ RA and ॡ LA combined with ॢ VOWEL SIGN U. The letter ॣ NGA is shown without the *bindu*. The letter । CHA and half of ॠ RA is missing because the folio is damaged.

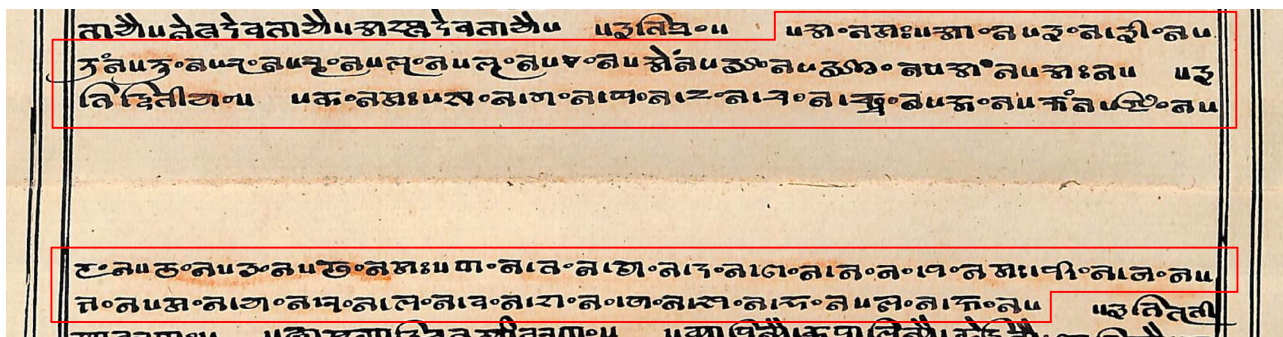


Figure 2: Nandinagari character inventory in a manuscript.



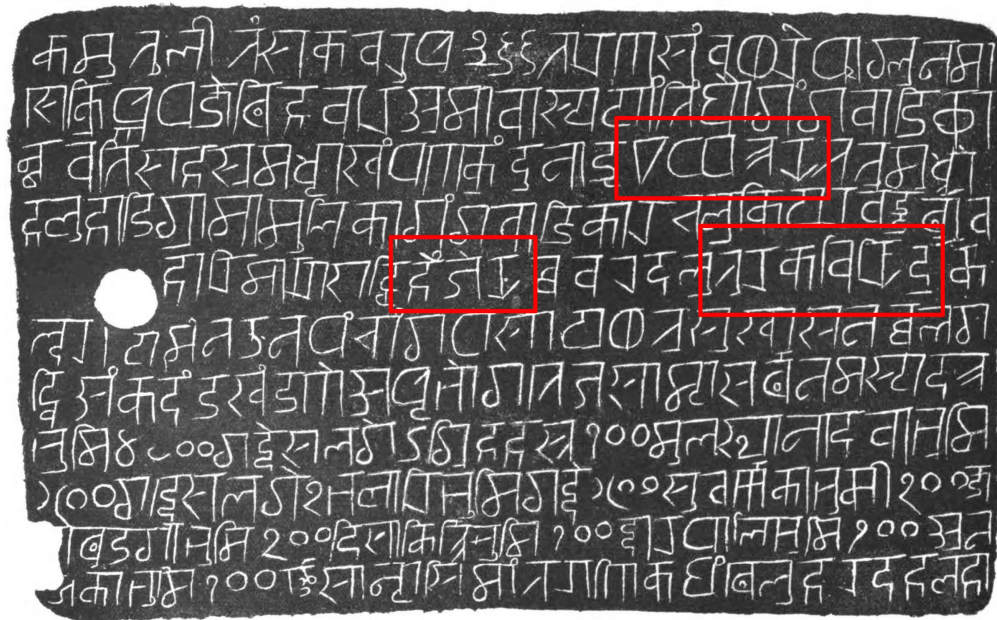
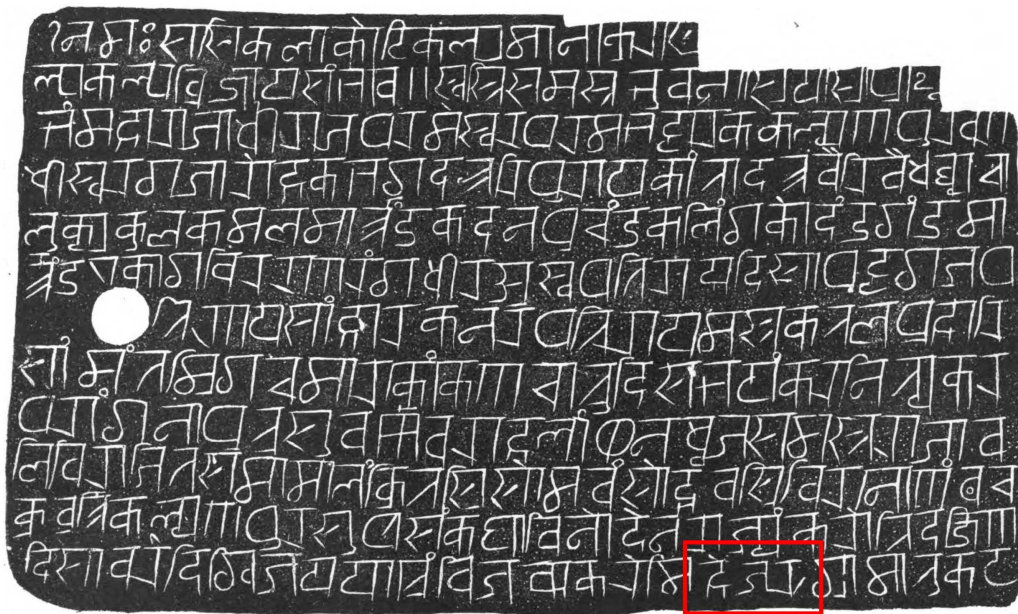


Figure 3: Copper plate of Vīraṇaṅamba bearing a grant inscribed in Nandinagari, Saka 366 (from Rice 1879, plates 1, 2). The letter RA occurs in the name of the village Henjara (*heṃjara-grāmā*) and in the phrases *eppattara* and *turakaviridu*.



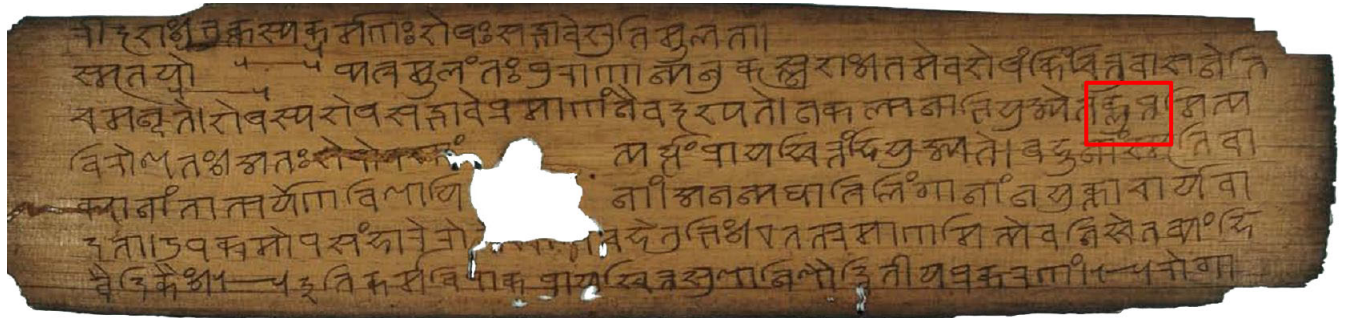


Figure 4: Occurrence of ṛ in the word kṛpta.

