Preliminary proposal to encode Tigalari script in Unicode

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KEY :   **PBF**   Post-Base Form

          VS   Vowel Sign

          (to the left of a character) ⬚ (to the right of a character)

1   Introduction

This proposal attempts to present a coherent orthography for the archaic Tigalari script as seen used predominantly in hand-written manuscripts. Additionally, it records the recently added characters that are being used to support the Tulu language. All the recommendations made in this proposal are the author's view alone.

The Tigalari[1] script is commonly seen inscribed on several palm leaf manuscripts that are found all along the western coastal belts and the Sahyadri mountain ranges (*Malanad*) of Karnataka and the northern districts of Kerala.

Since Tigalari was never used in a printed format, it gradually fell into disuse and was forgotten as a secret script (*Gupta lipi*). The large number of manuscripts available in this script have been found to be of great value due to the variety and complexity of topics covered by them.[2] A vast majority of these manuscripts are being restored, catalogued, digitised and studied today by several institutions.[3] The research community would therefore find it useful to have a Unicode supported Tigalari typeface.

On another front, there is a renewed interest in the Tigalari script among the Tulu speaking community as this script was previously used in the Tulu speaking regions. Tulu language requires a few additional characters in Tigalari to support it fully. It would therefore be useful to include these in the Tigalari block as there is a ready need for them.

Tigalari has not been formally standardized in the past as the missionaries chose to use the Kannada script instead. The glyphs referred to here are based on: hand written samples found largely on palm leaf/paper manuscripts, stone/metal inscriptions and the works of several scholars who have studied this script closely (Refer Figures 1-4). It has to be noted here that the Tigalari script in most of these samples are surprisingly similar in their orthography and letter construction considering there was no formal standard that was followed. The samples studied are largely from libraries and private collections found across the sates of Karnataka, Tamil Nadu and Kerala. A handful of users who still practice this script were also contacted.

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1   Tiga<u>l</u>āri

2   There are over 3,000 manuscripts in the Udupi Mutts alone. Over 500 manuscripts at Dharmasthala and 4000 manuscripts recorded in the Descriptive Catalogue of Tigalari Palm Leaf Manuscripts complied Keladi Gunda Jois and S.R. Rao. There would be several thousands more if you take into account manuscripts found in smaller temples and homes of people of this region along with many manuscripts found in libraries and archives across India.

3   Several manuscripts are being restored, digitized and read in places like Udupi Mutts (Udupi, Mangalore, Sirsi etc.,), Dharmasthala Trust (Mangalore), Tara Prakashana (Bangalore), French Institute of Pondicherry (Puducherry), Poornaprajna Samshodhana Mandiram (Bangalore), Keladi Museum (Sagara), Govind Pai Research Institute (Udupi) to name a few. A few digitised manuscripts from FIP are available online : http://www.ifpindia.org/manuscripts/

1.1   Script Name

The script being proposed here is known by several names. The four commonly used ones are listed below :

NAME OF THE SCRIPT	PREVALENT IN	REFERENCES TO THEIR ROOTS
Arya Ezhuttu / Grantha Malayalam	Kerala	Malayalam Speakers, Manipravala, Tamil Grantha
Western Grantha/ Tulu-Malayalam[4]	Few academic publications	19th Century Western Scholars
Tigalari	*Malanadu* (hilly) regions of Karnataka	Kannada speakers, Havyaka, National Manuscript Mission Catalogues
Tulu Lipi/ Tulu Grantha Lipi	Coastal Karnataka	Tulu speakers, A C Burnell

The name by which this script is referred to is closely tied with its regional, linguistic or historical roots. It would not be wrong to assign all the names mentioned above to this script. Considering the technical difficulties in doing so, listed below are a few the reasons for choosing the name 'Tigalari' in the current context.

Arya Ezhuttu or the more recently coined term: Grantha Malayalam is used to refer to this script in Kerala. *Arya Ezhuttu* covers the spectrum between the older script (that is Tigalari) until it was standardised by the lead types for Malayalam script (old style) in Kerala.[5]

'Tigalari' is used to this day by the Havyaka brahmins of the *Malanadu* region. Tigalari is also the term that is commonly used to refer to this script in most manuscript catalogues and in several academic publications today. Prof. Gunda Jois has studied this script closely for over four decades now. According to his findings that were based on evidences found in stone inscriptions (Refer Figure 5), palm leaf manuscripts and early research work done by western scholars like Prof. B L Rice, he finds the only name used for this script historically has been 'Tigalari'.

This script is commonly known as the Tulu script or Tulu Grantha script in the coastal regions of Karnataka. There are several recent publications and instructional books for learning this script. It is also called the Tulu script in—Elements of South Indian

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4   Rev. A C Burnell refers to this script as Tulu-Malayalam script and calls it a form of western Grantha script. The Grantha script used in the Tamil region is in the same sentence called the Eastern Grantha script. (page 41.)

5   Kerala as a region was very similar linguistically to Tamil Nadu until the *Manipravala* period. This is when Malayalam as a language took shape. This was a time of social shift where Sanskrit as a language was being promoted to build an identity in this region independent of its neighbours. This was driven by a demand for an equal society which addressed region, caste and gender. Until this time we find Vattezhttu and Kolezhuttu being used as the dominant scripts of this region (similar to Tamil Nadu). These two scripts had a limited character-set and were inadequate to write this new Sanskritised language.

Tigalari, which had evolved from the later Chola Grantha script, precisely to write Sanskrit, was being used then by the brahmins to the north of Kerala. To this day, its common for brahmins of this region to travel to Kerala for studying Astrology. Its possible that this Tigalari script (called Arya Ezhuttu in Kerala) was widely adopted here simply because it was a readily available script that better supported this new shift in language. Simultaneously in the Tamil regions, Grantha script was used to write Sanskrit. Thunchaththu Ramanujan Ezhuthachan, a 16th century poet is credited as the father of Malayalam language and script. Further study into the topic would be necessary as there is no concrete proof available to substantiate this.

Palaeography by Rev. A C Burnell and a couple of other early publications of the Basel Mission press, Mangalore.

The question arises whether 'Tulu' or 'Tigalari' should be chosen as a name for this script. I would like to suggest adopting the term 'Tigalari Script' for all practical purposes of the script encoding. Tigalari is more inclusive as it was often referred to by this name in both the Tulu and *Malanadu* regions where this script was in use predominantly. The alternate 'Tulu Script' can be added as an alias similar to the alternate names added to Siddham and Tai Tham scripts.

1.2 Geography

Tigalari was used along the western coastal regions of South India (from Goa to Kasargod) and the surrounding mountain ranges of the western ghats (Sahyadri). These regions would mainly comprise *Uttara Kannada*, Udupi, Mangalore and Shimoga districts of Karanataka and Kasaragod district in Kerala.

1.3 Languages

Tigalari was used to write Sanskrit, Tulu and Kannada languages. It was used mostly by the Shivalli (Tulu speaking), Havyaka (Kannada/Malayalam speaking) and Kota (Kannada speaking) brahmins to write Sanskrit religious texts. We also find a few examples of Tigalari manuscripts containing original pieces of Tulu (Refer Figures 12, 14) and Kannada literature (Refer Figures 7, 10).[6] The orthography of Tigalari is influenced by other dominant languages/ scripts like Nandinagari, Kannada, Tamil Grantha and Malayalam (Refer Figure 6). We find several predominantly Tigalari manuscripts that use multiple scripts (Refer Figures 8, 9). The commonly found scripts in such manuscripts are Kannada and Nandinagari.

2 History of Tigalari Script

There is a lack of material/research available for accurately dating the introduction of this script to these regions and the reasons for doing so when there were several other scripts that were actively used here at the time to write Sanskrit.

In a few of the older manuscript examples found so far, we come across the notable philosopher and god man Madhwacharya's student Hrishikesha Teertha recording Madhwa's teachings using this script. These manuscripts are called *Sarvamoola Grantha* or the root books.[7] From this, based on the time-period that Madhwacharya might have been alive, we can comfortably come to the conclusion that Tuḷu script was being actively used in this region from at least 1300 CE.

It is commonly stated by those who have studied this script that due to geographic isolation of this region created by the western ghats to the east and the Arabian sea to its

6   Tulu books : Kaveri, Ramayana, Bhagavato, Mahabharato, Devi Mahatmyam
Kannada Books : Vamanajayanti anantavratam, Gramapaddhati, Yajnavalkya vyavaharadhiyaya, Surya-chandra grahan-adhyaya, Gokarna Mahatmyam (Note : Keladi Museum: Descriptive catalogue of Tigalari manuscripts records several Ti-galari script, Kannada language books. On inspection of a couple of these manuscripts, they appeared to contain Kannada script along with Tigalari and not Kannada language (the language was Sanskrit). Awaiting scans for the manuscripts listed here currently not available in the Museum.)

7   http://www.sciencedaily.com/releases/2006/09/060919102046.htm

west, Tigalari further evolved independently from the Chola Grantha Script.[8] Besides this, if you take into account several prominent character constructions it retains from the Chola Grantha script and the fact that it was a fully formed script when it was used in *Sarvamoola Grantha*, it seems possible that Tigalari might have existed at-least a century before Madhwa.[9]

The regions where Tigalari was used have been centres of learning for centuries and still continues to have high levels of literacy. It naturally follows that the manuscripts written in these regions; majority of which are in Tigalari script; to be of great literary and scientific value. These manuscripts cover a wide range of subjects such as: medicine, various sciences, Vedas, Sutras, Upanishads, mathematical formulae, daily accounts, astronomy, aesthetics and philosophy to name a few.

Historically, the rulers of these regions were subordinates of the larger Kannada kingdoms and they used Kannada script for official purposes. It's probably because of this along with political motivations, and economic reasons that the Basel Missionaries, who were aware of its use and having studied this script closely, thought it best to use Kannada script over Tigalari.

3   Current Situation

Tuḷu Sahitya academy, a cultural wing of the Government of Karnataka, has introduced Tuḷu language and Tigalari in schools across the Mangalore and Udupi districts. The text books for Tulu are currently in Kannada script. They are however trying to re-introduce Tigalari (called Tulu script here) by providing instructional manuals to learn this script (Refer Figure 45). A few workshops[10] conducted by them in the previous years to teach Tigalari were well attended. They have also published 'Tuḷu script' lessons on their website to popularise it.[11] Due to this increased interest in Tigalari, there is a pressing need to have a Unicode compliant Typeface that will enable its use both in print and web.

In *the Tulu speaking regions*, Tigalari is in continuous use for several ritual purposes like writing birth charts, creating charms and *Mandalas* (during *Yajña*) or for reciting/memorising religious scriptures (*Pārāyaṇa*) from manuscripts that have been handed down generations. Making new copies of the ancestral manuscripts is considered meritorious and several copies of the same manuscript are commonly found. The religious heads of the eight Mutts (*Ashta matha*) of Udupi (established over 800 years ago) have been traditionally forbidden to use any script apart from Tigalari. Due to this, we see their signatures in this script to this day (Refer Figure 9). We also find large collections of Tigalari manuscripts in these Mutts and the

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8   Rev. Burnell (EOSIP Pg. 41, 42) ascribes this script to about 8th or 9th Centuries AD and goes on to analyse the characteristic features this script and compares it with the Chola Grantha script.

9   Several stone inscriptions found in Udupi Taluk and Kadargod are currently being examined and are tentatively dated to mid 12th century based on the name references.

10   Tuḷu Script workshops are also held at Poornaprajna Vidyapeetha, Bangalore, which is affiliated to Karnataka Sanskrit University. Poornaprajna Vidyapeetha and Udupi Mutts house several scholars in Sanskrit and Tuḷu languages who also know Tigalari. Many of the old Tigalari manuscripts are serving as materials of study for Ph.D. students.

11   http://www.tuluacademy.org/en/category/tulu-alphabets/ There are several errors in representing Tigalari in this primer and therefore cannot be used as a reference.
        A Tigalari font was released by the Tulu Sahitya Academy under the name 'Tulu script Unicode Version' on 15 September 2014. This font built on Malayalam code-points. This font, despite being an interesting experiment, does not function properly to support Tigalari for academic use. It does not take advance of the advances in type technology available today that enables better representation of alternate forms and complex character constructions. Also, the font reflects a lot of contemporary Malayalam script influences in its typographic interpretation.

students are taught this script by following the lines in the manuscript as the teacher recites. Over time, one begins recognise the characters for the sounds they stand for.

Apart from this, there are several religious and government bodies who have undertaken large-scale conservation and digitisation of the Tigalari manuscripts. A working typeface for Tigalari is an immediate requirement for archival, research and documentation purposes.

4 Proposal History

This proposal is a revision of the draft proposal titled "Preliminary proposal for encoding the Tuḷu script in the SMP of the UCS", submitted on 2011-04-22 by Michael Everson.

Since this is an attempt at standardizing Tigalari for the first time in a formal manner, the characters cited there have been re-visited and at times revised after careful examination of primary sources. The glyph forms presented here are the normalized/standardized version of the script based on research into various sources.

5 Structure

Tigalari is an alpha syllabic script belonging to the Brahmic family where each letter carries an inherent schwa vowel. This vowel is commonly referred to as the vowel 'A' or [ə] in the IPA. **Its orthography is similar to Grantha[12] and Malayalam scripts** (Refer Figure 6). Today, majority of the Tigalari script users are well versed in Kannada/Malayalam and Devanagari scripts. Because of this, the switch will be mostly between these scripts and Tigalari.

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Total number of proposed characters¹³: 90
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5.1 Vowels (*Swarakshara*)

Tigalari has 16 independent vowels or *Swarakshara* which includes 2 diphthongs (ᴛɪɢᴀʟᴀʀɪ ʟᴇᴛᴛᴇʀ ᴀɪ & ᴛɪɢᴀʟᴀʀɪ ʟᴇᴛᴛᴇʀ ᴀᴜ) along with *Anuswara* and *Visarga*. Keeping with the structure of Indic proposals, *Anuswara* and *Visarga* are discussed under Section 8.1. It needs to be noted here that many scholars of the Tulu speaking region recognise retroflex vowels U (ᯱᯮᯮ), UU (ᯱᯮᯮ), E (ᯮᯮ) and EE (ᯮᯮ) as *Swarakshara* (discussed under Section 5.4). The Tigalari vowels are to be encoded atomically in Unicode even if they can be analysed visually as consisting of multiple parts. For example, Tigalari Letter AI (ᯮᯮᯮ) does not decompose as Tigalari Vowel Sign EE (ᯮ◌) + Tigalari Letter EE (ᯮᯮ). Instead, Tigalari Letter AI (ᯮᯮᯮ) will have a separate unique Unicode value. This behaviour is similar to the vowel letter behaviour in Malayalam[14].

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12   Throughout this document, 'Grantha', when used alone, refers to the modern Grantha script (U+11300–U+1137F).

13   A link for Tigalari orthography adopted by Tulu Sahitya Academy for instructional purposes : http://www.tuluworld.org/dictionary/cgi-bin/web/html/Alphabets.pdf .