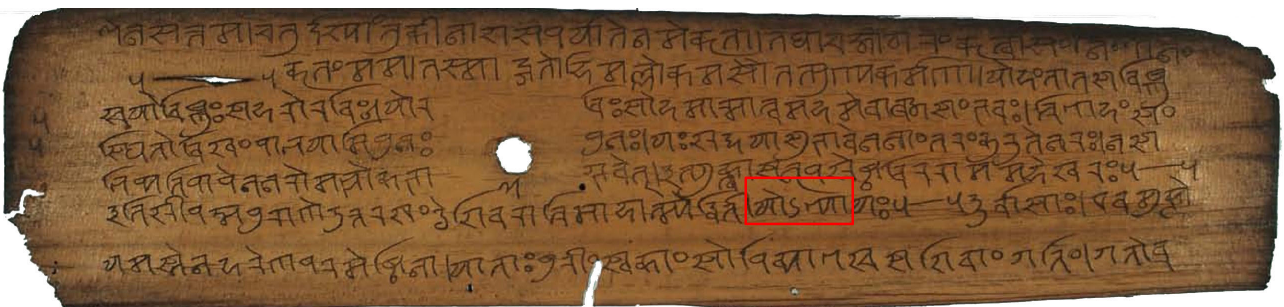
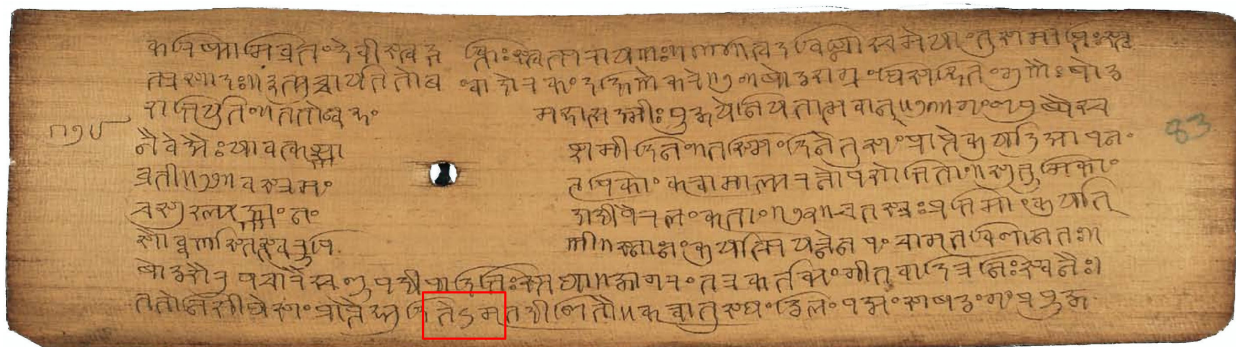


Figure 5: Nandinagari folios showing usage of S NANDINAGARI SIGN AVAGRAHA.



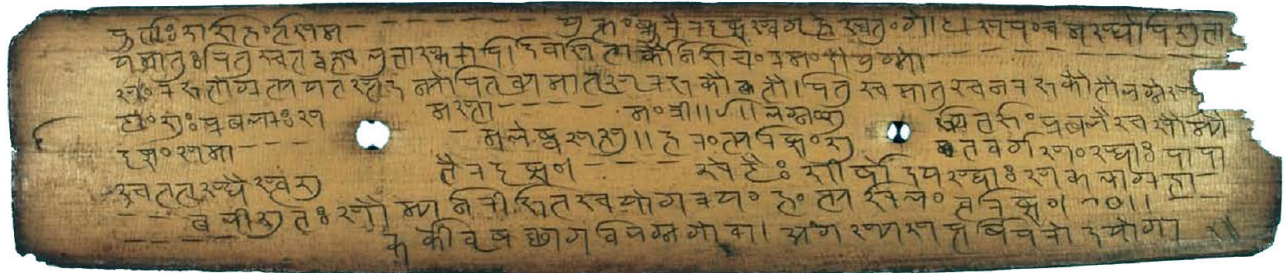
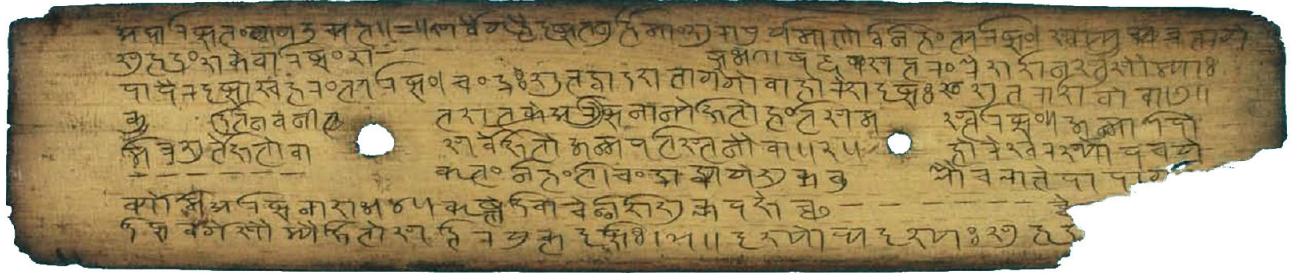


Figure 6: Usage of the  $\bar{\text{—}}$  NANDINAGARI HEADSTROKE (from *Jyotisham Vastulakshanam*, IFP no. RE33587).

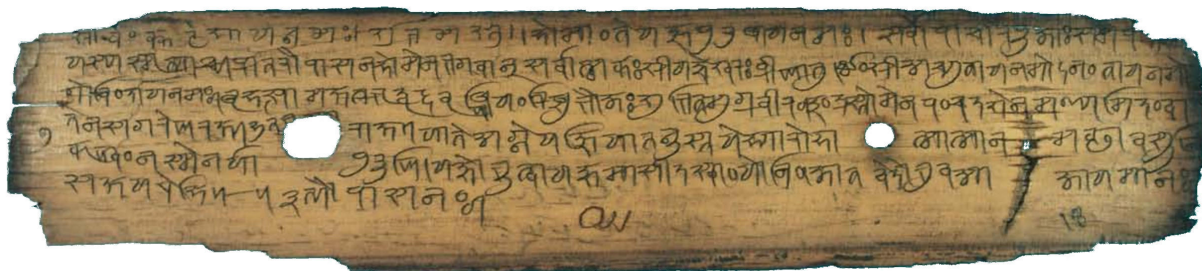
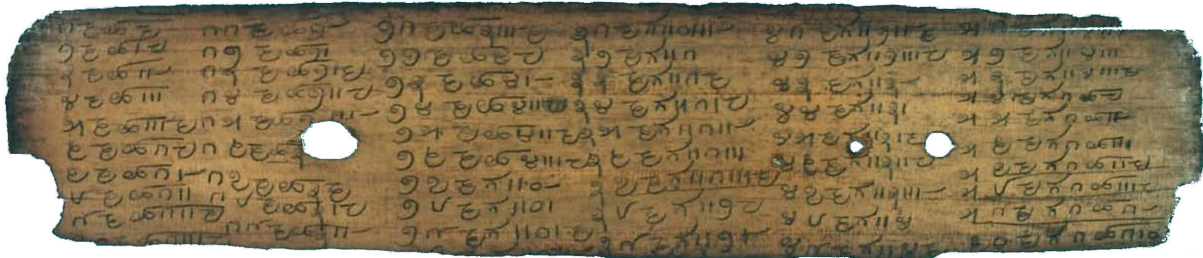


Figure 7: Usage of fraction signs in Nandinagari (from *Jyotisham Vastulakshanam*, IFP no. RE33587).

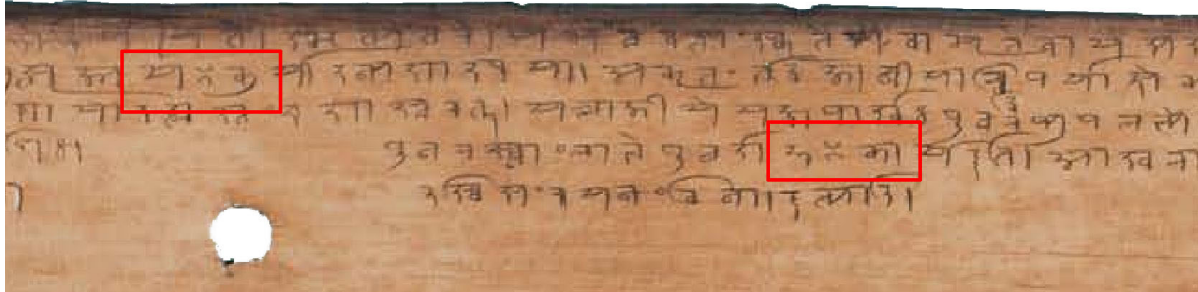


Figure 8: Usage of *jihvāmūlīya* in Nandinagari.

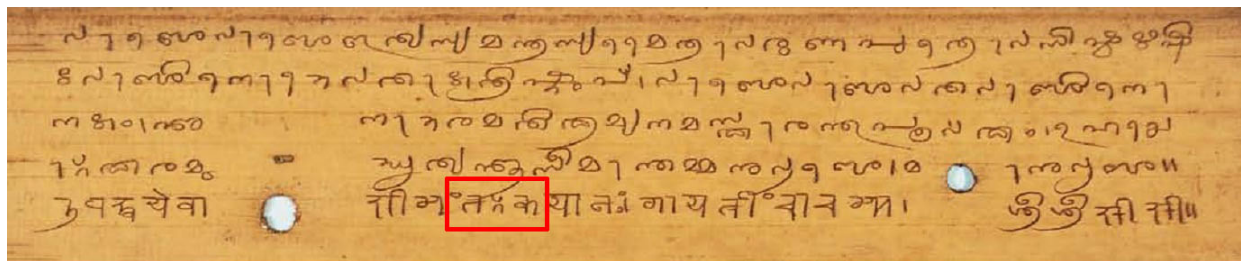


Figure 9: Usage of *jihvāmūlīya* in Nandinagari.



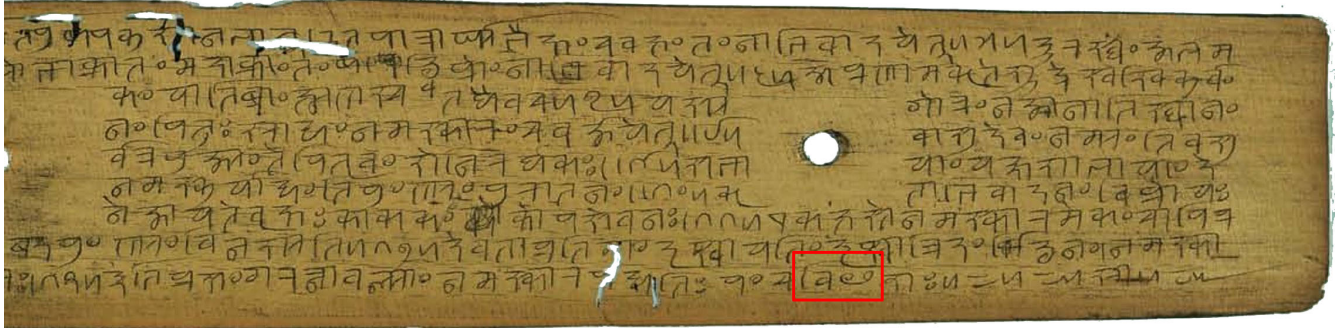


Figure 10: Usage of U+1CE9 VEDIC SIGN ANUSVARA ANTARGOMUKHA in Nandinagari.

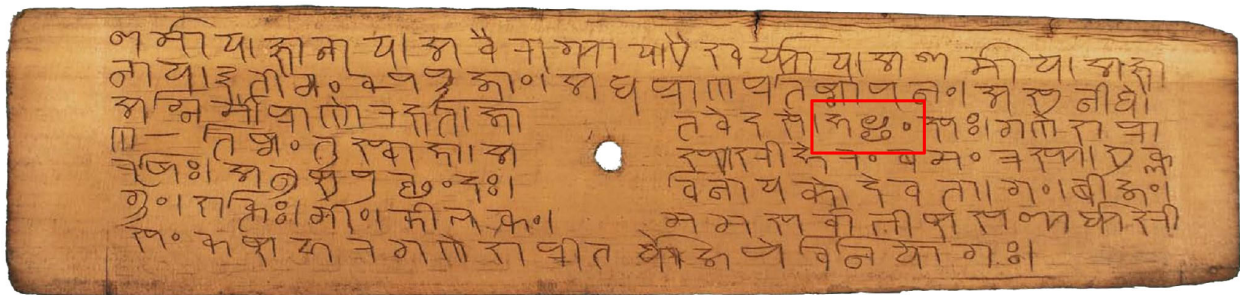


Figure 11: Usage of NANDINAGARI SIGN DOUBLE ANUSVARA ANTARGOMUKHA in ॠ. The NANDINAGARI SIGN ANUSVARA is attached to it in this example.

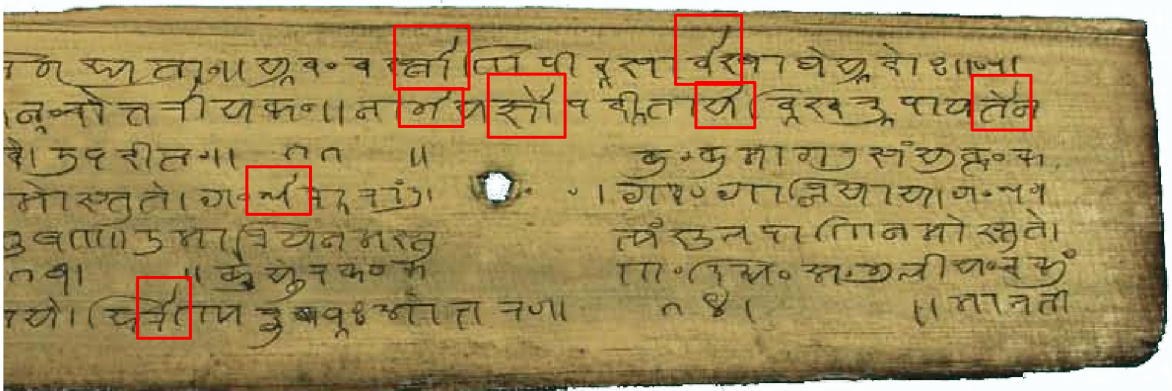
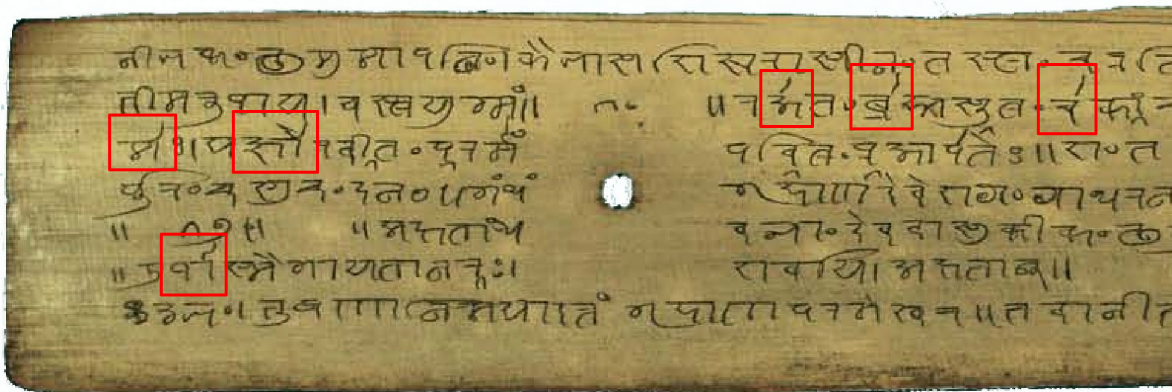


Figure 12: Usage of the Vedic intonation sign ◌̣ svarita in Nandinagari.