14   Refer to Table 12-30 for Malayalam in The Unicode Standard 9.0 (TUS).

TIGALARI LETTER A (a)	౨ఌ
TIGALARI LETTER AA (ā)	౨ఌ
TIGALARI LETTER I (i)	౭
TIGALARI LETTER II (ī)	౭
TIGALARI LETTER U (u)	౭
TIGALARI LETTER UU (ū)	౭
TIGALARI LETTER VOCALIC R (ṛ)	౪
TIGALARI LETTER EE (ē)	౨ఌ
TIGALARI LETTER AI (ai)	౧౨ఌ
TIGALARI LETTER OO (ō)	౨
TIGALARI LETTER AU (au)	౨

TIGALARI LETTER VOCALIC RR (౪౪) & TIGALARI LETTER VOCALIC L (౬ఌ) are rare and are mostly found in the Sanskrit language *Shakta* texts as *Bijakshara*. The long syllabic lateral: TIGALARI LETTER VOCALIC LL (౬ఌ) is found only nominally in the alphabet[15]. It gets an honorary mention in the lexicon as a *Bijakshara and* doesn't appear otherwise.

TIGALARI LETTER VOCALIC RR (ṝ)	౪౪
TIGALARI LETTER VOCALIC L (ḷ)	౬ఌ
TIGALARI LETTER VOCALIC LL (ḹ)	౬ఌ

TIGALARI LETTER O & TIGALARI LETTER E are not present in the traditional Tigalari orthography. These two characters are essential for writing Tulu and Kannada languages. We see some initial attempts to introduce these characters for Tigalari in-order to write in Tulu language (Figures 42, 43 & 44). It is useful to have these characters and their equivalent vowel signs encoded for the Tulu audience who are already using this script as a part of the language and script revival exercise.

On a similar note, there were suggestions in Grantha for using the 'Virama' to denote short e/o[16]. The reasons for not adopting this practice and proposing separate characters (illustrated below) for Tigalari is discussed further under *Virama*, Section 5.4. TIGALARI LETTER O & TIGALARI LETTER E seen here have not been in previous use and have been created by the author based on discussions and careful study of the structure of Tigalari glyph shapes.

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15   The debate on whether or not to add vocalic LL character to the Sanskrit alphabet has been going on since the time of Paanini. It is he who supposedly introduced this character. Prominent Sanskrit grammarians like Apishali have questioned the existence of this. Despite this, vocalic LL needs to be encoded as this character exists in the Tigalari manuscripts. (Ref : Emeneau, M. B. "The Nasal Phonemes of Sanskrit." Language, vol. 22, no. 2, 1946, pp. 86. JSTOR, www. jstor.org/stable/410341.)

16   http://unicode.org/L2/L2011/11034-dravidian-grantha.pdf

TIGALARI LETTER O (o)   ೞ

TIGALARI LETTER E (e)   ಖ

5.2   Dependent Vowel Signs

All independent *Swarakshara* have their corresponding dependent vowel signs except for TIGALARI LETTER A (inherent). These signs combine before, after, above and below other consonants/ conjuncts, replacing the final inherent vowel 'A'. A single vowel sign attaches to a consonant/ cluster. TIGALARI VOWEL SIGN AA is seen combining with other independent vowels in a few manuscripts to indicate the elongation of the shorter vowels[17]. This behaviour of 'aa' as a vowel lengthening sign should be supported by rendering engines. The vowel signs' decomposition is similar to their Malayalam counterparts.

Right spacing vowel signs :

Vowel signs AA, I & II are placed to the right of a character/conjunct.

TIGALARI VOWEL SIGN AA (ā) ೦ೕ

ೞೕ   =   ೞ   +   ೕ
KAA   KA   A-vs

TIGALARI VOWEL SIGN I (ī) ೦

ೞ   =   ೞ   +
KAA   KA   I-vs

TIGALARI VOWEL SIGN II (ī) ೦

ೞ   =   ೞ   +
KAA   KA   II-vs

Vowel signs re-ordered to the left of the base character :
Tigalari vowel signs E, EE & AI re-order; appearing before a character/conjunct. TIGALARI VOWEL SIGN E is a recent introduction and the representative glyph seen here is recommended by the author based on the behaviour of other similar Tigalari characters.

TIGALARI VOWEL SIGN E (e) ೨೦

೨ೞ   =   ೞ   +   ೨೦
KE   KA   E-vs

TIGALARI VOWEL SIGN EE (ē) ೧೦

೧ೞ   =   ೞ   +   ೧೦
KEE   KA   EE-vs

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17   This behaviour is seen in old Kannada manuscripts as-well. For examlple : U (ಎ⌣)+ AA vowel mark (⌣ಆ) = UU (ಎ⌣ಆ)

TIGALARI VOWEL SIGN AI (ai) ꣠꣠◌

꣠꣠ꢰ	=	ꢰ	+	꣠꣠◌
KAI		KA		AI-vs

For the TIGALARI AI LENGTH MARK (꣠꣠◌) U+113C8 should be used.

꣠꣠◌	IS NOT	꣠◌	+	꣠◌
AI-vs	≠	EE-vs		E-vs

Two part vowel signs :

Vowel signs O, OO & AU are two part vowel signs that appear both before and after a character/conjunct and would also require re-ordering. The behaviour of Tigalari two part vowels are similar to Malayalam two part vowels with an exception of TIGALARI VOWEL SIGN AU. Here, the character that appears to the left of the base glyph is not similar to the TIGALARI VOWEL SIGN E like found in Malayalam but is similar to the TIGALARI VOWEL SIGN EE.

TIGALARI AU LENGTH MARK (◌ꢟ) is encoded separately similar to TAMIL AU LENGTH MARK U+0BD7. It is to be noted here that unlike MALAYALAM AU LENGTH MARK U+0D57, in Tigalari, this mark is not to be used in isolation. ◌ꢟ mark is used primarily to render the two part TIGALARI VOWEL SIGN EE. TIGALARI VOWEL SIGN O is a recent introduction. The representative glyph seen here is recommended by the author. It is based on the structure and behaviour of Tigalari script.

Similar to Malayalam, the normalised form of two part vowels require for a equivalent combination of two component vowel sign code points to render them accurately. To avoid confusion, a single code point which appears after the base consonant should be assigned to this combination of code points that form a single two part vowel sign. The equivalence decomposition information for the rendering engines is as follows :

ꢴ◌ꢱ		ꢴ◌	+	◌ꢱ
O-vs	≡	E-vs		A-vs

ꢵ◌ꢱ		ꢵ◌	+	◌ꢱ
OO-vs	≡	EE-vs		A-vs

ꢵ◌ꢟ		ꢵ◌	+	◌ꢟ
AU-vs	≡	EE-vs		AU-length mark

TIGALARI VOWEL SIGN O (o) ꢴ◌ꢱ

ꢴꢰꢱ	=	ꢰ	+	ꢴ◌ꢱ
KO		KA		O-vs

TIGALARI VOWEL SIGN OO (ō) ꢵ◌ꢱ

ꢵꢰꢱ	=	ꢰ	+	ꢵ◌ꢱ
KOO		KA		OO-vs

TIGALARI VOWEL SIGN AU (au) �

꯰(꯰)꯰	=	꯰	+	꯰◌꯰
KAU		KA		AU-vs

Vowel signs placed below and to the right; ligating :

Tigalari vowel signs U, UU, vocalic R & vocalic RR are rendered as ligatures. TIGALARI VOWEL SIGN U & TIGALARI VOWEL SIGN UU change their shape depending on the consonant they combine with (Refer Figures 11 and 38)[18].

TIGALARI VOWEL SIGN U (u) ◌ ◌ ◌ ◌ (Default form : ◌)

꯰	=	꯰	+	◌
KU		KA		U-vs

꯰	=	꯰	+	◌
KU		KA		U-vs (alternate form)

꯰	=	꯰	+	◌
CHU		CHA		U-vs

꯰	=	꯰	+	◌
KHU		KHA		U-vs

TIGALARI VOWEL SIGN UU (ū) ◌ ◌ (Default form : ◌)

꯰	=	꯰	+	◌
CHUU		CHA		UU-vs

꯰	=	꯰	+	◌
KHUU		KHA		UU-vs

TIGALARI VOWEL SIGN VOCALIC R (ṛ) ◌

꯰	=	꯰	+	◌
KRU		KA		Vocalic RR-vs

TIGALARI VOWEL SIGN VOCALIC RR (ṝ) ◌

꯰	=	꯰	+	◌
KRUU		KA		Vocalic RR-vs

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18   For more information on this behaviour, refer : Comments on encoding the Tigalari script - Srinidhi A & Sridatta A - L2/17-182, 2.1 Contextual vowel signs of U and UU, Page 7. (http://www.unicode.org/L2/L2017/17182-tigalari-cmt.pdf)

Vowel L & LL signs placed below & right ligating :
It is to be noted here that the frequency of these two characters are extremely low. Vocalic LL vowel mark is added directly below the consonant it's combining with. Vocalic L in Tigalari has two[19] alternate forms.

1. Placed directly below :

TIGALARI VOWEL SIGN VOCALIC L (ḷ)

ⓐ   =   ⓐ   +   ◌
KLU   KA   Vocalic L-vs

TIGALARI VOWEL SIGN VOCALIC LL (ḹ)

ⓐ   =   ⓐ   +   ◌
KLUU   KA   Vocalic LL-vs

2. Placed below and to the right; ligating :
    This form was recorded by Venkataraja Puninchathaya and looks like the combing form of TIGALARI LETTER LA + *Virama* ligature. While the TIGALARI LETTER LA + *Virama* combination can be used here, it is recommended not to as the characters are not canonically equal. These alternate forms of the Vocalic L vowel sign can be handled using the same logic as the alternate forms of post-base consonants (as a font variation).

TIGALARI VOWEL SIGN VOCALIC L (ḷ)

ⓐ   =   ⓐ   +   ◌
KLU   KA   Vocalic L-vs (alternate form)

5.3 Consonants & Semi-vowels (*Vyanjanakshara*)

Consonants and semi-vowles together constitute *Vyanjanakshara*. Consonants in Tigalari script orthography are traditionally laid-out in a phonetic order similar to other Indic scripts.

Consonants (25)	Un-aspirated	Aspirated	Nasals
Gutteral	KA, GA	KHA, GHA	NGA
Palatal	CA, JA	CHA, JHA	NYA
Retroflex	TTA, DDA	TTHA, DDHA	NNA
Dental	TA, DA	THA, DHA	NA
Labial	PA, BA	PHA, BHA	MA

Semi-vowels (11)	YA, RA, RRA, LA, VA, SHA, SSA, SA, HA, LLA, LLLA

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19   A third option exists where the vocalic L and vocalic LL marks are placed placed above the base and to the right (ⓐ & ⓐ). This behaviour is seen in only one manuscript so-far and therefore not mentioned here.

All *Vyanjanakshara* have an equivalent post-base form called *Adi vottu*[20]. The behaviour of *Adi vottu* is further discussed under Section 5.5

	CONSONANTS	POST-BASE / BELOW-BASE FORMS
TIGALARI LETTER KA (ka)	ഞ	ഞ
TIGALARI LETTER KHA (kha)	�	�
TIGALARI LETTER GA (ga)	൬	൬
TIGALARI LETTER GHA (gha)	൨ൗ	൨ൗ
TIGALARI LETTER NGA (ṅa)	൭	൭
TIGALARI LETTER CA (ca)	൧	൧
TIGALARI LETTER CHA (cha)	�	�
TIGALARI LETTER JA (ja)	൩൯	൩൯
TIGALARI LETTER JHA (jha)	൙	൙
TIGALARI LETTER NYA (ña)	൩	൩
TIGALARI LETTER TTA (ṭa)	൮	൮
TIGALARI LETTER TTHA (ṭha)	൦	൦
TIGALARI LETTER DDA (ḍa)	ൢ	ൢ
TIGALARI LETTER DDHA (ḍha)	൰	൰
TIGALARI LETTER NNA (ṇa)	൩൩	൩൩
TIGALARI LETTER TA (ta)	൫	൫
TIGALARI LETTER THA (tha)	൧ൈ	൧ൈ
TIGALARI LETTER DA (da)	ൗ	ൗ
TIGALARI LETTER DHA (dha)	ൽ	ൽ
TIGALARI LETTER NA (na)	൩	൩
TIGALARI LETTER PA (pa)	൧	൧
TIGALARI LETTER PHA (pha)	൧ൈ	൧ൈ
TIGALARI LETTER BA (ba)	൦൧	൦൧
TIGALARI LETTER BHA (bha)	൬	൬
TIGALARI LETTER MA (ma)	൨	൨

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20   The term '*adi vottu*' is borrowed from Kannada.

	SEMI—VOWELS	POST—BASE / BELOW—BASE FORMS
TIGALARI LETTER YA (ya)	24	ଚ୍
TIGALARI LETTER RA (ra)	၆	୬
TIGALARI LETTER LA (la)	౬	൦
TIGALARI LETTER VA (va)	ഡ	ୱ
TIGALARI LETTER SSA (śa)	൸	൸
TIGALARI LETTER SHA (ṣa)	൱	൱
TIGALARI LETTER SA (sa)	൸	൸
TIGALARI LETTER HA (ha)	൸	൸
TIGALARI LETTER LA (ḷa)	੨	੨

Tigalari has two characters that represent the Dravidian sounds : LLLA and RRA (*Shakata Repha*). These two characters are rare and are mostly found in Kannada (language) manuscripts (Refer Figures 10). It is due to the discovery of these two borrowed Dravidian phonemes in Tigalari manuscripts studied so far that a space for the TIGALARI LETTER NNNA is reserved.

	SEMI—VOWELS	POST—BASE / BELOW—BASE FORMS
TIGALARI LETTER LLLA (ḻa)	ലୁ	ലୁ
TIGALARI LETTER RRA (ṟa)	ലୁ	ലୁ

5.4 *Virama*

The three prominent characteristics of the *Virama* are : to create conjuncts, to suppress the inherent vowel 'A' and to represent the retroflex vowels U, UU, E and EE.

Virama behaviour between two consonants creating a conjunct character is similar to other Indic scripts.

ඥ/ඥා = ෩ + ँ + ๒
KMA   KA   virama   MA

We also find the *Virama* sign representing two distinct sounds in Tigalari similar to Malayalam :

1. Suppress inherent vowel 'A' :

ω̆ = ω + ँ
DH   DHA   virama

2. Represent short Un-rounded 'u/uu' similar to *Samvrutokaram* in Malayalam script when combined with vowel/vowel mark A, AA, U or UU and Retroflex 'E/EE'[21] sounds when combined with vowel/vowel mark E or EE.[22] These sounds are very common in Tulu language. It is therefore recommended to support this unique behaviour in Tigalari script.

Combining the *Virama* with vowels/vowel marks A & AA despite its phonetic inaccuracy needs to be used as default combination for this representation simply because the combinations with A and AA forms have been well accepted and are sometimes seen used in Tulu language manuscripts[23]. However, this practice of adding the *Virama* mark after vowels/vowel marks U & UU are commonly used in Malayalam script today. I would recommend adding this behaviour to Tigalari as-well. This will allow for this combination to occur for those who are more comfortable using the phonetically correct behaviour.

A ZWNJ character can be used after the *Virama* to avoid forming conjuncts that would naturally follow. Its also because of the presence of these characters that the *Virama* cannot be added to TIGALARI LETTER EE & TIGALARI LETTER OO to form their respective shorter (*Hrsva*) forms. At a later date, when the script behaviour for these phonemes are standardised, it is recommended to encode them as separate glyphs similar to U+090D (ऍ), U+0945 (ॅ), U+0911 (ऑ) and U+0949 (ॉ) in Devanagari.