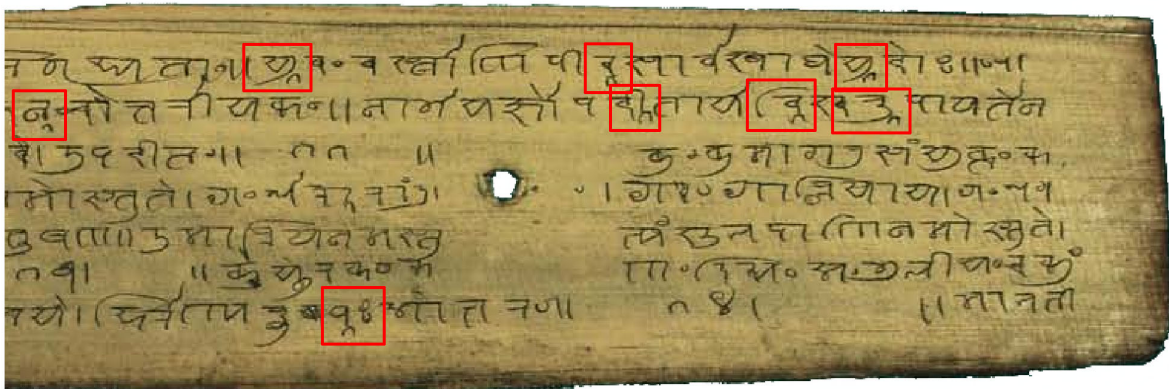
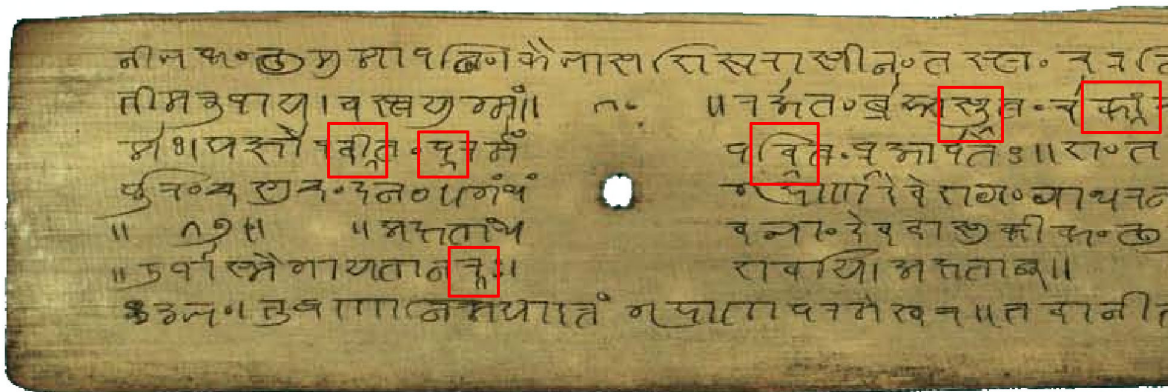


Figure 13: Usage of the Vedic intonation sign ◌ anudatta in Nandinagari.



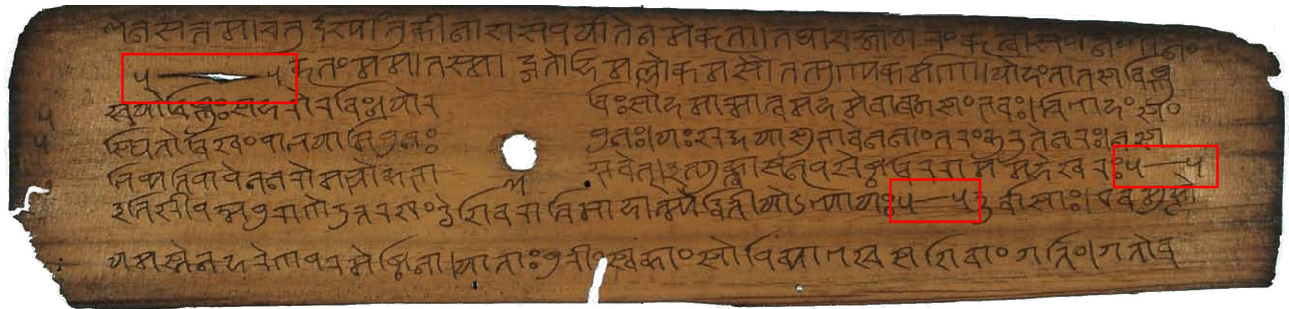


Figure 14: Folio showing usage of the U GAP FILLER and ¯ HEADSTROKE for marking gaps.

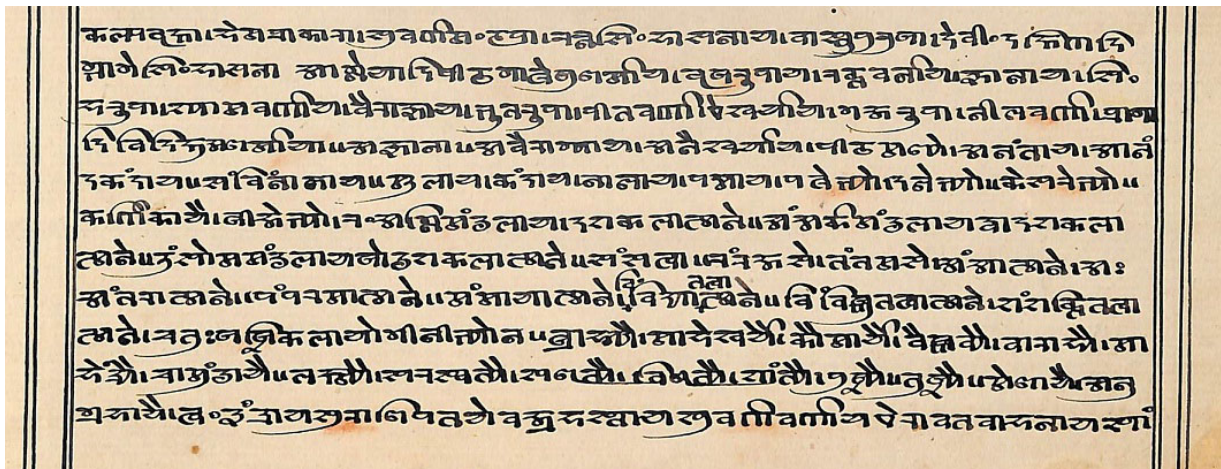


Figure 15: Example of a style of Nandinagari written in ink, which differs from the style used on palm leaves, as shown in the preceding figures.



Figure 16: A coin of Krishnadevaraya, the emperor of Vijayanagara (r. 1509–1530), with the inscription “*srīkṛṣṇarāya*” in Nandinagari on the reverse.



The Krāku Grant of Harihara II - Plate XXXV

Śaka 1298 (A.D.1376/1377)

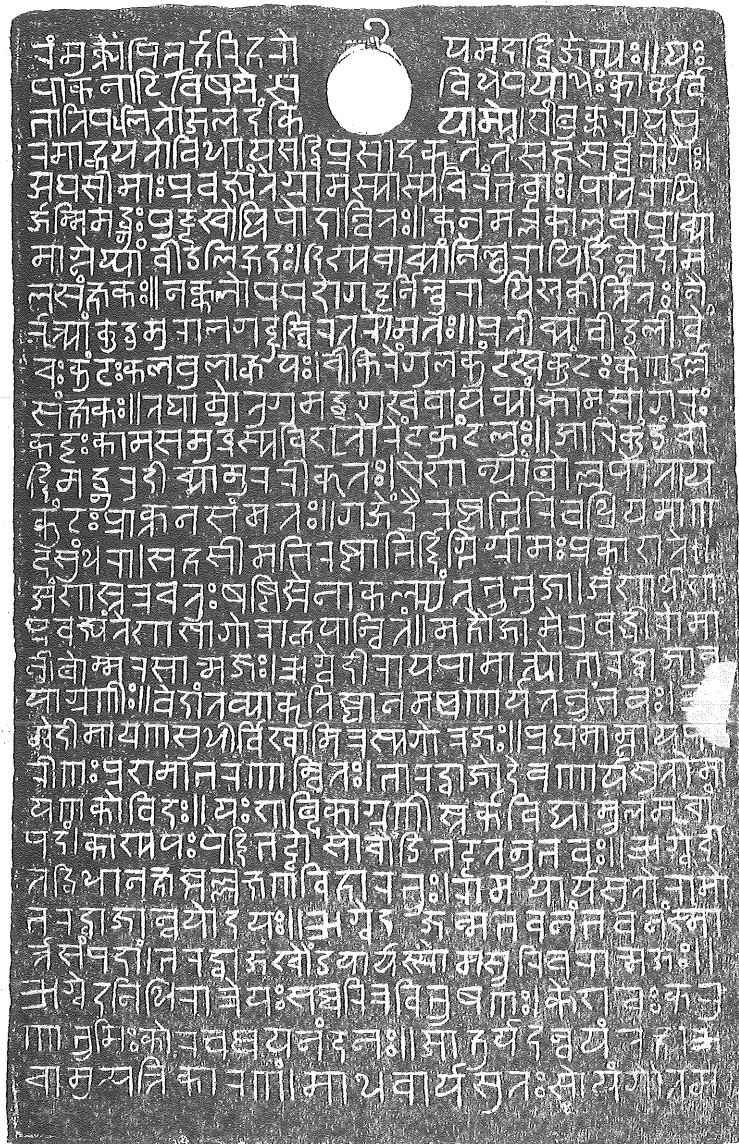


Figure 17: A plate containing a record in Nandinagari (from Visalakshy 2003: 266).

Nandinagari script नन्दिनागरी नन्दिनागरी लिपि

Vowels स्वराः स्वराः

अ	आ	इ	ई	उ	ऊ
a अ	ā आ	i इ	ī ई	u उ	ū ऊ
ऋ	ॠ	ए	ऐ	ओ	औ
r̄ ऋ	r̄ ॠ	e ए	ai ऐ	o ओ	au औ

Consonants वामानि व्यञ्जनानि

क	ख	ग	घ	ङ
ka क	kha ख	ga ग	gha घ	ṅa ङ
च	छ	ज	झ	ञ
ca च	cha छ	ja ज	jha झ	ña ञ
ट	ठ	ड	ढ	ण
ṭa ट	ṭha ठ	ḍa ड	ḍha ढ	ṇa ण
त	थ	द	ध	न
ta त	tha थ	da द	dha ध	na न
प	फ	ब	भ	म
pa प	pha फ	ba ब	bha भ	ma म
य	र	ल	व	श
ya य	ra र	la ल	va व	śa श
ष	स	ह	ळ	र
ṣa ष	sa स	ha ह	ḷa ळ	ra र

Figure 18: Handwritten chart of Nandinagari characters (courtesy of Srinidhi A., Tumkur, Karnataka).

## Vowel signs

क का कि की कु कु क् क् के कै को को  
ka kā ki kī ku kū kṛ kṛ ke kai ko kau

## Various signs

Anusvara- ँ Visarga- ः Ardhavisarga- ऌ

Avagraha- ऽ Vedic Anusvaras- ऌ, ऍ

Virama- ः

क-क, ग-ग त-त न-न, त्-त्

## Digits (Kannada digits)

० १ २ ३ ४ ५ ६ ७ ८ ९

0 1 2 3 4 5 6 7 8 9

## Variants

झ - झ, झ

चे - चो

ष - ष

ऌ - ऌ

ॠ - ॠ

ॡ - ॡ

घ - घ

ण - ण, थ

फ - फ, फ

ब - ब, ब

म - म

ष - ष, ष

स - स, स

ो - ो

ी - ी

ी - ी

ॊ - ॊ

ो - ो

Figure 19: Handwritten chart of Nandinagari characters (courtesy of Srinidhi A., Tumkur, Karnataka).



gghna	गघ		grya	ग्र्या		c-	
gja	गज		grva	ग्रव		cca	ब्र
gja	गजा		gla	गल		cca	ब्र
giva	गिवा		gva	गव		ccha	ब्रु
gda	गद		gvya	गव्या		cchya	ब्रु
gda	गद		gvra	गव्र		cchra	ब्रु
gdya	गद्या					cchla	ब्रु
gdra	गद्र		gh-			cchva	ब्रु
gdva	गद्व		ghgha	गघ		cma	ब्र
gdvya	गद्व्या		ghna	गन		cna	ब्र
gdha	गदह		ghnya	गन्या		cya	ब्र
gdhra	गदह्र		ghma	गम		cra	ब्र
ghya	गघ्या		ghya	गघ्या		cva	ब्र
gdhva	गदह्व		ghra	ग्र			
gna	गन		ghrya	ग्र्या		i-	
gnya	गन्या		ghva	गव		ija	गि, गि
gba	गब		ghvya	गव्या			
gbha	गभ		i-			ijna	गिना
gbhya	गभ्या		rita	रि		ijya	गिया
gbhra	गभ्र		rina	रि		ijva	गिवा
gma	गम		riya	रि		ijha	गिह
gmya	गम्या		rma	रि, रि, रि		ina	गि
gya	ग्या		niva	रि			
gra	ग्र						

Figure 21: Handwritten table of Nandinagari conjuncts (courtesy of Srinidhi A., Tumkur, Karnataka).

ṅīya	ङी	ṭtra	टत्र,	ḍjā	डजा
ṅīva	ङीव	ṭva	टव	ḍjya	डजी
jma	जम	ṭpa	टप	ḍḍa	डड
jmya	जमी	ṭpra	टप्र	ḍḍha	डढ
jya	जी	ṭpha	टफी	ḍḍhya	डढी
jva	जीव	ṭma	टम	ḍḍhva	डढ्व
jya	जी	ṭya	टय	ḍḍa	डड
jva	जीव	tra	ट्र	ḍḍva	डडव
jya	जी	ṭva	टव,	ḍba	डब,
ṭ-		ṭṣa	ट्, ट्	ḍbha	डभ,
ṭka	टक,	ṭsa	ट्सा	ḍbhya	डभ्य,
	टक	ṭsa	टसा	ḍma	डम
ṭkra	टक	ṭsva	टसव	ḍya	डय
ṭca	टच	ṭh-		ḍra	डर
ṭcha	टच	ṭhya	ट्ही	ḍla	डल
ṭta	टट,	ḍ-		ḍva	डव,
	टट,	ḍg	डङ	ḍya	डय
	टट,	ḍgya	डङी	ḍra	डर
	टट,	ḍgra	डङी	ḍhya	डङी
ṭta	टट	ḍgha	डङ्व	ḍh-	
	टट	ḍja	डङ	ḍhya	डङ
				ḍhra	डङ्व

Figure 22: Handwritten table of Nandinagari conjuncts (courtesy of Srinidhi A., Tumkur, Karnataka).

dhva	धु		ttma	तम		trva	त्र
n-			ttya	तय		tva	त्व, व
nna	नन		ttra	त्रे त्र		tvya	व्य
nna	न्र		ttrya	त्र्य		tsa	स
nma	नम, मम		ttva	त्र		tska	स्क
nya	नय, मय		tsa	स		tskha	सख
nva	नव		ttha	थ		tsta	सत
nvya	नव्य		tthya	थ्य		tstra	सत्र
t-			tna	न		tstha	सथ
tka	क		tnya	न्य		esthya	सथ्य
tkya	क्य		tnva	नव		tsna	सन
tkva	कव		tpa	त		tspa	सप
tkla	कल		tpra	त्र		tspra	सप्र
tkla	कै		tpla	तल		tspha	सफ
tksa	कस		tpha	तफ		tsphya	सफ्य
tkṣma	कṣम		tna	न		tsma	सम
tkṣva	कṣव		tmya	म्य		tsya	स्य
tka	तस, स		tya	त		tsra	स्र
tkhya	सथ		tyva	तव		tsra	स्र
tta	त		tpa	त, ञ		th-	
ttna	तन		trya	त्र		thna	थ
						thnya	थ्य
						thya	थ्य

Figure 23: Handwritten table of Nandinagari conjuncts (courtesy of Srinidhi A., Tumkur, Karnataka).