ಀೇ̆	=	ಀೇ	+	̆	
Short un-rounded U		A		virama	
ೕ̆	=	ೕ	+	̆	
Short un-rounded U		U		virama	
̥̆	=	̥	+	̆	
Short un-rounded U-vs		U-vs		virama	
ಕ̥̆	=	ಕ	+	̥	+ ̆
kụ		KA		U-vs	virama
ಀೕ̆	=	ಀೕ	+	̆	
Short un-rounded UU		AA		virama	
ೕ̆	=	ೕ	+	̆	
Short un-rounded UU-vs		AA-vs		virama	
ಕೕ̆	=	ಕ	+	ೕ	+ ̆
kū		KA		AA-vs	virama
ೕ̆	=	ೕ	+	̆	
Short un-rounded UU		UU		virama	

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21   Tulu Language: ụ. Both J. Brigel and A. Männer state that this character is pronounced like 'e' in the French '*je*'. If so, its phonetic value may be [œ]. However, if it is like Malayalam "half-u", then [ə] or [ɨ] may be a better description. Bhat describes this phoneme as /ɯ/. In the Kannada script, Brigel and Männer used a '*Virama*', ◌್, to denote this vowel. Bhat goes on to say, a '*telakaṭṭu*' (*Virama*) is used for this purpose. (Source: Wikipedia) (Further reading: William Bright 1972, The Enunciative Vowel, International Journal of Dravidian Linguistics 1.1, 26-5., http://www.ling.ohio-state.edu//~mielke/papers/Mielke_diss.pdf)

22   These retroflex vowels are used extensively in Tulu language. http://www.unicode.org/L2/L2012/12203-kannada-tulu.pdf discusses this behaviour in Kannada script that is already adopted and in use.

23   This issue of representing *Virama* in the Kannada script is presented in the proposal : http://www.unicode.org/L2/L2012/12203-kannada-tulu.pdf . The resolution of this issues with ZWNJ can be applied to Tuḷu script as-well.

◌ꬵ Short un-rounded UU-vs	=	◌ꬵ UU-vs	+	◌ virama		
ക്ൄ kū̆	=	ക KA	+	◌ꬵ UU-vs	+	◌ virama
ന Retroflex E	=	ന E	+	◌ virama		
◌ Retroflex E-vs	=	◌ E-vs	+	◌ virama		
ക kɛ	=	ക KA	+	◌ E-vs	+	◌ virama
ന Retroflex EE	=	ന EE	+	◌ virama		
◌ Retroflex EE-vs	=	◌ EE-vs	+	◌ virama		
ക kɛ̄	=	ക KA	+	◌ EE-vs	+	◌ virama

Tigalari script has two *Virama* forms (similar to Malayalam script in their appearance but does not follow the behaviour exactly). Both the forms of *Virama* are found in Tigalari manuscripts as seen in Figure 14. There is no need to encode these forms separately like Malayalam does. Tigalari was used primarily to write the Sanskrit language. These two forms of *Virama* used in manuscripts are compatible and serves to represent : (a.) the schwa sounds discussed in the previous page and (b.) as a vowel suppressant.

1. *Ligature form :*
   The *Virama* ligature curves upwards and outwards from the final stem of a character it combines with and are completable to their non-ligated sequence. Currently, we know of this form of *Virama* occurring with letters KA, TTA, TA & NA[24] (Refer Figure 14). Adding a *Virama* would have to create their respective ligature forms with these characters (default forms for these consonant + *Virama* combination).

ക്ക K	=	ക KA	+	◌ virama
ട TT	=	ട TTA	+	◌ virama

---

[24]   There are a few rare examples of GA+*Virama* ligature as indicated by Srinidhi. This ligature is not included here as its very similar to SHA+*Virama* form and can lead to confusion. Similar to Malayalam, NNA, RA & SHA ligature forms with *Virama* might also exist. These can be added at a later date as an alternate form in the font if found. However, they will not be default forms as they would be rare. These two issues need to be resolved in the future after careful study.

ഗ്ഗ = ഩ + ◌̆
T   TA   virama

ന്ഗ = ന + ◌̆
N   NA   virama

2. *Semi-circular form* [◌̆] :

The semi-circular—*Candra Virama* form appears to the top right of the base character/cluster. Adding a ZWNJ before the Virama will produce the Candra Virama and stop the next character from combining. Therefore, a ZWNJ added before or after a virama form will break the cluster.

ല്̆ = ല + ◌̆
KH   KHA   virama

ക്ല്̆ = ക + ◌̆ + ⌗ + ല + ◌̆
KỤLỤ   KA   virama   ZWNJ   LA   virama

ക്ല്̆ = ക + ⌗ + ◌̆ + ല + ◌̆
KỤLỤ   KA   ZWNJ   virama   LA   virama

Word Example : ᵃൽക്ല്̆ (Tulu : AKỤLỤ / Eng. : Them)

Virama *Character Order :*

Virama character always appears at the end of and to the top right of a cluster.

Consonant (ω) → Vowel Sign (◌ী) → Virama (◌̆) = ωী̆

Consonant (ω) → Vowel Sign (◌ী) → Virama (◌̆) = ωী̆

5.5   Ligatures :

A maximum of four consonant/semi-vowel characters can be found in Tagalari manuscripts that form a ligature. Similar to Grantha and old style Malayalam scripts, we find a large number of ligature forms across Tigalari manuscripts. One can assume that character clusters which were easy to write in a single continuous stroke without lifting the stylus/chisel ended-up as ligatures. There are a few Tigalari ligatures that have varying behaviours across manuscripts as illustrated in an example below[25]. It is hard to come to a consensus and identify a definitive conjunct/ligature set or shape for this script as of now. The alternate forms of ligatures can be handled using the open-type feature—stylistic sets while making the font.

ജ്ജ = ജ + ◌̆ + ജ (Stylistic Set 1)
JJA   JA   virama   JA

ജ്ജ = ജ + ◌̆ + ജ (Stylistic Set 2)
JJA   JA   virama   JA

_____

25   Further study into this subject is required.

The Malayalam model of adding a ZWJ character before the *Virama* to display the alternate ligature shape can be employed[26] for Tigalari as-well. In the example below, adding a ZWJ before the virama form calls the alternate form as defined by the font :

ഌതഌ = ഌ + ◌̆ + ഌ (Defalt form)
JJA   JA   virama JA

ഌ ഌ = ഌ + [ZWJ] + ◌̆ + ഌ (Alternate Form)
JJA   JA   zwj   virama JA

There are four basic types of ligatures in Tigalari :
1. Consonant/Semi-Vowel + Consonant(s)/Semi-Vowel(s) = Conjunct
2. Consonant / Conjunct/Semi-Vowel + Vowel Sign
3. Consonant/Conjunct/Semi-Vowel + Special Character
4. Ligating Special Characters

1. **Consonant/Semi-Vowel + Consonant(s)/Semi-Vowel(s) = Conjunct :**
    Consonants and semi-vowels in most cases have a corresponding post-base form that look similar to the independent consonant/semi-vowel that sits vertically centred below the base character (꧑). These characters form vertical conjunct stacks with combining *vottu* forms. These post-base character(s) are represented at the same size as their corresponding base glyphs. These below-base forms are not reduced in size to save inter-linear space or to improve the over-all texture. This practice however might change over time as reflected in reformed Malayalam or Grantha typefaces. The conjunct forms can be defined at the font level. Stacking forms can be used where the ligature forms are not available.

    Vertical stacking of conjunct forms is the default behaviour unless the font provides for an alternate rendering of a ligating form.

    ജ്ന = ജ + ◌̆ + ന
    JHNA   JHA   virama NA

    Consonants/semi-vowels can combine horizontally, vertically or have a combination of both in Tagalari. Sometimes the same conjunct can have both these ways of ligating as seen above in the case of JJHA. It is commonly found that the characters which have their final stem turning downwards and ending at the baseline form horizontal ligatures with characters that begin with upward strokes.

    ക്ക = ക + ◌̆ + ക
    KKA   KA   virama KA

    ങ്ക്ത = ങ + ◌̆ + ക + ◌̆ + ത
    NKTA   NGA   virama KA   virama TA

---

26   As recommended in the document : L2/16-342. Recommendations to UTC #149 November 2016 on Script Proposal. Malayalam ZWJ ligature switch behaviour is discussed in The Unicode Standard 9.0 (TUS) (p.502)

There are always exceptions to these general patterns :

 LLLA = LLA + virama + LLA

The characters that have their final stem turning upwards form vertical ligatures with other characters of the same kind :

CCA[27] / = CA + virama + CA

A ligature can have both horizontal and vertical combinations based on the same logic. The characters that combine vertically are usually formed at the end of such a ligature.

KSSA = KA + virama + SA + virama + SA

TIGALARI LETTER MA, TIGALARI LETTER YA, TIGALARI LETTER RA, TIGALARI LETTER LA & TIGALARI LETTER VA have a combining post-base form that is unrelated to their parent shapes. These characters usually form ligatures with the characters they're combing with.

KMA = KA + virama + MA

KYA = KA + virama + MA

KRA = KA + virama + RA

KLA = KA + virama + LA

KVA = KA + virama + VA

The semi-vowel signs that attach below the baseline in a conjunct cluster are attached to the final character (similar to vowel signs that attach below the baseline).

SSVA = SA + virama + SA + virama + VA

---

27   Here the triangular form attached to the bottom right of letter CA is a duplication symbol that also appears with letters BA, VA and YA. This behaviour is not very common in Tigalari and seems to be an influence of Malayalam script.

Ligature forms of conjuncts can appear as post-base forms in a vertical stack. This occurs often when a below-base consonant/semi-vowel combines horizontally with the post-base forms of RA, LA, VA, MA or YA :

KSSNNYA = KA + virama + SSA + virama + NNA + virama + YA

The above mentioned ways of forming consonant ligatures is not a rule but merely an observation and there are several exceptions to this behaviour.

2. **Consonant/Conjunct/Semi-Vowel** + **Vowel Sign :**
The vowel signs U, UU[28], Vocalic R & Vocalic RR combine with other base or post-base consonants/ semi-vowels/conjuncts forming ligatures. The vowel signs that appear below the baseline in a conjunct cluster are attached to the final character.

KKU = KA + virama + KA + U-vs

SSKRU = SSA + virama + KA + vocalic R-vs   (Refer Figure 18)

3. **Consonant/Conjunct/Semi-Vowel** + **Special Character :**
In Tigalari, this kind of ligatures are seen formed by *Virama* and *Reph* with a select few characters :

The *Virama* ligatures are formed with KA (ᬓ), NA (ᬧ), TA (ᬢ) and TTA (ᬝ) (discussed earlier in Section 5.4).

Reph ligatures are formed with letters YA (ᬬ) and RA (ᬭ); discussed under Section 8.5.

4. Ligating **Special Characters :**
There is only one found example of a special character ligature so far : *Reph* + *Virama* (◌). This occurs when the character/conjunct following the *Reph* ends with a *Virama* (Refer Figure 19). This ligature form should be enabled even when there is a ZWNJ character added before the *Virama* as illustrated in second example below :

RK (default) RA + virama + KA + virama

---

28   Various U & UU ligature forms are discussed on pp. 9 & 20

ഞ൞ = ഞ + ◌ + ഞ + 𑗐 + ◌
RK   RA   virama   KA   ZWNJ   virama

                    ◌   ഞ
                    reph   K

                              ഞ൞
                              >reorder reph & K
                              >replace (virama + reph) with ligature

This *Reph+Virama* ligature follows the character order of *Virama* and not *Reph*.

Consonant (ധ) → Vowel (◌ി) → Virama (◌̆) + Reph (◌̇) = ധി൞

5.6   Vertical metrics :

Tigalari is seen to have a maximum of six characters in a cluster (Eg.: ൙൙൙൙). Characters that form these clusters come together in several ways making Tigalari a challenging script to build on a font platform that's made primarily for Lain based scripts (Refer Figures 15-17). To avoid the possibility of an infinite vertical stack, a *Virama* character can be used by the font to break a cluster after three vertically stacking consonants/semi-vowels. Tigalari font metrics needs to accommodate up-to six vertical stacks. Below is a representation of this using an abstract character :

6.   BASIS FOR GLYPH SHAPES

Historically, Tigalari letter shapes have undergone several changes across various regions, time periods and materials (as is expected with any script). It is therefore possible to represent only the most commonly used forms while also considering the relevance of several later influences of the surrounding script systems like Kannada, Tamil, Grantha, Nandinagari and Malayalam on Tigalari.

The Tigalari script is slowly transitioning from a scribal culture to mass literacy—especially in the context of it being adopted to write the Tulu language. This implies the need for Tigalari to be standardised; keeping in mind its practical uses for archival, literary and educational purposes. Since this is an early attempt at standardisation; there is a possibility of Tigalari evolving quite differently from what is proposed here.

6.1   Alternate Glyph Shapes

Tigalari script has been studied by scholars like Venkataraja Puninchathaya, *Shrii* Bannanje Govindacharya, Keladi Gunda Jois, Dr S R Vighnaraj, *Shrii* Ramanath Acharya and *Shrii* Krishnaraja Bhat to name a few. After having consulted them regarding this issue, several characters clearly seem to have no resolution for the glyph shapes due to the frequency of their occurrence and the presence of several commonly used alternate glyph shapes as seen below. A few of these alternate shapes appear in sets (as seen grouped together under letters A, AA & O, OO). All the instances of alternate shapes can be addressed using stylistic sets (opentype features) and need not be encoded as separate characters. The exception to this being *Alankaara*. *Alankaara* forms have many variations across manuscripts. This is discussed further under Sections 8.2 & 8.7.

Alankaara

The first glyph (from the left) in the list below is the default form.

Tigalari vowels with alternate forms. :

TIGALARI LETTER A (a)	ᚔᚕ | ᚕᚖ | ᚖᚗ
TIGALARI LETTER AA (ā)	ᚔᚘ ᚔᚙ | ᚕᚚ | ᚖ᚛ ᚖ᚜
TIGALARI LETTER II (ī)	ᚕ᚝ ᚕ᚞ ∘O∘
TIGALARI LETTER UU (ū)	᚟ᚠ ᚟ᚡ ᚕᚢ
TIGALARI LETTER VOCALIC RR (r̄)	ᚣᚤ ᚥᚦ
TIGALARI LETTER OO (ō)	ᚧ | ᚨ | ᚩ
TIGALARI LETTER AU (au)	ᚪᚫ | ᚨᚬ | ᚩᚭ

TIGALARI VOWEL SIGN U & TIGALARI VOWEL SIGN UU have varying shapes depending on the glyphs they combine with (Refer Section 5.2) (all these shapes belong the same stylistic set of the font and are not alternate shapes as is the case with the other characters listed in this section) :

TIGALARI VOWEL SIGN U (u)	◌ᚮ ◌ᚯ ◌ᚰ ◌ᚱ
TIGALARI VOWEL SIGN UU (ū)	◌ᚲ ◌ᚳ

TIGALARI VOWEL SIGN VOCALIC RR has two varying styles :

TIGALARI VOWEL SIGN VOCALIC RR (r̄)	◌ᚴ ◌ᚵ

Consonants and their corresponding below-base forms (*Vattu*) look similar in most cases. The alternate forms of Consonants and their corresponding *Vattu* are listed below :

	CONSONANTS	POST—BASE / BELOW—BASE FORMS
TIGALARI LETTER KHA (kha)	ꕁ ꕂ	ꕁ ꕂ
TIGALARI LETTER GHA (gha)	ꕃ ꕄ ꕅ	ꕃ ꕄ ꕅ
TIGALARI LETTER CHA (cha)	ꕆ ꕇ	ꕆ ꕇ
TIGALARI LETTER JHA (jha)	ꕈ ꕉ	ꕈ ꕉ
TIGALARI LETTER NYA (ña)	ꕊ ꕋ	ꕊ ꕋ
TIGALARI LETTER DDA (ḍa)	ꕌ ꕍ	ꕌ ꕍ
TIGALARI LETTER DDHA (ḍha)	ꕎ ꕏ	ꕎ ꕏ
TIGALARI LETTER TA (ta)	ꕐ ꕑ	ꕐ ꕑ
TIGALARI LETTER DA (da)	ꕒ ꕓ	ꕒ ꕓ
TIGALARI LETTER BHA (bha)	ꕔ ꕕ	ꕔ ꕕ
TIGALARI LETTER MA (ma)	ꕖ ꕗ ꕘ	ꕖ ꕗ ꕘ △ ꕚ
TIGALARI LETTER VA (ma)	ꕛ ꕜ	ꕛ ꕜ ꕝ ꕞ
TIGALARI LETTER LA (ḷa)	ꕟ ꕠ	ꕟ ꕠ
TIGALARI LETTER RRA (ṟa)	ꕡ ꕢ	ꕡ ꕢ

Virama sign has two forms (ꕣ & ꕤ, KA + virama) in Tigalari as discussed under Section 5.4 in detail.

Reph forms a ligature with letters YA (ꕥ) and RA (ꕦ); discussed under Section 8.5.

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7.   Digits

The most popular convention is to use the Kannada numeral system along with Tigalari script. It is recommend to use these characters from the Kannada Unicode block: U+0CE6, U+0CE7, U+0CE8, U+0CE9, U+0CEA, U+0CEB, U+0CEC, U+0CED, U+0CEE & U+0CEF (Section 12 requests an extension of this Kannada block).

Similar to Malayalam, Tigalari manuscripts often use letters to represent numbers in the

Katapayadi (*Paralperu*) system[29]. These are used commonly for page numbering. Tigalari digits seen below are quite rare.

DIGITS :	0	1	2	3	4	5	6	7	8	9	10	100
Tigalari	೦	೧	೨	೩	೪	೫	೬	೭	೮	೯	೧೦	೧೦೦
Malayalam	0	൧	൨	൩	൪	൫	൬	൭	൮	൯	൰	൱
Grantha	௦	௧	௨	௩	௪	௫	௬	௭	௮	௯	௰	௱
Kannada	೦	೧	೨	೩	೪	೫	೬	೭	೮	೯	೧೦	೧೦೦

Tigalari digits follow a system similar to Grantha which is illustrated below (Refer Figure 22)[30],[31]. Dr. Vighnaraj of Dharmasthala is an authority on Tigalari numeral system. Due to its similarity with Grantha, it is quite possible that this system too had other characters and fractions. [32]

1		11		21		31		41		51		61		71		81		91	
2		12		22		32		42		52		62		72		82		92	
3		13		23		33		43		53		63		73		83		93	
4		14		24		34		44		54		64		74		84		94	
5		15		25		35		45		55		65		75		85		95	
6		16		26		36		46		56		66		76		86		96	
7		17		27		37		47		57		67		77		87		97	
8		18		28		38		48		58		68		78		88		98	
9		19		29		39		49		59		69		79		89		99	
10		20		30		40		50		60		70		80		90		100	

Explanation of Tigalari number system :

1	=	[glyph]	[1]	
12	=	[glyph]	[10+2]	[glyph] + [glyph]
21	=	[glyph]	[2×10+1]	[glyph] × [glyph] + [glyph]
102	=	[glyph]	[100+2]	[glyph] + [glyph]
121	=	[glyph]	[100+2×10+1]	[glyph] + [glyph] × [glyph] + [glyph]
221	=	[glyph]	[2×100+2×10+1]	[glyph] × [glyph] + [glyph] × [glyph] + [glyph]

Key :

221 = Two hundred [2x100] and twenty [2x10] one [1] = [glyph]

37 = Thirty [3x10] Seven [7] = [glyph]

784 = Seven hundred [7x100] and eighty [8x10] four [4] = [glyph]

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29   https://en.wikipedia.org/wiki/Katapayadi_system , https://ml.wikipedia.org/wiki/പരൽപ്പേര്

30   It has recently come to light that zero was also used in Tigalari numeral system(Refer Figures 20 & 21) where numbers are formed similar to the Kannada or Hindu-Arabic systems with the decimal values.

31   The Tigalari numbers as illustrated in Tulu Sahitya Academy's text book does not follow a consistent logic. They do not reflect their corresponding behaviour in the manuscripts and are therefore erroneous. http://www.tuluacademy.org/en/tulu-alphabets-lesson-10/

32   Srinidhi A is studying the fractions and additional digits that appear in Tigalari manuscript.

8.   Other / Symbols / Punctuations

Candra Anunaasika	◌ᴗ
Anuswara	◌o
Visarga	◌ଃ
Avagraha	ꞅ
Reph	◌̓ (*does not need a separate code point*)
Dandas	∣ ‖
Alankaara	ⓖ ꞵ ✳
Correction mark (Tiddu)	◌₊

8.1.   *Visarga, Candra Anunaasika, Anuswara*

Anunaasika means to pronounce simultaneously through the nose and mouth. It is not pure nasalisation (*Anuswara*). In Tigalari manuscripts, the *Anunaasika* sounds closely follow the Paninyan rules of nasalisation using class consonants. A spacing semicircle also represents the *Anunasika* in Tigalari, similar to Grantha sign *Candrabindu* U+11301[33]. The resulting vowel sounds this character affects is produced through both the nose and the mouth, nasalising it in the process (making this an *Anunaasika*). Though this does indicate *Anunaasika*, it would be confusing to call this character *Anunaasika as-well.* The word *Anunaasika* denotes a wider set of behaviours as described above. Also, its not called *Candrabindu* because this character does not have a dot (*Bindu*) in Tigalari. Attestations for this semi-circular (*Candra*) *Anunaasika* form can be found in the document : L2/17-182, Comments on encoding the Tigalari script - Srinidhi A and Sridatta A (5.2 ANUNASIKA, p. 13)[34]. This character can combine with all vowels/vowel marks.

ꣿꩶꣿᴗ	=	ꩶ	+	ꣿꩳ +	◌ᴗ
≃KOÕ		KA		OO-vs	candra anunaasika

A pure nasal sound in Tigalari is represented by an *Anuswara. Anuswara* means that which follows a vowel (where the vowel sound is not disturbed). *Anuswara* is added to the right of the character it affects.

ꩶo	=	ꩶ	+	◌o
KAM		KA		anuswara

Visarga indicates a voiceless glottal fricative. It is added to the right of the characters it affects.

ꩶଃ	=	ꩶ	+	◌ଃ
KAHA		KA		visarga

---

33   There is a *Candrabindu* form of *Anunaasika* in Tigalari as-well (Refer Figure 28). Its use in Tigalari is rare and experimental. The *Candrabindu* form can be added at a later date (if at all) as an alternate form of *Anunaasika* if more manuscripts containing *Candrabindu* are found where it represents the *Anunaasika* sound.

34   In the document L2/17-182, this character is called *Anunaasika*.

8.2. *Alankaara*

There are various symbols that appear in Tigalari manuscripts which are collectively referred to as *Alankaara or Pushpika. Pushpika* is derived from '*Pushpa*', which means 'flower'. A flower can be a ritual offering or a decoration. *Alankaara* means decoration. In this proposal, the word *Alankaara* is used as the word *Pushpika* comes along with several connotations from other scripts that do not necessarily apply to Tigalari.

These *Alankaara* symbols are often elaborately drawn and stand-out on a page. There is no formal rule that dictates their use. These symbols serve several functions besides being purely for decoration. For example :

୫୫୫୫୫	When a row of *Alankaara* symbols appear between two verses, it could indicate an interval of a certain length before reciting the next verse.
୫୫୫୫୫	The same thing could instead be a pattern used to cover the imperfections on a palm leaf.
୫୫୫୫୫	Once again a row of *Alankaara* symbols could also be used to make a page look evenly grey when there is a large amount of empty pace.
୫୫୫୫୫	Can indicate the number of *Om* to recite.
୫୫୫୫୫	A row of *Alankaara* can indicate a chapter or book ending.
|୫|	Is semantically equal to a Double *Danda.*
||୫||	Is semantically equal to a Double *Danda.*
୫୫	Indicates a stop or pilcrow[35].
❋	Drawn on the margin to mark an important section.

In the above examples, ୫ can be replaced by ௐ *or* ❋. We often find all the three of these symbols appearing in a single manuscript with interchanging behaviour. These decorative punctuations remain to be studied in detail. Taking a closer look at these three forms :

Om Alankaara (୫) :
This *Alankaara* symbol seems to be a stylised Tigalari *Om* [36]. There are several variations of this *Om Alankaara* that are seen across manuscripts. I'd recommend using a separate code-point for this character.

Pushpa Alankaara (❋) :
This can be an abstraction of a lotus or a *Sudarshana Chakra.* ❋ can be plotted on FLOWER PUNCTUATION MARK (U+2055, ✸) while making a Tigalari font.

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35   It is to be noted here that the Period symbol in Tigalari has several forms that remains to be studied in detail. While a period serves a specific semantic function, *Alankaara* is an open-ended symbol that will be useful in documenting manuscripts.

36   Some scholars like Shrii. Krishnaraja Bhat and Ramanatha Achar are of the opinion that this character might be an abstraction of the '*Om*' symbol.

Shrii Alankaara ( ) :

The *Shrii* ligature in Tigalari has two forms:

1. = + + +

       SHRII   SHA   virama   RA   II-vs

2.

Both these forms can appear within the same manuscript. While version 1. is read as a ligature, version 2. can be a either *Shrii* ligature or a symbol indicating beginnings, pauses, endings or space fillers (Refer Figure 23 & 24). Due to these differences and the frequency of use of both these forms, the symbol form of *Shrii* needs to be encoded as a separate character and the glyph plotted twice in a font. These two representations are semantically/canonically different despite being visually identical.[37]

8.3. *Tiddu* mark (Correction mark)

Tiddu or correction mark in Tigalari behaves very similar to a 'caret' when used as an editors mark. *Tiddu* mark is used to indicate imperfections in the written text such as misspellings or insertions. This symbol is found in many manuscripts and looks like a small plus sign (Refer Figure 25). There is no particular rule to govern it's placement. It tends to orbit around a glyph/conjunct or word that its pointing to as an error. We often find the corrections written alongside, above or below the baseline (where it usually appears in the opposite direction of the *Tiddu* mark). These corrections are often seen not inked-in as they were inscribed at a later stage (while reading from an already inked palm leaf manuscript). This character should not be mistaken for *Kaakapaada* (crow's foot)/*Kraunchapada* (crane's foot) or *Hamsapada* (swan's foot) which are notations used in classical music.

Representing this *Tiddu* mark accurately might prove to be a challenge while documenting a manuscript. It is advisable to use this as merely a visual symbol that does not affect the rendering behaviour in any way. Included here is a brief note on its use.

Often the person keying in the Tigalari materials is not familiar with the subject matter of the manuscript. There is a possibility of misreading the *Tiddu* mark therefore, not knowing the right glyph/conjunct or word it is marking as an error. To avoid this from happening, it would be useful to have a standardised approach to make it easy to type as read.

This proposal recommends using this *Tiddu* mark as a spacing sign placed after the glyph/conjunct or word instead of a non-spacing sign as it appears in its manuscript counterpart. The reasons for this being :

(a) Tigalari as a script will require a large vertical metrics to fit all the combining marks. Introducing a non-spacing *Tiddu* mark will add to this making it unnecessarily cumbersome.

(b) This mark will not be tagged to a particular character unless specifically indicated by brackets. This will avoid misinterpreting the manuscript matter. Indicated below are the proposed positions for the Tiddu character. The positioning can be handled within the font.

Spacing above :

 = +

Spacing below :

 = +

---

37   Tigalari manuscripts have several symbols that appear decorative. These symbols have not been studied closely and might be worth examining. Similar symbols appear in several manuscripts and stone inscriptions from the Ashokan times and across most Brahmic script systems.

The corrections that are indicated in the manuscript can be added within brackets following the *Tiddu* mark. The following examples indicates the proposed method to use this mark :

ಕ$^+$(ೞ)ಕ / ಕ$_+$(ೞ)ಕ = ಕೞೞಕ

```
(the matra that reorders attaches to the next glyph)
```

ಕ$^+$(ೀ) ಕ / ಕ$_+$(ೀ)ಕ   = ಕೀಕ

```
(the matra that does not reorder attaches to the previous glyph)
```

ಕ$^+$(ಬ)ಕ / ಕ$_+$(ಬ)ಕ = ಕಬಕ

```
(extra characters appear where the mark is placed)
```

ಕಕ (ಕಬ)$^+$(ಬಕ) ಕಕ / ಕಕ (ಕಬ)$_+$(ಬಕ) ಕಕ
= ಕಕ ಬಕ ಕಕ

```
(a word in brackets followed by a Tiddu mark is read as:

replaced by a word in brackets that follows)
```

The function of these brackets is not encoded and is manually input and read. It is not to be confused as an automatic function.

8.4   Vedic Tone Marks

Tigalari manuscripts have many Vedic *Swara* marks [38]. The whole repertoire of these symbols can proposed to be added to the Tigalari block at a later date after studying them closely.

Svarita (◌̀) and *Anudatta* (◌̗) are the two most commonly found Vedic Tone (*Swara*) marks in Tigalari script. They are non-spacing signs (Refer Figure 26). Svarita and Anudatta are added centred directly above and below a cluster respectively.

8.5   *Reph* (Reph does not need a separate code-point)

Reph is called *Repha* or *Arka Vottu in* Tigalari/Kannada. I would recommend the use of *Repha* instead of *Reph* for Tigalari. However, throughout this proposal, the word *Reph* is used as it indicates the standard function of this character as recognised commonly across the Indic planes. This character is called on typing the sequence [RA+*Virama*+Consonant/Semi-vowel].

ಕ́   = ರ + ◌̆ + ಕ
```
RKA        RA      virama   KA
```

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38   Discussed in another unicode proposal by Srinidhi : http://www.unicode.org/L2/L2015/15101-vedic.pdf
Further comments on this : http://www.unicode.org/L2/L2015/15113-vedic-nondeva-cmt.pdf

In Tulu language, the *Virama* sign can also indicate retroflexion. It is therefore necessary to have an alternative to form this [RA+*Virama*] which does not create a *Reph* form. This can be easily achieved by adding a ZWNJ following *Virama*. [RA+*Virama*] as a stand-alone form does not form *Reph*.