thra	𑒦	dna	𑒧	dhya	𑒧𑒛
thva	𑒦𑒛	dva	𑒧𑒛	dhra	𑒧𑒛𑒦
d-	𑒧	dvra	𑒧𑒛𑒦𑒛	dhrya	𑒧𑒛𑒦𑒛𑒧
dga	𑒧𑒛	dbha	𑒧𑒛𑒧	dhva	𑒧𑒛𑒦𑒛
dgra	𑒧𑒛𑒛	dbhya	𑒧𑒛𑒧𑒛	dhnya	𑒧𑒛𑒦𑒛𑒧𑒛
dglā	𑒧𑒛𑒛𑒛	dbhra	𑒧𑒛𑒧𑒛𑒦	dhvra	𑒧𑒛𑒦𑒛𑒦𑒛
dghē	𑒧𑒛𑒛𑒛𑒛	dhva	𑒧𑒛𑒦𑒛	n-	𑒧
dghra	𑒧𑒛𑒛𑒛𑒦	dma	𑒧𑒛𑒧𑒛	nka	𑒧𑒛𑒧
dghra	𑒧𑒛𑒛𑒛𑒦𑒛	dmya	𑒧𑒛𑒧𑒛𑒧	nkra	𑒧𑒛𑒧𑒛𑒧
dda	𑒧𑒛𑒛	dya	𑒧𑒛𑒧	nkla	𑒧𑒛𑒧𑒛𑒧𑒛
ddya	𑒧𑒛𑒛𑒛	dra	𑒧𑒛𑒧𑒛	nkva	𑒧𑒛𑒧𑒛𑒧𑒛𑒦
ddra	𑒧𑒛𑒛𑒛𑒛	drya	𑒧𑒛𑒧𑒛𑒧	nkṣa	𑒧𑒛𑒧𑒛𑒧𑒛𑒧
ddva	𑒧𑒛𑒛𑒛𑒦	drva	𑒧𑒛𑒧𑒛𑒦	nkha	𑒧𑒛𑒧𑒛𑒧𑒛𑒧𑒛
ddha	𑒧𑒛𑒛𑒛𑒦𑒛	dva	𑒧𑒛𑒧𑒛𑒦𑒛	nknya	𑒧𑒛𑒧𑒛𑒧𑒛𑒧𑒛𑒧𑒛
ddhma	𑒧𑒛𑒛𑒛𑒦𑒛𑒛	dvya	𑒧𑒛𑒧𑒛𑒦𑒛𑒧	nga	𑒧𑒛𑒧𑒛𑒦
ddhya	𑒧𑒛𑒛𑒛𑒦𑒛𑒛𑒛	dvra	𑒧𑒛𑒧𑒛𑒦𑒛𑒧𑒛	ngḥa	𑒧𑒛𑒧𑒛𑒦𑒛𑒧
ddhva	𑒧𑒛𑒛𑒛𑒦𑒛𑒛𑒦	dh-	𑒧𑒛𑒧𑒛	nna	𑒧𑒛𑒧𑒛𑒦𑒛
ddhva	𑒧𑒛𑒛𑒛𑒦𑒛𑒛𑒦𑒛	dhra	𑒧𑒛𑒧𑒛𑒧	nnya	𑒧𑒛𑒧𑒛𑒦𑒛𑒧
ddhva	𑒧𑒛𑒛𑒛𑒦𑒛𑒛𑒦𑒛𑒛	dhḍha	𑒧𑒛𑒧𑒛𑒧𑒛	nnva	𑒧𑒛𑒧𑒛𑒦𑒛𑒧𑒛
ddhva	𑒧𑒛𑒛𑒛𑒦𑒛𑒛𑒦𑒛𑒛𑒛	dhnya	𑒧𑒛𑒧𑒛𑒧𑒛𑒧	npa	𑒧𑒛𑒧𑒛𑒦𑒛𑒧𑒛
ddhva	𑒧𑒛𑒛𑒛𑒦𑒛𑒛𑒦𑒛𑒛𑒛𑒛	dhma	𑒧𑒛𑒧𑒛𑒧𑒛𑒧	npṛa	𑒧𑒛𑒧𑒛𑒦𑒛𑒧𑒛𑒦

Figure 24: Handwritten table of Nandinagari conjuncts (courtesy of Srinidhi A., Tumkur, Karnataka).



npla	नप्ल			pma	पू
npsa	नपस	nsna	नस	pya	प
npha	नपि	nspa	नसप	pra	प्र
nba	ब	nsma	नसम	prya	प्र
nbra	ब्र	nsya	नस	pla	प्र
nbha	भ	nsra	नस	pva	व
nbhra	भ्र	nsva	नसव	psa	स
nma	म	nha	नह	psa	स
nmya	म	p-		psna	स
nmra	म	pka	क	psnya	स
nmla	म	pca	व	psya	स
nya	न	pccha	वृ	psva	स
nyva	न	pta	प	b-	
nra	र	pna	न	bga	ग
nva	व	pta	न,त	bgra	ग
nvya	व	ptya	त	bja	ज
nvna	व	ptrya	त		क
nsa	स	ptva	त	bija	ज
nsa	स	pna	न	bda	द
nska	सक	pnya	न	bdya	द
nsta	स	ppa	प	bdhva	द
nstha	स	ppra	प	bdhya	द
	स	pph	प		द

Figure 25: Handwritten table of Nandinagari conjuncts (courtesy of Srinidhi A., Tumkur, Karnataka).



vya	व्या	ऽ-		ऽra	र	ssa	सस
vra	व्र	ऽka	क	ऽva	व	ssya	सस्य
vla	व्ल	ऽkya	क्या	s-	स	ssva	सस्य
wa	व्व, व	ऽkra	क्र	ska	स्क	h-	
ś-		ऽkla	क्ल	sta	स्त	hna	ह्न
śca	श्च	ऽkva	क्व	stma	स्म	nna	न्न
ścya	श्च्य	ऽsta	स्त	stya	स्त्या	hnya	ह्न्या
ścha	श्च	ऽtja	त्ज	stya	स्त्या	hna	ह्न
śna	श्न	ऽtja	त्ज	stra	स्त्र	hmya	ह्न्या
śnya	श्न्य	ऽtra	त्र	stya	स्त्या	hya	ह्य
śpa	श्प	ऽtrja	त्रज	stva	स्त्व	hra	ह्र
śma	श्म	ऽtrja	त्रज	stha	स्थ	hla	ह्ल
śmya	श्म्य	ऽva	व	sthna	स्थन	hva	ह्व
śya	श्य	ऽna	न	sthya	स्थ्य	hva	ह्व
śra	श्र	ऽnya	न्य	sthya	स्थ्य	l-	
śrya	श्य	ऽnva	न्य	sna	स्न	lga	लग
śrva	श्र्व	ऽpa	प	sny	स्य	ly	ल्य
śla	श्ल	ऽpa	प	spa	स्प	lka	लक
śva	श्व	ऽpya	प्य	spra	स्प	lila	ल्ल
śvya	श्व्य	ऽpra	प्र	spha	स्फ		
śśa	श्र	ऽpla	प्ल	sphya	स्फ्य		
		ऽpva	पव	sma	स्म		
		ऽpha	फ	smya	स्म्य		
		ऽma	म	sya	स्य		
		ऽmya	म्य	sya	स्य		
		ऽya	य	sya	स्य		
				sva	स्व		
				svya	स्व्य		

Figure 27: Handwritten table of Nandinagari conjuncts (courtesy of Srinidhi A., Tumkur, Karnataka).

## CHAPTER II

## ALPHABETS AND NUMERALS

Nandināgarī has twelve vowel letters and thirty five consonant letters. The number excludes 'a' with anuvāra and 'a' with visarga. In the inventory of Nandināgarī alphabets 'kṣa' and 'jña' are treated as single letters. In the case of the letter for 'kṣa' it does not show any apparent resemblance with the letters of ka and ṣa. However, in the case of 'jña' it has some resemblance with the letter ja. The letter for 'ba' is very often used to represent 'va' and the letter for 'sa' is commonly used to represent 'śa'. Since a few instances are noticed where sa-śa and ba - va are distinguished by separate letters, all the four are included in the inventory of letters.

## VOWELS

There exists only four basic vowel letters. The other letters representing vowels are only derivations. These four primary vowel letters are those which represent a, i, u and e. The long vowels ā, ī, and ū are derived by the use of subsidiary symbols. The vowels ṛ and ṝ are derived from the consonant letters 'ra' and 'la'. The letters for long vowels ṝ and ṝ̄ are absent. The diphthong 'ai' is formed by the use of subsidiary symbol with the letter for the vowel 'e', the letters for 'o' and 'au' are formed by adding subsidiary symbols to the letter 'ā'. The vowels of Nandināgarī script are given below.