ರ್ಕ	=	ರ	+	ಿ	+	✝	+	ಕ
RKA		RA		virama		ZWNJ		KA

Tigalari manuscripts also have *Reph* combining with VOCALIC R (ಋ). In Sankrit, this combination is rare but can be found in words like निर्ऋति Nirrti[39]. This behaviour can be extended to VOCALIC RR & VOCALIC L as-well. These sounds are found in Tulu language. (Refer Figure 27)[40]

ಋ	=	ರ	+	ಿ	+	ಋ
RR		RA		virama		Vocalic R

ೠ	=	ರ	+	ಿ	+	ೠ
RRR		RA		virama		Vocalic RR

ಌ	=	ರ	+	ಿ	+	ಌ
RL		RA		virama		Vocalic L

There are two ways of representing *Reph.* They follow two distinct character orders[41] :

1. To the right of the character/conjunct. The advantage of this version is that it saves space vertically.

   Character (ಮ) → Vowel Mark (ಿ) → Reph (ಿ) = ಮೀ'

2. Directly above (centred) a character/conjunct. This placement is most commonly seen used in manuscripts and is the recommended form (Refer Figure 27).

   Consonant (ಮ) → Reph (ಿ) → Vowel Mark (ಿ) = ಮೀ

Tigalari has a conjunct form of Reph that occurs with the a few characters like YA, VA etc.,. This behaviour is also seen in to Grantha and Malayalam[42]. The 'conjunct form 1' with the letters YA and VA as illustrated below are quite commonly seen in manuscripts and can be made the default forms in the font for these two characters. The Reph+Virama ligature form

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39   Sage Kashyapa's wife

40   For more information, refer : Comments on encoding the Tigalari script - Srinidhi A and Sridatta A - L2/17-182, section 2.2, Page 8. (http://www.unicode.org/L2/L2017/17182-tigalari-cmt.pdf)

41   At the time of making alternate conjunct forms, it is useful to note that Tigalari has a conjunct form of *Reph* character that appears in a few manuscripts as indicated in the document 'L2/17-182, Comments on encoding the Tigalari script'. The alternate form attestations and behaviour are on pages 16 & 18. These forms as mentioned are rare and need not be a part of the standard behaviour.

42   For more information, refer : Comments on encoding the Tigalari script - Srinidhi A and Sridatta A - L2/17-182, section 8, Page 16. (http://www.unicode.org/L2/L2017/17182-tigalari-cmt.pdf)

will not form with these two characters as the RA+YA/VA takes priority. The conjunct forms of *Reph* can be handled at the font level.

꣑	=	ꠤ	+	꣎	+	꣕	
RYA		RA		virama		YA	

꣐	=	ꠤ	+	꣎	+	꣕	(Refer Figure 27)
RYA		RA		virama		YA	(conjunct form 1)

꣒	=	ꠤ	+	꣎	+	꣖	
RVA		RA		virama		VA	

꣓	=	ꠤ	+	꣎	+	꣖	(Refer Figure 27)
RVA		RA		virama		VA	(conjunct form 1)

꣔	=	ꠤ	+	꣎	+	꣖	(Refer Figure 27)
RVA		RA		virama		VA	(conjunct form 2)

꣐	=	ꠤ	+	꣎	+	꣕	+	꣎
RY		RA		virama		YA		virama

8.6. *Avagraha*

Tigalari Avagraha follows the Devanagari (U+093D) Malayalam (U+0D3D) model and can be encoded on similar lines.

8.7 *Dandas*

Danda (।) and Double-*Danda* (॥) are commonly seen in Tigalari manuscripts. These two characters need not be encoded separately for Tigalari as they behave very similar to DEVANAGARI DANDA U+0964 & DEVANAGARI DOUBLE DANDA U+0965. From a font point of view however, it would be useful to dis-unify these two characters from Devanagari as its easier to have script specific letter-shape and spacing in a multi-script font scenario (instead of customising the behaviour of Devanagari Danda for Tigalari).

8.8 Other

Other punctuation marks like the question mark, semicolon, ellipses, single and double quotation marks, mathematical notations etc., is used as is from the Latin script and would not require separate code points for Tigalari.

9 Script behaviour

Going over what's already discussed in earlier; the inherent vowel 'A' can be suppressed by adding a *Virama*. *Virama* also represents the half un-rounded 'U/UU' sounds and retroflex 'E/EE' sounds (when added with a vowel mark E or EE) (discussed in Section 5.4).

ഞ് / ഞ̆ = ഞ + ◌̆
K/KU̱   KA   virama

ೕഞ̆ = ഞ + ೕ + ◌̆
Kɛ̄   KA   E-vs   virama

The consonant clusters form a complex entity. The consonants are read from left to right and top to bottom. The inherent vowel 'A' is carried to the final consonant in a conjunct :

ഞ̤ = ഞ + ◌̆ + ৳ഥ
KKHA   KA   virama   KHA

When a vowel sign is added to a character/conjunct, the inherent vowel 'A' is replaced by the new vowel indicated by the corresponding vowel sign and carried to final consonant in a conjunct.

ഞ̤ী = ഞ + ◌̆ + ৳ഥ + ◌ী
KKHII   KA   virama   KHA   II-vs
             >K + A   -A   >KH + A   -A + II

A few vowel signs reorder to appear before a consonant/conjunct, but is read after[43]:

ೕഞ = ഞ + ೕ◌
KEE   KA   EE-vs

ೕೕഞ = ഞ + ೕೕ◌
KAI   KA   AI-vs

Two part vowel signs appear before and after a consonant/conjunct and is read after :

ೕഞೂ = ഞ + ೕ◌ೂ
KAU   KA   AU-vs

---

43   The method of writing or reading this is subjective. We see clusters written in two ways: (1) The order of reading, that is, the consonant/consonant-cluster is written first and the vowel sign added to it later, making the direction from right to left in case of re-ordering vowel marks; or, (2) The vowel sign added in the order of writing. That is, from left to right. Most software today add the vowel sign after entering the consonants(s).

10 IMPLEMENTATION

10.1 Collation

The collations is to be modelled upon Grantha and Malayalam.

A < AA < I < II < U < UU < Voc R < Voc RR < Voc L < Voc LL < E <
EE < AI < O < OO < AU < ANUSVARA < CANDRA ANUNAASIKA < VISARGA <
KA < KHA < GA < GHA < NGA < CA < CHA < JA < JHA < NYA < TTA < TTHA
< DDA < DDHA < NNA < TA < THA < NA < PA < PHA < BA < BHA < MA < YA
< RA < LA < VA < SHA < SSA < SA < HA < LLA < LLA < RRA < AVAGRAHA
< VS. AA < VS. I < VS. II < VS. U < VS. UU < VS. Voc R < VS. Voc
RR < VS. Voc. L < VS. Voc LL < VS. E < VS. EE < VS. AI > VS. O <
VS. OO < VS. AU < VS. AU Length Mark < VIRAMA < SVARITA < ANUDATTA

< TIDDU < PUSHPA ALANKARA < OM ALANKAARA < SHRII ALANKARA

10.2 Character Properties

```
11380;  << RESERVED >>
11381;TIGALARI SIGN CANDRA ANUNAASIKA;Mc;0;L;;;;;N;;;;;
11382;TIGALARI SIGN ANUSVARA;Mc;0;L;;;;;N;;;;;
11383;TIGALARI SIGN VISARGA;Mc;0;L;;;;;N;;;;;
11384;  << reserved >>
11385;TIGALARI LETTER A;Lo;0;L;;;;;N;;;;;
11386;TIGALARI LETTER AA;Lo;0;L;;;;;N;;;;;
11387;TIGALARI LETTER I;Lo;0;L;;;;;N;;;;;
11388;TIGALARI LETTER II;Lo;0;L;;;;;N;;;;;
11389;TIGALARI LETTER U;Lo;0;L;;;;;N;;;;;
1138A;TIGALARI LETTER UU;Lo;0;L;;;;;N;;;;;
1138B;TIGALARI LETTER VOCALIC R;Lo;0;L;;;;;N;;;;;
1138C;TIGALARI LETTER VOCALIC L;Lo;0;L;;;;;N;;;;;
1138D;  << reserved >>
1138E;TIGALARI LETTER E;Lo;0;L;;;;;N;;;;;
1138F;TIGALARI LETTER EE;Lo;0;L;;;;;N;;;;;
11390;TIGALARI LETTER AI;Lo;0;L;;;;;N;;;;;
11391;  << reserved >>
11392;TIGALARI LETTER O;Lo;0;L;;;;;N;;;;;
11393;TIGALARI LETTER OO;Lo;0;L;;;;;N;;;;;
11394;TIGALARI LETTER AU;Lo;0;L;;;;;N;;;;;
11395;TIGALARI LETTER KA;Lo;0;L;;;;;N;;;;;
11396;TIGALARI LETTER KHA;Lo;0;L;;;;;N;;;;;
11397;TIGALARI LETTER GA;Lo;0;L;;;;;N;;;;;
11398;TIGALARI LETTER GHA;Lo;0;L;;;;;N;;;;;
11399;TIGALARI LETTER NGA;Lo;0;L;;;;;N;;;;;
1139A;TIGALARI LETTER CA;Lo;0;L;;;;;N;;;;;
1139B;TIGALARI LETTER CHA;Lo;0;L;;;;;N;;;;;
1139C;TIGALARI LETTER JA;Lo;0;L;;;;;N;;;;;
1139D;TIGALARI LETTER JHA;Lo;0;L;;;;;N;;;;;
1139E;TIGALARI LETTER NYA;Lo;0;L;;;;;N;;;;;
1139F;TIGALARI LETTER TTA;Lo;0;L;;;;;N;;;;;
113A0;TIGALARI LETTER TTHA;Lo;0;L;;;;;N;;;;
113A1;TIGALARI LETTER DDA;Lo;0;L;;;;;N;;;;;
113A2;TIGALARI LETTER DDHA;Lo;0;L;;;;;N;;;;
113A3;TIGALARI LETTER NNA;Lo;0;L;;;;;N;;;;;
```

```
113A4;TIGALARI LETTER TA;Lo;0;L;;;;;N;;;;;
113A5;TIGALARI LETTER THA;Lo;0;L;;;;;N;;;;;
113A6;TIGALARI LETTER DA;Lo;0;L;;;;;N;;;;;
113A7;TIGALARI LETTER DHA;Lo;0;L;;;;;N;;;;;
113A8;TIGALARI LETTER NA;Lo;0;L;;;;;N;;;;;
113A9;  << reserved >>
113AA;TIGALARI LETTER PA;Lo;0;L;;;;;N;;;;;
113AB;TIGALARI LETTER PHA;Lo;0;L;;;;;N;;;;;
113AC;TIGALARI LETTER BA;Lo;0;L;;;;;N;;;;;
113AD;TIGALARI LETTER BHA;Lo;0;L;;;;;N;;;;;
113AE;TIGALARI LETTER MA;Lo;0;L;;;;;N;;;;;
113AF;TIGALARI LETTER YA;Lo;0;L;;;;;N;;;;;
113B0;TIGALARI LETTER RA;Lo;0;L;;;;;N;;;;;
113B1;TIGALARI LETTER RRA;Lo;0;L;;;;;N;;;;;
113B2;TIGALARI LETTER LA;Lo;0;L;;;;;N;;;;;
113B3;TIGALARI LETTER LLA;Lo;0;L;;;;;N;;;;;
113B4;TIGALARI LETTER LLLA;Lo;0;L;;;;;N;;;;
113B5;TIGALARI LETTER VA;Lo;0;L;;;;;N;;;;;
113B6;TIGALARI LETTER SHA;Lo;0;L;;;;;N;;;;;
113B7;TIGALARI LETTER SSA;Lo;0;L;;;;;N;;;;;
113B8;TIGALARI LETTER SA;Lo;0;L;;;;;N;;;;;
113B9;TIGALARI LETTER HA;Lo;0;L;;;;;N;;;;;
113BA;  << reserved >>
113BB;TIGALARI SIGN TIDDU;;Mc;0;L;;;;;;N;;;;;
113BC;  << reserved for NUKTA >>
113BD;TIGALARI SIGN AVAGRAHA;Lo;0;L;;;;;N;;;;;
113BE;TIGALARI VOWEL SIGN AA;Mc;0;L;;;;;N;;;;;
113BF;TIGALARI VOWEL SIGN I;Mc;0;L;;;;;N;;;;;
113C0;TIGALARI VOWEL SIGN II;Mc;0;L;;;;;N;;;;;
113C1;TIGALARI VOWEL SIGN U;Mn;0;NSM;;;;;N;;;;;
113C2;TIGALARI VOWEL SIGN UU;Mn;0;NSM;;;;;N;;;;;
113C3;TIGALARI VOWEL SIGN VOCALIC R;Mn;0;NSM;;;;;N;;;;;
113C4;TIGALARI VOWEL SIGN VOCALIC RR;Mn;0;NSM;;;;;N;;;;;
113C5;  << reserved >>
113C6;TIGALARI VOWEL SIGN E;Mc;0;L;;;;;N;;;;;
113C7;TIGALARI VOWEL SIGN EE;Mc;0;L;;;;;N;;;;;
113C8;TIGALARI VOWEL SIGN AI;Mc;0;L;;;;;N;;;;;
113C9;  << reserved >>
113CA;TIGALARI VOWEL SIGN O;Mc;0;L;113C6 113BE;;;;N;;;;;
113CB;TIGALARI VOWEL SIGN OO;Mc;0;L;113C7 113BE;;;;N;;;;;
113CC;TIGALARI VOWEL SIGN AU;Mc;0;L;113C7 113D7;;;;N;;;;;
113CD;TIGALARI SIGN VIRAMA;Mn;9;NSM;;;;;N;;;;;
113CE;TIGALARI PUSHPA ALANKAARA;So;0;L;;;;;N;;;;;
113CF;  << reserved >>
113D0;TIGALARI OM ALANKAARA;So;0;L;;;;;N;;;;;
113D1;TIGALARI VEDIC TONE SVARITA;Mn;230;NSM;;;;;N;;;;;
113D2;TIGALARI VEDIC TONE;Mn;220;NSM;;;;;N;;;;;
113D3;TIGALARI SHRII ALANKAARA;So;0;L;;;;;N;;;;;
113D4;  << reserved >>
113D5;  << reserved >>
113D6;  << reserved >>
113D7;TIGALARI AU LENGTH MARK;Mc;0;L;;;;;N;;;;;
113D8;  << reserved >>
113D9;  << reserved >>
113DA;  << reserved >>
113DB;  << reserved >>
113DC;  << reserved >>
113DD;  << reserved >>
113DE;  << reserved >>
```

```
113DF; << reserved >>
113E0;TIGALARI LETTER VOCALIC RR;Lo;0;L;;;;;;N;;;;;
113E1;TIGALARI LETTER VOCALIC LL;Lo;0;L;;;;;;N;;;;;
113E2;TIGALARI VOWEL SIGN VOCALIC L;Mn;0;NSM;;;;;;N;;;;;;
113E3;TIGALARI VOWEL SIGN VOCALIC LL;Mn;0;NSM;;;;;;N;;;;;;
113E4; << reserved >>
113E5; << reserved >>
113E6;TIGALARI DIGIT ZERO;Nd;0;L;;0;0;0;N;;;;;
113E7;TIGALARI DIGIT ONE;Nd;0;L;;1;1;1;N;;;;;
113E8;TIGALARI DIGIT TWO;Nd;0;L;;2;2;2;N;;;;;
113E9;TIGALARI DIGIT THREE;Nd;0;L;;3;3;3;N;;;;;
113EA;TIGALARI DIGIT FOUR;Nd;0;L;;4;4;4;N;;;;;
113EB;TIGALARI DIGIT FIVE;Nd;0;L;;5;5;5;N;;;;;
113EC;TIGALARI DIGIT SIX;Nd;0;L;;6;6;6;N;;;;;
113ED;TIGALARI DIGIT SEVEN;Nd;0;L;;7;7;7;N;;;;;
113EE;TIGALARI DIGIT EIGHT;Nd;0;L;;8;8;8;N;;;;;
113EF;TIGALARI DIGIT NINE;Nd;0;L;;9;9;9;N;;;;;
113F0;TIGALARI NUMBER TEN;No;0;L;;;;10;N;;;;;
113F1;TIGALARI NUMBER HUNDRED;No;0;L;;;;100;N;;;;;
113F2; << reserved >>
113F3; << reserved >>
113F4; << reserved >>
113F5; << reserved >>
113F6; << reserved >>
113F7; << reserved >>
113F8; << reserved >>
113F9; << reserved >>
113FA; << reserved >>
113FB; << reserved >>
113FC; << reserved >>
113FD; << reserved >>
113FE; << reserved >>
113FF; << reserved >>


Indic Syllable Category

# Indic_Syllabic_Category=Bindu

11381..11382  ; Bindu # Mn   [2] TIGALARI SIGN CANDRA ANUNAASIKA..
TIGALARI SIGN ANUSVARA

# Indic_Syllabic_Category=Visarga

11383         ; Visarga # Mc      TIGALARI SIGN VISARGA

# Indic_Syllabic_Category=Avagraha

113BD         ; Avagraha # Lo      TIGALARI SIGN AVAGRAHA

# Indic_Syllabic_Category=Virama

113CD         ; Virama # Mn      TIGALARI SIGN VIRAMA

# Indic_Syllabic_Category=Vowel_Independent

11385..1138C  ; Vowel_Independent # Lo  [8] TIGALARI LETTER
A..TIGALARI LETTER VOCALIC L
1138E..11390  ; Vowel_Independent # Lo  [3] TIGALARI LETTER
E..TIGALARI LETTER AI
11392..11394  ; Vowel_Independent # Lo  [3] TIGALARI LETTER
O..TIGALARI LETTER AU
```

```
113E0..113E1  ; Vowel_Independent # Lo  [2] TIGALARI LETTER
VOCALIC RR..TIGALARI LETTER VOCALIC LL

# Indic_Syllabic_Category=Vowel_Dependent
113BE..113C0  ; Vowel_Dependent # Mc   [3] TIGALARI VOWEL SIGN
AA..TIGALARI VOWEL SIGN II
113C1..113C4  ; Vowel_Dependent # Mn   [4] TIGALARI VOWEL SIGN
U..TIGALARI VOWEL SIGN VOCALIC RR
113C6..113C8  ; Vowel_Dependent # Mc   [3] TIGALARI VOWEL SIGN
E..TIGALARI VOWEL SIGN AI
113CA..113CC  ; Vowel_Dependent # Mc   [3] TIGALARI VOWEL SIGN
O..TIGALARI VOWEL SIGN AU
113E2..113E3  ; Vowel_Dependent # Mn   [3] TIGALARI VOWEL SIGN
VOCALIC L..TIGALARI VOWEL SIGN VOCALIC LL

# Indic_Syllabic_Category=Consonant
11395..113A8  ; Consonant # Lo  [20] TIGALARI LETTER KA..TIGALARI
LETTER NA
113AA..113B9  ; Consonant # Lo  [16] TIGALARI LETTER PA..TIGALARI
LETTER HA

# Indic_Syllabic_Category=Cantillation_Mark
113D1..113D2  ; Cantillation_Mark # Mn   [2] TIGALARI VEDIC TONE
SVARITA..TIGALARI VEDIC TONE ANUDATTA

# Indic_Syllabic_Category=Syllable_Modifier
113BB         ; Syllable_Modifier # Mc      TIGALARI SIGN TIDDU

# Indic_Syllabic_Category=Number
113E6..113EF  ; Number # Nd  [10] TIGALARI GONDI DIGIT ZERO..
TIGALARI GONDI DIGIT NINE

Indic Positional Category

# Indic_Positional_Category=Right

11381..11383  ; Right # Mc   [3] TIGALARI SIGN CANDRA ANUNAASIKA..
TIGALARI SIGN VISARGA
113BE..113C0  ; Right # Mc   [3] TIGALARI VOWEL SIGN AA..TIGALARI
VOWEL SIGN II
113D0         ; Right # Mc       TIGALARI SIGN TIDDU

# Indic_Positional_Category=Left
113C2..113C4  ; Left # Mc   [3] TIGALARI VOWEL SIGN E..TIGALARI
VOWEL SIGN AI
113D7         ; Left # Mc       TIGALARI AU LENGTH MARK

# Indic_Positional_Category=Left_And_Right
113CA..113CC  ; Left_And_Right # Mc   [3] TIGALARI VOWEL SIGN OO..
TIGALARI VOWEL SIGN AU

# Indic_Positional_Category=Top
113CD         ; Top # Mn       TIGALARI SIGN VIRAMA
113D1         ; Top # Mn       TTIGALARI TONE MARK SVARITA

# Indic_Positional_Category=Bottom
113C1..113C4  ; Bottom # Mn   [4] TIGALARI VOWEL SIGN U..TIGALARI
VOWEL SIGN VOCALIC RR

# Note: U, UU, R & RR form complex ligatures with consonants in
Tigalari orthography.
```

```
113E2..113E3  ; Bottom # Mn   [4] TIGALARI VOWEL SIGN VOCALIC
L..TIGALARI VOWEL SIGN VOCALIC LL
113CF         ; Bottom # Mn       TIGALARI TONE MARK ANUDATTA
```

```
11380  ---  << RESERVED >>
```

11380 Tigalari **113DF**

	1138	1139	113A	113B	113C	113D	113E	113F
0	11380	11390	113A0	113B0	113C0	113D0	113E0	113F0
1	11381	11391	113A1	113B1	113C1	113D1	113E1	113F1
2	11382	11392	113A2	113B2	113C2	113D2	113E2	113F2
3	11383	11393	113A3	113B3	113C3	113D3	113E3	113F3
4	11384	11394	113A4	113B4	113C4	113D4	113E4	113F4
5	11385	11395	113A5	113B5	113C5	113D5	113E5	113F5
6	11386	11396	113A6	113B6	113C6	113D6	113E6	113F6
7	11387	11397	113A7	113B7	113C7	113D7	113E7	113F7
8	11388	11398	113A8	113B8	113C8	113D8	113E8	113F8
9	11389	11399	113A9	113B9	113C9	113D9	113E9	113F9
A	1138A	1139A	113AA	113BA	113CA	113DA	113EA	113FA
B	1138B	1139B	113AB	113BB	113CB	113DB	113EB	113FB
C	1138C	1139C	113AC	113BC	113CC	113DC	113EC	113FC
D	1138D	1139D	113AD	113BD	113CD	113DD	113ED	113FD
E	1138E	1139E	113AE	113BE	113CE	113DE	113EE	113FE
F	1138F	1139F	113AF	113BF	113CF	113DF	113EF	113FF

NASALS :

11381   ◌ᴗ   TIGALARI SIGN CANDRA ANUNAASIKA
                   • Candrabindu

11382   ◌ం   TIGALARI SIGN ANUSVARA

SPECIAL CHARACTER :

11383   ◌ః   TIGALARI SIGN VISARGA

VOWELS :

11384   ---   << RESERVED >>

11385   ೨೬౨   TIGALARI LETTER A

11386   ೨೬౩   TIGALARI LETTER AA

11387   ೮ಿ_   TIGALARI LETTER I

11388   ೮ಿౄ   TIGALARI LETTER II

11389   ౬_   TIGALARI LETTER U

1138A   ౬ౄ   TIGALARI LETTER UU

1138B   ౿౿   TIGALARI LETTER VOCALIC R

1138C   ౬౨   TIGALARI LETTER VOCALIC L

1138D   ---   << RESERVED >>

1138E   ౭౫   TIGALARI LETTER E
                   • Dravidian vowel

1138F   ౭౫ం   TIGALARI LETTER EE

11390   ౩౭౫ం   TIGALARI LETTER AI

11391   ---   << RESERVED >>

11392   ౚ   TIGALARI LETTER O
                   • Dravidian vowel

11393   ౚఽ   TIGALARI LETTER OO

11394   ౚౢ   TIGALARI LETTER AU

CONSONANTS :

11395   ഓ   TIGALARI LETTER KA

11396   ᇿ   TIGALARI LETTER KHA

11397   സ   TIGALARI LETTER GA

11398   ൜   TIGALARI LETTER GHA

11399   ᇿ   TIGALARI LETTER NGA

1139A   ᇿ   TIGALARI LETTER CA

1139B   ᇿ   TIGALARI LETTER CHA

1139C   ᇿ   TIGALARI LETTER JA

1139D   ᇿ   TIGALARI LETTER JHA

1139E   ᇿ   TIGALARI LETTER NYA

1139F   ᇿ   TIGALARI LETTER TTA

113A0   ◉   TIGALARI LETTER TTHA

113A1   ᇿ   TIGALARI LETTER DDA

113A2   ᇿ   TIGALARI LETTER DDHA

113A3   ᇿ   TIGALARI LETTER NNA

113A4   ഩ   TIGALARI LETTER TA

113A5   ᇿ   TIGALARI LETTER THA

113A6   ᇿ   TIGALARI LETTER DA

113A7   ᇿ   TIGALARI LETTER DHA

113A8   ന   TIGALARI LETTER NA

113A9   ---   << RESERVED FOR NNNA >>

113AA   ᇿ   TIGALARI LETTER PA

113AB   ᇿ   TIGALARI LETTER PHA

113AC   ᇿ   TIGALARI LETTER BA

113AD   ᇿ   TIGALARI LETTER BHA

113AE   ᇿ   TIGALARI LETTER MA

113AF	ꙮ	TIGALARI LETTER YA
113B0	ꙮ	TIGALARI LETTER RA
113B1	ꙮ	TIGALARI LETTER RRA
113B2	ꙮ	TIGALARI LETTER LA
113B3	ꙮ	TIGALARI LETTER LLA
113B4	ꙮ	TIGALARI LETTER LLLA
113B5	ꙮ	TIGALARI LETTER VA
113B6	ꙮ	TIGALARI LETTER SHA
113B7	ꙮ	TIGALARI LETTER SSA
113B8	ꙮ	TIGALARI LETTER SA
113B9	ꙮ	TIGALARI LETTER HA
113BA	---	<< RESERVED >>

VARIOUS SIGNS :

113BB	◌	TIGALARI SIGN TIDDU
113BC	---	<< RESERVED FOR NUKTA >>
113BD	ꙮ	TIGALARI SIGN AVAGRAHA

DEPENDENT VOWEL SIGNS :

113BE	◌	TIGALARI VOWEL SIGN AA
113BF	◌	TIGALARI VOWEL SIGN I
113C0	◌	TIGALARI VOWEL SIGN II
113C1	◌	TIGALARI VOWEL SIGN U
113C2	◌	TIGALARI VOWEL SIGN UU
113C3	◌	TIGALARI VOWEL SIGN VOCALIC R
113C4	◌	TIGALARI VOWEL SIGN VOCALIC RR
113C5	---	<< RESERVED >>
113C6	◌	TIGALARI VOWEL SIGN E
		• Dravidian vowel-sign

113C7 ꠇꠦ TIGALARI VOWEL SIGN EE

113C8 ꠇꠇꠦ TIGALARI VOWEL SIGN AI

113C9 --- << RESERVED >>

113CA ꠇꠦꠇ TIGALARI VOWEL SIGN O
 • Dravidian vowel-sign
 ≡ 113C6 ꠇꠦ 113BE ꠦꠇ

113CB ꠇꠦꠇ TIGALARI VOWEL SIGN OO
 ≡ 113C7 ꠇꠦ 113BE ꠦꠇ

113CC ꠇꠦꠇ TIGALARI VOWEL SIGN AU
 ≡ 113C7 ꠇꠦ 113D7 ꠦꠇ

VIRAMA :

113CD ꠇ̆ TIGALARI SIGN VIRAMA
 = Halanth
 = vowel half-u

113CE ✳ TIGALARI PUSHPA ALANKAARA

113CF --- << RESERVED >>

SIGN :

113D0 ꠃ TIGALARI OM ALANKAARA

VEDIC TONE MARKS :

113D1 ꠇ́ TIGALARI VEDIC TONE SVARITA
 • high/mid-high falling tone

113D2 ꠇ TIGALARI VEDIC TONE ANUDATTA
 • low tone

SIGN :

113D3 ꠃ TIGALARI SHRII ALANKAARA

113D4 --- << RESERVED >>

113D5 --- << RESERVED >>

113D6 --- << RESERVED >>

DEPENDENT VOWEL SIGNS :

113D7   ◌ᴍ   TIGALARI AU LENGTH MARK

113D8   ---   << RESERVED >>

113D9   ---   << RESERVED >>

113DA   ---   << RESERVED >>

113DB   ---   << RESERVED >>

113DC   ---   << RESERVED >>

113DD   ---   << RESERVED >>

113DE   ---   << RESERVED >>

113DF   ---   << RESERVED >>

INDEPENDENT VOWELS :

113E0   ୫୫   TIGALARI LETTER VOCALIC RR

113E1   ୬ଌ   TIGALARI LETTER VOCALIC LL

DEPENDENT VOWEL SIGNS :

113E2   ◌   TIGALARI VOWEL SIGN VOCALIC L
        ୬

113E3   ◌   TIGALARI VOWEL SIGN VOCALIC LL
        ୬ଌ

113E4   ---   << RESERVED >>
              → 0964 । Devanagari danda

113E5   ---   << RESERVED >>
              → 0965 ॥ Devanagari double danda

DIGITS :

113E6   O   TIGALARI DIGIT ZERO

113E7   ௧   TIGALARI DIGIT ONE

113E8   2   TIGALARI DIGIT TWO

113E9   ൩   TIGALARI DIGIT THREE

113EA   ∞   TIGALARI DIGIT FOUR

113EB   ⑤   TIGALARI DIGIT FIVE

113EC   ൬   TIGALARI DIGIT SIX

113ED   ၆   TIGALARI   DIGIT SEVEN

113EE   ೩೧   TIGALARI   DIGIT EIGHT

113EF   ೧೬   TIGALARI   DIGIT NINE

113F0   ಡು   TIGALARI   NUMBER TEN

113F1   ೧೨   TIGALARI   NUMBER HUNDRED

113F2   ---   << RESERVED >>

113F3   ---   << RESERVED >>

113F4   ---   << RESERVED >>

113F5   ---   << RESERVED >>

113F6   ---   << RESERVED >>

113F7   ---   << RESERVED >>

113F8   ---   << RESERVED >>

113F9   ---   << RESERVED >>

113FA   ---   << RESERVED >>

113FB   ---   << RESERVED >>

113FC   ---   << RESERVED >>

113FD   ---   << RESERVED >>

113FE   ---   << RESERVED >>

113FF   ---   << RESERVED >>

11.   Similar characters (Confusables)

Tigalari script has a few characters that look similar to each other. All efforts have been made to make them as unambiguous as possible while not straying away from the original script. However, some characters might still create confusion in their hand-written forms.