NANDINĀGARĪ	ROMAN	DEVANĀGARĪ
अ	A	अ
आ	Ā	आ
इ	I	इ

NANDINĀGARĪ	ROMAN	DEVANĀGARĪ
ओ	O	ओ
औ	AU	औ

## CONSONANTS

The basic consonant letters of Nandināgarī, similar to that of other Indian scripts, indicate the consonant + the vowel 'a'. As in Devanāgarī, letters are found for all the varga consonants. When a pure consonant i.e. without any vowel is to be represented, a separate subsidiary symbol which is identical with the symbol in the Devanāgarī script is found to be in use. Eg. (k), (c), (t). The consonant letters are as follows:

NANDINĀGARĪ	ROMAN	DEVANĀGARĪ
क	KA	क
ख	KHA	ख
ग	GA	ग

NANDINĀGARĪ	ROMAN	DEVANĀGARĪ
ई	Ī	ई
उ	U	उ
ऊ	Ū	ऊ
ऋ	Ṛ	ऋ
ॠ	Ṝ	ॠ
ए	E	ए
ऐ	AI	ऐ

NANDINĀGARĪ	ROMAN	DEVANĀGARĪ
घ	GHA	घ
ङ	ṆA	ङ
च	CA	च
छ	CHA	छ
ज	JA	ज
झ	JHA	झ
ञ	ṆA	ञ

Figure 28: Charts showing basic characters of Nandinagari (from Visalakshy 2003: 20–23).

NANDINĀGARĪ	ROMAN	DEVANĀGARĪ
ट	ṬA	ट
ठ	ṬHA	ठ
ड	ḌA	ड
ढ	ḌHA	ढ
ण	ṆA	ण
त	TA	त
थ	THA	थ

NANDINĀGARĪ	ROMAN	DEVANĀGARĪ
द	DA	द
ध	DHA	ध
न	NA	न
प	PA	प
फ	PHA	फ
ब	BA	ब
भ	BHA	भ

NANDINĀGARĪ	ROMAN	DEVANĀGARĪ
म	MA	म
य	YA	य
र	RA	र
ल	LA	ल
व	VA	व
श	ŚA	श
ष	ṢA	ष

NANDINĀGARĪ	ROMAN	DEVANĀGARĪ
स	SA	स
ह	HA	ह
क्ष	KṢA	क्ष
ज्ञ	JṆA	ज्ञ

## ANUSVĀRA AND VISARGA

Anusvāra                      °

Visarga                         :

Figure 29: Charts showing basic characters of Nandinagari (from Visalakshy 2003: 24–27).

]. For the combination of the vowel 'i' with consonants, instead of a separate subsidiary symbol the letter for 'i' itself is used.

**Subsidiary Symbols of Vowels:**

SUBSIDIARY SYMBOL (NANDINĀGARĪ)	VOWEL REPRESENTED	DEVANĀGARĪ
𑌗	Ā	आ
𑌘	I	इ
𑌙	Ī	ई
𑌚	U	उ
𑌛	Ū	ऊ
𑌜	Ṛ	ऋ

SUBSIDIARY SYMBOL (NANDINĀGARĪ)	VOWEL REPRESENTED	DEVANĀGARĪ
𑌝	E	ए
𑌞	AI	ऐ
𑌟	O	ओ
𑌠	AU	औ

**Letters Representing Consonant Vowel Combinations**

Though 'r' does not occur with all consonants, its combination with consonants is not very much restricted and also has a regular pattern. Hence all C+r combinations are given. Only very few examples are found for the occurrence of consonant +vowel 'i'.

NANDINĀGARĪ	ROMAN	DEVANĀGARĪ
𑌡	KA	क

NANDINĀGARĪ	ROMAN	DEVANĀGARĪ
𑌢	KĀ	का
𑌣	KI	कि
𑌤	KĪ	की
𑌥	KU	कु
𑌦	KŪ	कू
𑌧	KṚ	कृ
𑌨	Kḷ	क्लृ

NANDINĀGARĪ	ROMAN	DEVANĀGARĪ
𑌩	KE	के
𑌪	KAI	कै
𑌫	KO	को
𑌬	KAU	कौ
𑌭	KHA	ख
𑌮	KHĀ	खा
𑌯	KHI	खि

Figure 30: Dependent vowel signs in Nandinagari (from Visalakshy 2003: 30–33).

## NUMERALS

In order to represent numerals, Nandināgarī uses ten symbols. They are as follows:

NANDINĀGARĪ	ROMAN	NANDINĀGARĪ	ROMAN
०	0	𑌵	5
𑌶	1	𑌶	6
𑌷	2	𑌷	7
𑌸	3	𑌸	8
𑌹	4	𑌹	9

The combination of these symbols derive higher numerals. The patterns of combinations are same as in Devanāgarī. The following are some examples:

NANDINĀGARĪ	ROMAN	NANDINĀGARĪ	ROMAN
𑌶𑌵	10	𑌶𑌵𑌵𑌵	1000
𑌶𑌶	11	𑌷𑌷𑌸𑌵	2235

Figure 31: Nandinagari digits (from Visalakshy 2003: 86).

CHAPTER VII  
VARIANTS

Some variant letters/symbols noticed in Nandināgarī are given here. Some of the variants may be due to the interference of other writing systems such as Devanāgarī.

Nandināgarī		Letter Represented	
Regular Form	Variant Form	Roman	Devanāgarī
उ	उ	u	उ
रु	रु	r	ऋ
वे	वे, वे	e	ए
वे	वे, वे	ai	ऐ
कु	कु	ku	कु

Nandināgarī		Letter Represented	
Regular Form	Variant Form	Roman	Devanāgarī
कु	कु, कु	kū	कू
क्र	क्र	kra	क्र
ख	ख, ख	kha	ख
चा	चा	cā	चा
चि	चि	ci	चि
छ	छ, छ, छ	cha	छ

Nandināgarī		Letter Represented	
Regular Form	Variant Form	Roman	Devanāgarī
ठ	ठ	ṭha	ठ
ल	ल	tna	ल
त्र	त्र, त्र	tra	त्र
त्व	त्व	tva	त्व
द्य	द्य	dya	द्य
ध	ध, ध, ध, ध, ध	dha	ध

Nandināgarī		Letter Represented	
Regular Form	Variant Form	Roman	Devanāgarī
प	प	pa	प
प्प	प्प	ppa	प्प
फ	फ, फ	pha	फ
ब	ब, ब	ba	ब
भू	भू	bhū	भू
म	म, म, म	ma	म

Figure 32: Glyphic variants in Nandinagari (from Visalakshy 2003: 235–238).



Nandināgarī		Letter Represented	
Regular Form	Variant Form	Roman	Devanāgarī
य	य	ya	य
र	र	ra	र
रु	रु	rū	रु
ल	ल	la	ल
ल	ल	rla	ल

Nandināgarī		Letter Represented	
Regular Form	Variant Form	Roman	Devanāgarī
ष	ष	ṣa	ष
ष्ट	ष्ट	ṣṭa	ष्ट
श्री	श्री	śrī	श्री
ज्ञ	ज्ञ	jñā	ज्ञ
०(Anusvāra)	०	ṁ	०

Nandināgarī		Letter Represented	
Regular Form	Variant Form	Roman	Devanāgarī
२	२	2	२
६	६	6	६
७	७	7	७
९	९	9	९

Figure 33: Glyphic variants in Nandinagari (from Visalakshy 2003: 235–238).

The following letters show close resemblance and care is required to distinguish them.

	NANDINĀGARĪ	ROMAN	DEVANĀGARĪ
SET I	३	I	इ
	उ	U	उ
	३	DA	ड
	३	JA	ज
SET II	७	JHA	झ
	७	RA	र

	ROMAN	DEVANĀGARĪ	NANDINĀGARĪ
SET III	७	TA	त
	७	BHA	भ
SET IV	३	NA	ड
	३	DA	द
SET V	७	PA	प
	७	YA	य

**CONSONANT VOWEL COMBINATIONS**

As already pointed out, the basic consonant letter represents the combination of consonant and the vowel 'a'. All the other vowel combinations with the consonants are represented by using subsidiary symbols with the basic consonant letter except in the case of

Figure 34: Internal 'confusables' in Nandinagari (from Visalakshy 2003: 28–29).