Key : Tigalari (Ti.), Kannada (Ka.)

1.		2.		3.	
KHA	6山	E	ಎ	TA	ಌ
CA	೨山	BHA	೧೧	NA	௱
PA	௶	HA	ಌ		
VA	௬	8 (Ti.)	௨೧		
MA	೩				

4.		5.		6.	
DHA	೨	SHA	ೞ	2 (Ti.)	௨
3	3	GA	௶	U	௬
				2	2

7.		8.		9.	
TTA	◌	Anuswara	◌	Virama	◌̆
Anudatta	◌	0	0	Anunaasika	◌ᴗ
		0 (Ti.)	O	Reph + Virama	◌̆

10.		11.		12.	
Vocalic R	೪	7 (Ti.)	௧	10 (Ti.)	௶
4 (Kan.)	೪	EE-vs	೧◌	DA	௶
				DDA	௶

13.	
3 (Ti.)	௱
I	௬

12.   Script Extensions

Kannada digits U+0CE6..U+0CEF should be extended for use with Tigalari as indicated under section 7.

ACKNOWLEDGEMENT

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FIGURES

FIGURE **1.**
Initials: PU (*Danda*) RA (stands for Puttige Ramakrishna), written on a copper vessel.
SOURCE
Private collection, Udupi District.

FIGURE **2.**
Stone inscriptions in Tigalari script found in a temple at Kodipadi, near Puttur.
SOURCE
Kodipay Janardhana Temple, Mangalore district.

FIGURE **3.**
Tigalari script, Tulu language (top) and Kannada language (bottom) manuscripts.
SOURCE
(Top) Punyahavidhi, Govind Pai Research Centre, Udupi. (Bottom) Srinidhi A

ಪಶ್ಯಭಾಗ

ಸಾಲು ೨೧.– ಪ್ರತ್ಯಖಿಮನೆ ಎರಡನೂ ಇನ್ತಿರಹ
ಕ್ಷೇತ್ರಂಗಳನೂ ಆ ಮಾಇಲಿಂಗೆಯಲು

ಸಾಲು ೨೨.– ರುಗ್ವೇದವನೋದಿಸುವ (ಖಿ)ಂಡಿಕದ ಉಪಾಧ್ಯರ
ಜೀವಿತಕ್ಕೆ ವರ್ಷ ೧ಕ್ಕೆ ಗ

ಸಾಲು ೨೪.– ದ್ಯಾಣಂ ಆಮಿ। ನಾಗರ ಕಂನಡ ತಿಗುಳಾರ್ಯ
ವನೋದಿಸುವ ಬಾಲಶೀಕ್ಷೆ

ಸಾಲು ೨೫.– ಉಪಾಧ್ಯರ ಜೀವಿತಕ್ಕೆ ವರ್ಷ ೧ಕ್ಕೆ ಗದ್ಯಾಣಂ ಆಖು।
ಇಂತೀ ಧರ್ಮವಂ.

ಸಾಲು ೨೬.– ಗಳಿಗೆ ಸಲುವಂತಾಗಿ ಆ ಪೆರುಮಾಳೆ ದೇವರನಾಯಕರು ಧಾರಾ

ಸಾಲು ೨೭.–ಪೂರ್ವಕಂ ಮಾಡಿಕೊಟ್ಟರು.॥

Note: TheTadimmalingi record (TN ೨೨೪) of ೧೨೯೦ of
pommala Dammayaka mentioned as the Son of Vishnu deva as
Manchale (not to be identified as the one from Hemmaragala)
speaks of his donation for running of primary school where Nagari
Kannda Tamil and Tigalarya were to be taught. ಶಾಸನದ ಕಾಲ
೧೪–೧೧–೧೨೯೦.

FIGURE 5.
An epigraphical reading from a stone inscription dated 14th November 1290 uses the term 'Tigalarya' to refer to this script.

SOURCE
Jois, Gunda. '*Havyaka Guudhalipi Tigalari Hasthaprathi Granthagalu*' Ananta Krishna Carita. 114. Print.

	Tamil	Grantha	Tigalari	Malayalam	Kannada
ANUSVARA	–	◌ం	◌ం	◌ం	◌ం
VISARGA	–	◌ః	◌ః	◌ః	◌ః
LETTER A	அ	ꢄ	ꢂ	അ	ಅ
LETTER AA	ஆ	ꢆ	ꢃ	ആ	ಆ
LETTER I	இ	ꢇ	ꢄ	ഇ	ಇ
LETTER II	ஈ	ꢈ	ꢅ	ഈ	ಈ
LETTER U	உ	ꢉ	ꢆ	ഉ	ಉ
LETTER UU	ஊ	ꢊ	ꢇ	ഊ	ಊ
LETTER VOCALIC R	–	ꢋ	ꢈ	ഋ	ಋ
LETTER VOCALIC RR	–	ꢌ	ꢉ	ൠ	ೠ
LETTER VOCALIC L	–	ꢍ	ꢊ	ഌ	ಌ
LETTER VOCALIC LL	–	ꢎ	ꢋ	ൡ	ೡ
LETTER E	எ	(ண்?)	ꢌ	എ	ಎ
LETTER EE	ஏ	ꢏ	ꢍ	ഏ	ಏ
LETTER AI	ஐ	ꢐ	ꢎ	ഐ	ಐ
LETTER O	ஒ	(ஃ?)	ꢏ	ഒ	ಒ
LETTER OO	ஓ	ꢑ	ꢐ	ഓ	ಓ
LETTER AU	ஔ	ꢒ	ꢑ	ഔ	ಔ
LETTER KA	க	ꢓ	ꢒ	ക	ಕ
LETTER KHA	–	ꢔ	ꢓ	ഖ	ಖ
LETTER GA	–	ꢕ	ꢔ	ഗ	ಗ
LETTER GHA	–	ꢖ	ꢕ	ഘ	ಘ
LETTER NGA	ங	ꢗ	ꢖ	ങ	ಙ
LETTER CA	ச	ꢘ	ꢗ	ച	ಚ
LETTER CHA	–	ꢙ	ꢘ	ഛ	ಛ
LETTER JA	ஜ	ꢚ	ꢙ	ജ	ಜ
LETTER JHA	–	ꢛ	ꢚ	ഝ	ಝ
LETTER NYA	ஞ	ꢜ	ꢛ	ഞ	ಞ
LETTER TTA	ட	ꢝ	ꢜ	ട	ಟ
LETTER TTHA	–	ꢞ	ꢝ	ഠ	ಠ

LETTER DDA	–	ಬ	ಒ	ಡ	ಡ
LETTER DDHA	–	ಬಿ	ಜಿ	ಡಿ	ಢ
LETTER NNA	ಣ	ಣ	೧	ಣ	ಣ
LETTER TA	ತ	ತ	ತ	ತ	ತ
LETTER THA	–	ಲಿ	ಟ	ಟ	ಥ
LETTER DA	–	ಲಿ	೨	ಙ	ದ
LETTER DHA	–	ಬಿ	ಬ	ಬ	ಧ
LETTER NA	ಞ	ಞ	೧	೧	ನ
LETTER PA	ಬ	ಬಿ	ಬ	ಬ	ಪ
LETTER PHA	–	ಬಿ	ಛ	ಛ	ಫ
LETTER BA	–	ಬಬ	ಬ	ಬಬ	ಬ
LETTER BHA	–	ಐ	ಬ	ಬ	ಭ
LETTER MA	ಬ	೭	೨	ಬ	ಮ
LETTER YA	ಬ	ಬ	ಝ	ಯ	ಯ
LETTER RA	ಬ	ಬ	ರ	ರ	ರ
LETTER RRA	ಬ	ಬ	೮	೦	೫
LETTER LA	ಲ	ಲ	ಲ	ಲ	ಲ
LETTER LLA	ಣ	ಣ	೭	೪	ಳ
LETTER LLLA	ಬ	ಛ	೪	ಳ	೫
LETTER VA	ಬ	ಬ	ಬ	ಬ	ವ
LETTER SHA	ಬ	ಬ	ಶ	ಶ	ಶ
LETTER SSA	ಷ	ಷ	ಷ	ಷ	ಷ
LETTER SA	ಸ	ಬಸ	ಸ	ಸ	ಸ
LETTER HA	ಹ	ಹ	೧	ಹ	ಹ
VOWEL SIGN AA	ಂಗ	ಂಗ	ಂ೧	ಂಂ	ೖ
VOWEL SIGN I	ಿ	ಿ	ಿ	ಿ	ಿ
VOWEL SIGN II	ಿ	ಿ	ಿ	ಿ	ೀ
VOWEL SIGN U	ೂ	ೂ	ೂ	ೂ	ೂ
VOWEL SIGN UU	ೂ	ೂ	ೂ	ೂ	ೂ
VOWEL SIGN VOCALIC R	–	ೖ	ೖ	ೖ	ೖ
VOWEL SIGN VOCALIC RR	–	ೖ	ೖ	ೖ	ೖ

	Tamil	Grantha	Tigalari	Malayalam	Kannada
VOWEL SIGN VOCALIC L	–	ꚗ	Ꙃ	ꙶ	ꙻ
VOWEL SIGN VOCALIC LL	–	Ꚙ	ꙃ	ꙷ	꙼
VOWEL SIGN E	ெ	ꙶ	Ꙅ	ꙸ	꙽
VOWEL SIGN EE	ே	ꙷ	ꙅ	ꙹ	꙾
VOWEL SIGN AI	ை	ꙸ	Ꙇ	ꙺ	Ꚁ
VOWEL SIGN O	ொ	ꙹ	ꙇ	ꙻ	ꚁ
VOWEL SIGN OO	ோ	ꙺ	Ꙉ	꙼	Ꚃ
VOWEL SIGN AU	ௌ	ꙻ	ꙉ	꙽	ꚃ
VIRAMA	்	꙼	Ꙋ	꙾	Ꚅ
AVAGRAHA	–	꙽	ꙋ	ʃ	ꚅ
REPH	–	꙾ / ꙶ	Ꙍ	●	Ꚇ
0	௦	೦	೦	൦	೦
1	க	க	೧	൧	೧
2	உ	உ	೨	൨	೨
3	௩	௩	೩	൩	೩
4	௪	௪	೪	൪	೪
5	௫	௫	೫	൫	೫
6	௬	௬	೬	൬	೬
7	எ	எ	೭	൭	೭
8	அ	அ	೮	൮	೮
9	௯	௯	೯	൯	೯
10	௰	௰	൰	൰	೧೦
100	௱	௱	൱	൱	೧೦೦

FIGURE **6.**
Comparison of Tamil, Grantha, Tigalari, Malayalam and Kannada scripts.
FONTS USED
Tamil : Noto Sans Tamil, Grantha : e-Grantamil 7, Tigalari : Mokay (Designed by the Author),
Malayalam : Meera, Kannada : Noto Sans Kannada
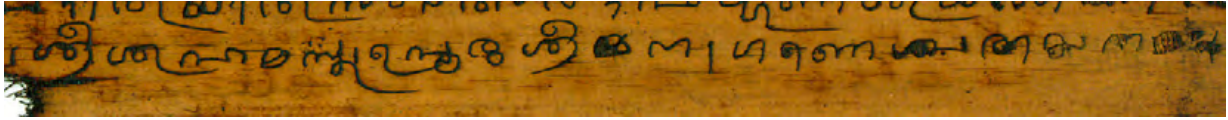
ಶ್ರೀ	ಶಾ	ಗು	ಡ	ಮೃ	I	ಇ	ಷ್ಕ	ಡಿ	ಶ್ರೀ	ಡ	ಲಾ	ಗ	೧ಣ	ಶ	ರಾ	ಘ	ಗ	ಡಃ	I
ಶ್ರೀ	ಶು	ಭ	ಮ	ಸ್ತು	I	ಉ	ಪೂ	ರು	ಶ್ರೀ	ಮ	ಹಾ	ಗ	ಣೇ	ಶ್ವ	ರಾ	ಯ	ನ	ಮಃ	I
श्री	शु	भ	म	स्तु	I	उ	पू	रु	श्री	म	हा	ग	णे	श्व	रा	य	न	मः	I
Shrii	*Shu*	*Bha*	*Ma*	*Stu*	.	*U*	*Puu*	*Ru*	*Shrii*	*Ma*	*Haa*	*Ga*	*Nnee*	*Shva*	*Raa*	*Ya*	*Na*	*Maha.*	

FIGURE 7.

Transcribing Tigalari characters into Kannada, Devanagari and Latin scripts from a manuscript source.

SOURCE

Dodmane. Uppoor. Udupi.

FIGURE 8.1.

Kannada language, Tigalari script manuscript.

SOURCE

Yajnavalkya Vyavaharadhiyaya, Srinidhi
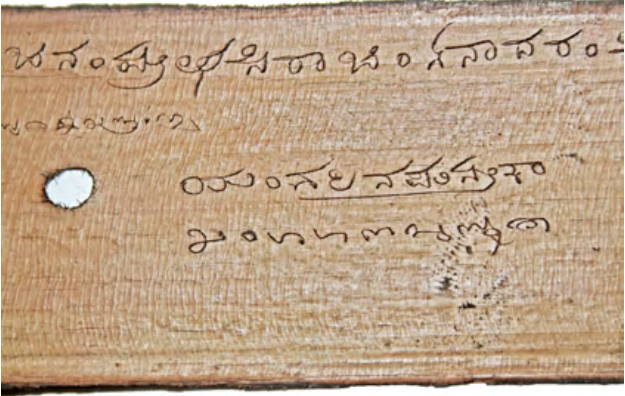
FIGURE 8.2.

A sample of both Kannada and Tigalari scripts used on the same leaf of a manuscript. Its common to see Kannada or Nandinagari scripts used in the last few pages of the Tigalari manuscripts.