*Appendix: Distinctive Features of Nandinagari*

<i>Vowels</i>	<i>Initial</i>	<i>Diacritic</i>	<i>k-Ligatures</i>
a	𑂔 & 𑂕 & 𑂖		𑂗
ā	𑂔𑂇 & 𑂕𑂇 & 𑂖𑂇	𑂇	𑂗𑂇
i	𑂔 & 𑂕	𑂇 & 𑂇 & 𑂇	𑂗 & 𑂗 & 𑂗
ī	𑂔𑂇 & 𑂕𑂇	𑂇	𑂗𑂇
u	𑂔 & 𑂕	𑂇	𑂗
ū	𑂔 & 𑂕	𑂇	𑂗
r	𑂔 (=“r̄”)	𑂇	𑂗
r̄	𑂔 (=“r̄”)	𑂇	𑂗
l	(not documented)	𑂇	𑂗
l̄	(not documented)		
e	𑂔 & 𑂕	𑂇	𑂗
ai	𑂔 & 𑂕	𑂇	𑂗
o	𑂔 & 𑂕	𑂇	𑂗
au	𑂔	𑂇	𑂗

Figure 35: Distinctive features of Nandinagari (from Grünendahl 2001: 201).

202

APPENDIX

*Consonants: Velar**Retroflex*

ka	क	ṭa	ट & ट & ट
kha	ख & ख	ṭha	ठ & ठ & ठ (cf. ḍha)
ga	ग & ग & ग & ग & ग	ḍa	ड & ड
gha	घ & घ	ḍha	ढ
ṅa*	ङ	ṅa	ण

*Palatal**Dental*

ca	च & च	ta	त
cha	छ & छ & छ (cf. ccha)	tha	थ & थ
ja	ज & ज	da	द & द
jha†	झ	dha	ढ & ढ & ढ
ña	(not documented)	na	न

\* interpolated from conjuncts

† to be distinguished from ञ ru

Figure 36: Distinctive features of Nandinagari (from Grünendahl 2001: 202).

NANDINAGARI		203	
<i>Labial</i>		<i>Sibilants</i>	
pa	प & प	śa	री & री
pha	फ़ & फ़	ṣa	ष & ष
ba	ब	sa	री & री
bha	त & त		
ma	म		
<i>Sonorants</i>		<i>Other</i>	
ya	य & य & प & प & ण	ha	रु & रु
ra	र	la	ल
la	ल & ल		
va	व & व		

Figure 37: Distinctive features of Nandinagari (from Grünendahl 2001: 203).

204

APPENDIX

*Additional Graphs*○ *-ṁ (anusvāra)*ॐ *-ñ (anunāsika)*ः & ॆ *-ḥ (visarga)*ॐ *avagraha*◻ & ◻ *virāma, e.g. -ṭ ॢ -t ॣ & ।*◻ & ◻ & ◻ *Vedic accents (preceding accented syllables)*ॐ *om**Numerals (cf. pp. 138, 180)*

○	॑	॒ & ॒ & ॑ & ॑	क़	ख़ & ख़
1	2	3	4	5
ॆ & ॆ	॑ & ॑	√ & √	ॆ & ॆ	○
6	7	8	9	0

Figure 38: Distinctive features of Nandinagari (from Grünendahl 2001: 204).

*Conjuncts*

kka	क		gga	ग
kca	क		gna	ग
kta	क	क	gya	ग
ktyā	क		gra	ग
ktra	क	क	gla	ग
ktva	क	क		
ktha	क		ghna	ग
kya	क	क		
kra	क		ñ-	<i>usually appears as anusvāra</i>
kla	क	क	ñmu	क
kṣa	क	kṣū		
kṣma	क		cca	क
kṣmyā	क		ccha	क (cf. cha) क
kṣya	क		cchṛ	क (also for cchru)
			cchva	क
khya	क		cya	क

Figure 39: Distinctive features of Nandinagari (from Grünendahl 2001: 205).

206		APPENDIX		
cyu	चु		dhva	धु
cra	च			
			ṅya	ण्य ण
jjha	ज्ज		ṅva	ण्व
jña	ज्ञ			
jñya	ज्ञ्य		tka	क क्त
jya	ज्य	ज्य	tta	त्त त्त
jyo	ज्यो	ज्यो	tna	न्त
jva	ज्व		tpa	त्प त्तप
			tpra	त्प्र
			tpha	त्फ
			tma	त्म
ṭya	ट्य		tmya	ट्य
ṭva	ट्व		tya	त्य
			tra	त्र
ḍya	ड्य		trya	ट्र्य

Figure 40: Distinctive features of Nandinagari (from Grünendahl 2001: 206).



		NANDINAGARI			
tva	व			dhva	ध्व ध
t	त	त्	त्		
tsya	त्स्य			nta	न्त न्त
tsva	त्सव			nma	न्म
				nya	न्य न्यु न्य
dga	ङ			nva	न्व
dda	ड	दु	डु डू		
ddha	ड्ह	ड्	डू	pta	प्ट
dba	डब			pna	प्न
dbra	डब्र			pno	प्नो प्नौ
dma	डम			pra	प्र प्
dya	ड्य	दु	डु		
dra	ड्र	ड्र		bda	ड्ड
dva	ड्व			bra	ड्र
dhya	ध्या धय			bhya	ड्य

Figure 41: Distinctive features of Nandinagari (from Grünendahl 2001: 207).

208		APPENDIX	
bhra	𑂒	vya	𑂗
		vra	𑂘
mpa	𑂙		
mya	𑂚	śca	𑂛
mra	𑂛	śna	𑂜
		śya	𑂝
yya	𑂞 𑂟	śra	𑂞
		śrī	𑂟 𑂠
rda	𑂡	śva	𑂡
rma	𑂢		
rya	𑂣	ṣka	𑂤 𑂥
rṣa	𑂦	ṣkr	𑂦
rṣe	𑂧	ṣta	𑂧
rṣya	𑂨	ṣtra	𑂨
		ṣtva	𑂩 𑂪
lkya	𑂫	ṣtha	𑂫 𑂬

Figure 42: Distinctive features of Nandinagari (from Grünendahl 2001: 208).

NANDINAGARI			
ṣṇa	ṣṇ		sma रम रम
ṣṇu	ṣṇ		sya रय रय
ṣṇva	ṣṇ		sra रर रर
ṣma	ṣṃ	ṣṃ	sva रव रव
ṣya	ṣṃ		
ṣva	ṣṃ		hna र्न
			hma र्न
ska	रक	रक	hya रग
sta	रस	रस	hla र्ल
stra	रर	रर	hva रव
stha	रथ	रथ	रच

Figure 43: Distinctive features of Nandinagari (from Grünendahl 2001: 209).

<u>Vowels</u>				
अ a(अ)	आ ā(आ)	इ i(इ)	ई ī(ई)	
उ u(उ)	ऊ ū(ऊ)	ऋ ṛ(ऋ)	ॠ ṝ(ॠ)	
ए e(ए)	ऐ ai(ऐ)	ओ o(ओ)	औ au(औ)	
<u>Consonants</u>				
क k(क)	ख kh(ख)	ग g(ग)	घ gh(घ)	ङ ṅ(ङ)
च c(च)	छ ch(छ)	ज j(ज)	झ jh(झ)	ञ ñ(ञ)
ट ṭ(ट)	ठ ṭh(ठ)	ड ḍ(ड)	ढ ḍh(ढ)	ण ṇ(ण)
त t(त)	थ th(थ)	द d(द)	ध dh(ध)	न n(न)
प p(प)	फ ph(फ)	ब b(ब)	भ bh(भ)	म m(म)
य y(य)	र r(र)	ल l(ल)	व v(व)	
श ś(श)	ष ṣ(ष)	स s(स)	ह h(ह)	

Figure 44: A chart showing letters of Nandinagari (from Mukhopadhyaya 2005).