SOURCE

Yajnavalkya Vyavaharadhiyaya, Srinidhi

FIGURE 8.3.
A tantric plam leaf manuscript that has Kannada, Nagari and Tigalari scripts.
SOURCE
Keladi Museum, Keladi.
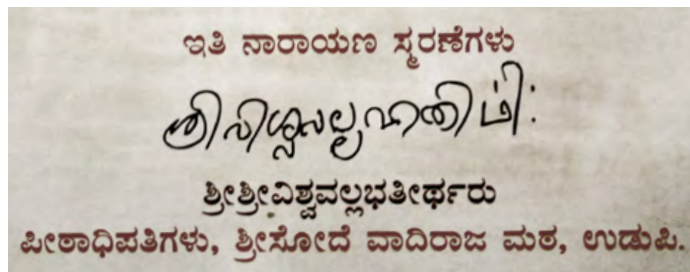
FIGURE 9.
Signature of a prominent seer from Udupi in Tigalari that reads 'Shrii Vishwa Vallabha Teertha' of Sōdé Mutt. Rest of the text surrounding it is in Kannada language and script.
SOURCE
Printed on an invitation card.
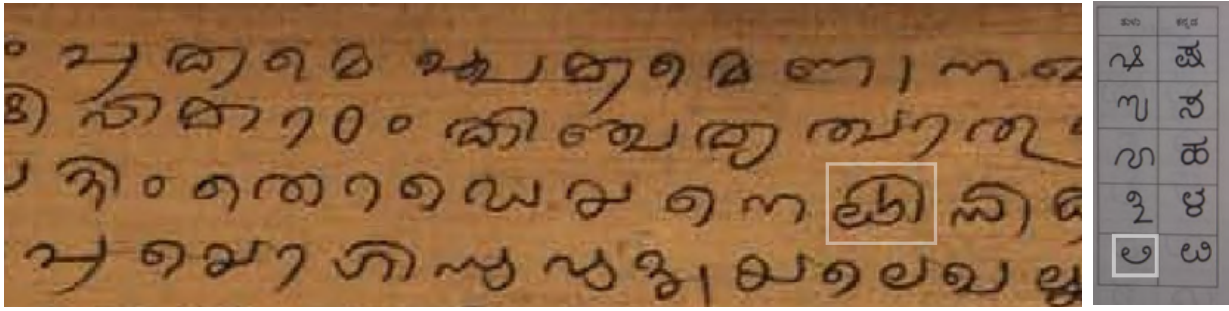
FIGURE 10.
(LEFT)
RRA+I-vs found in a Kannada language, Tigalari script manuscript. This character has been recently found by Srinidhi in several other such Kannada language manuscripts.
SOURCE
Srinidhi.

(RIGHT)
Tigalari letter LLLA as proposed by Venkataraja Puninchathaya.
SOURCE
Puninchathaya Venkataraja, Tulu Lipi, Tuḷu Sahitya Academy, Mangalore.
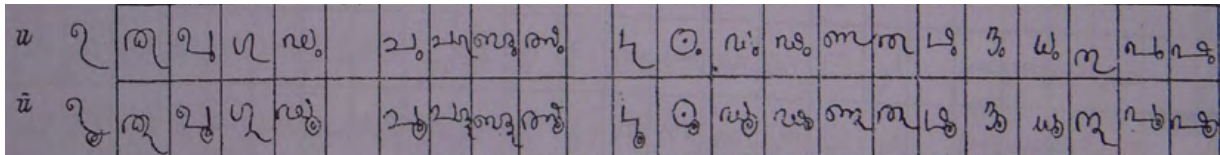
FIGURE 11.
Vowel sign U & UU change according to the character they are combining with.
SOURCE
A C Burnell, Elements of South Indian Palaeography
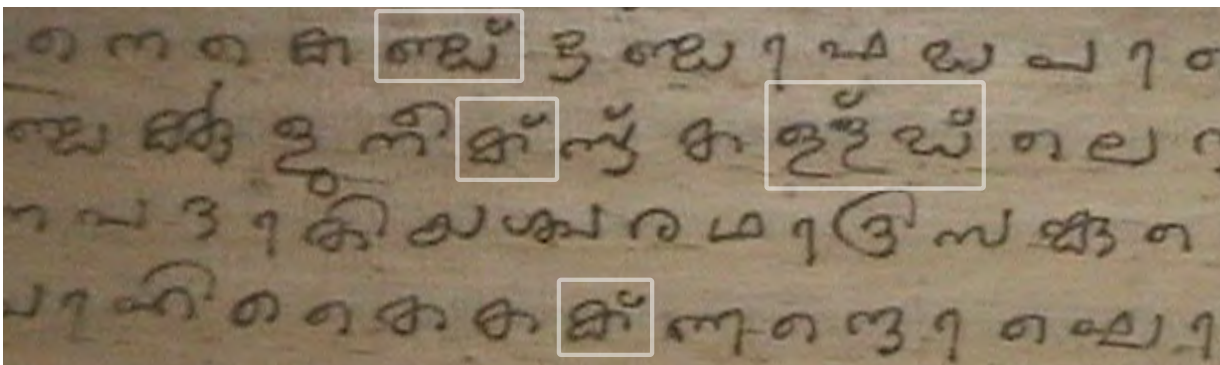
FIGURE 12.
A manuscript of Tuḷu language and Tigalari script. Here we see a sequence of letters with *Virama* representing the short un-rounded 'u'.
SOURCE
Dharmasthala Samshodana Pratishtana, Dharmasthala.
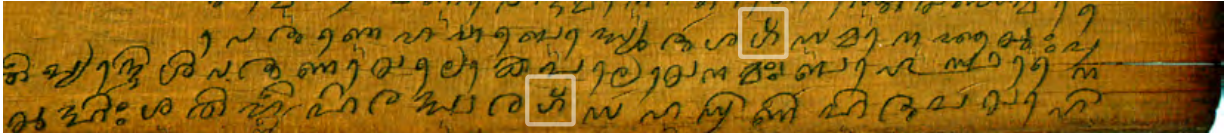
FIGURE 13.
A manuscript of Sanskrit language which uses the semi-circular *Virama* form denoting the negation of the inherent vowel 'A'.
SOURCE
Taraprakashana, Bangalore.
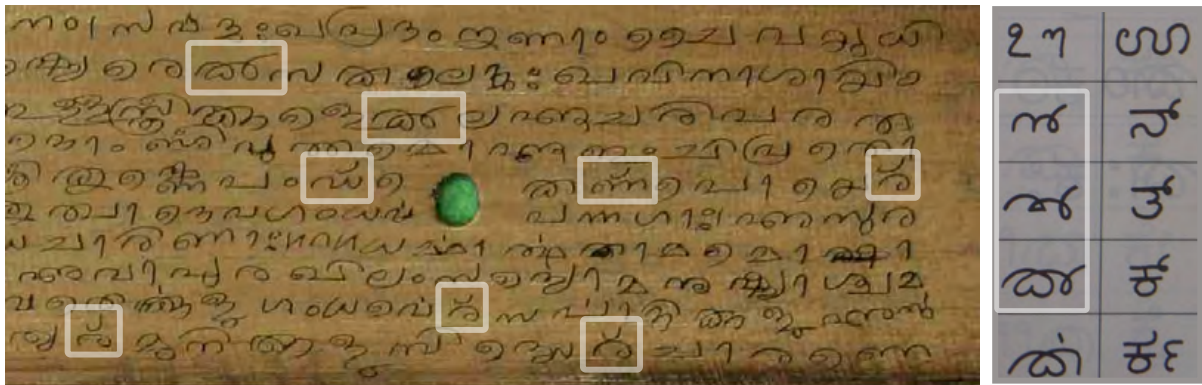
FIGURE 14.
(LEFT)
Both the *Virama* forms seen used in a Tulu language, Tigalari script manuscript. Note Ra+*Virama* does not form *Reph*. The combining *Virama* indicates a retroflexion that is distinct from a *Reph*.
SOURCE
Anantavruta Kathe, S.A.Krishnaiah, Govinda Pai Research Centre, Udupi

(RIGHT)
Virama ligatures in a Tigalari script text book.
SOURCE
Tuḷu Sahitya Academy, Mangalore.
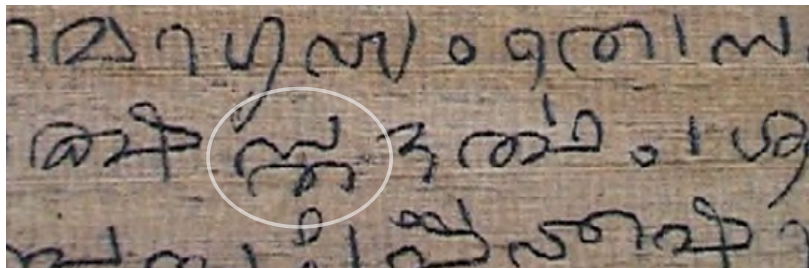
FIGURE 15.
Here, we can see the common practice of drawing post-base forms the same size as the base consonant. It is also interesting to note that most vertical conjuncts shift slightly above the base-line, reducing the interlinear space.
SOURCE
Oriental Research Institute, Mysore.
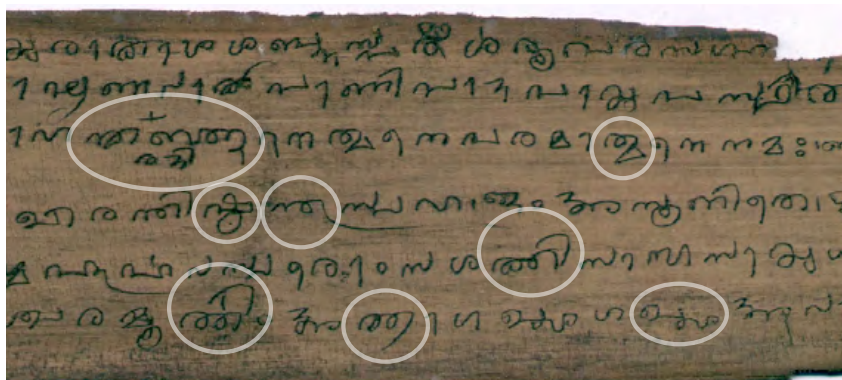
FIGURE **16.**
Various forms of ligatures found on a manuscript.
SOURCE
Private collection, Tamil Nadu.
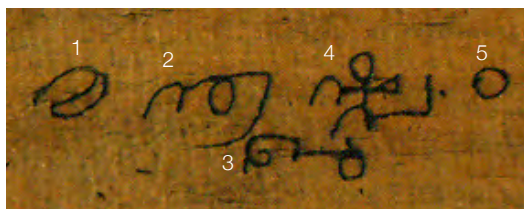
FIGURE **17.**
1. Consonant MA, 2. Horizontal Conjunct [NTRA = NA+TA+RA-*PBF*], 3. Consonant + Vowel Sign [PU =
PA+U-*VS*], 4. Vertical Conjunct [SSPA = SSA+PA-*PBF*], 5. *Anuswara*. The word reads *Mantrapushpam*.
SOURCE
Private Collection, Puttur.
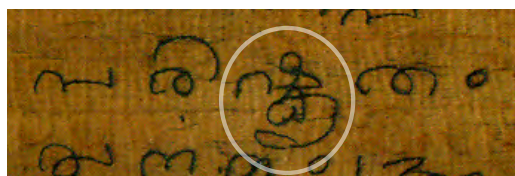
FIGURE **18.**
An example of Vertical Ligature combining with a vowel sign [SSA+KA+Vocalic R].
SOURCE
Private Collection, Bangalore.
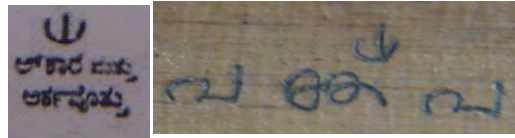
FIGURE **19.**
Virama and *Reph* ligature.
SOURCE
(LEFT)
15th century specimen isolated by Dr Venkataraja Puninchathaya.
(RIGHT)
Tulu Ramayana, Dharmasthala Samshodana Pratishtana, Dharmasthala.

FIGURE **20.**
Tulu page numbering examples :
1, 2, 3, 5, 6
7, 8, 9, 10, 17
SOURCE
Dharmasthala Samshodana Pratishtana, Dharmasthala.
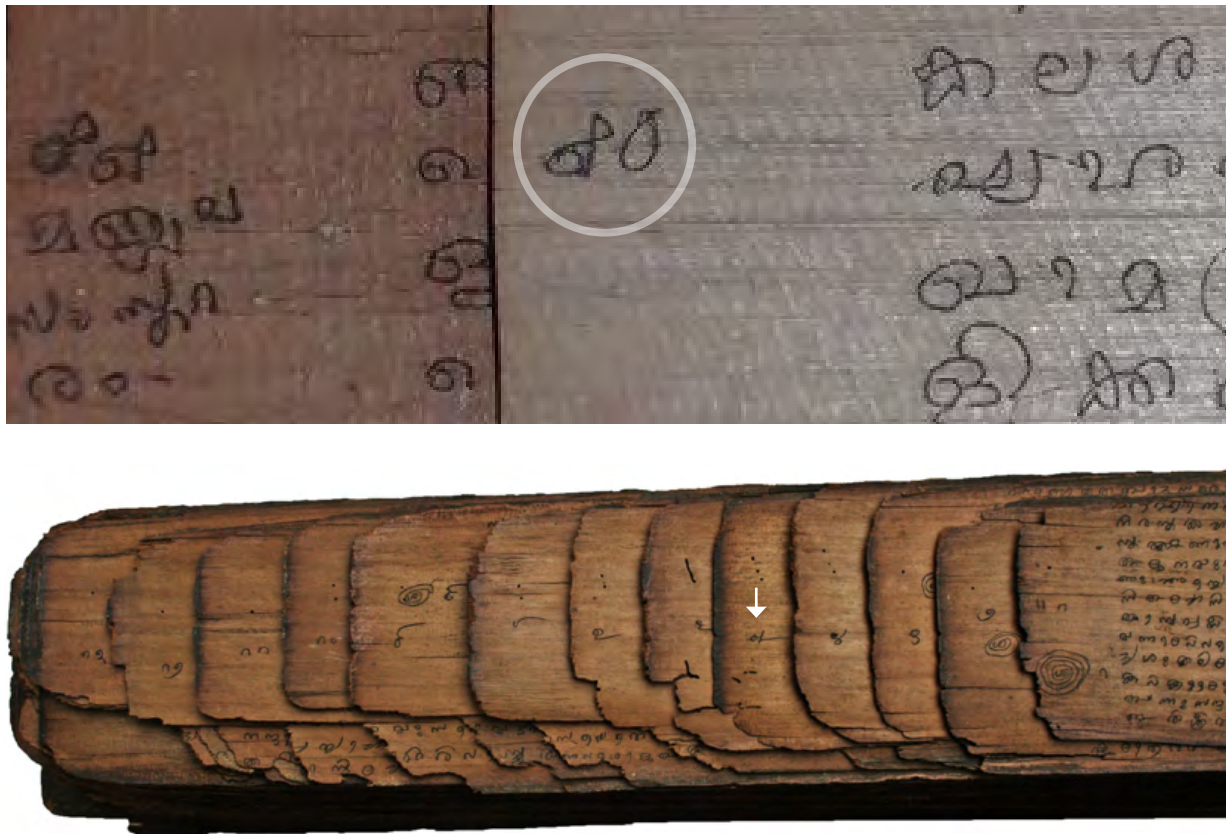
FIGURE **21.**

(ABOVE)
Digits One and Zero written using Tulu numbers.

IMAGE CREDIT
GVS Ullal

SOURCE
Dharmasthala Samshodana Pratishtana, Dharmasthala.

(BELOW)
Telugu-Kanarese numerals are used in most Tigalari manuscripts. In the above example, these numbers are seen used to number the pages on a palm leaf manuscript. Its interesting to note however that 5 (arrow indicator) is sometimes written in the above style which is slightly different from the current Telugu-Kannada style.

SOURCE
Private collection. Ududpi.

FIGURE 22.

Tigalari Number system. The title reads 'Tulu numbers' as its commonly referred to by this name by the scholars of the Tulu speaking region today.

SOURCE

Dr S R Vighnaraj, Dharmasthala Samshodana Pratishtana, Dharmasthala. Published by Tulu Sahitya Academy, Mangalore. 2006.
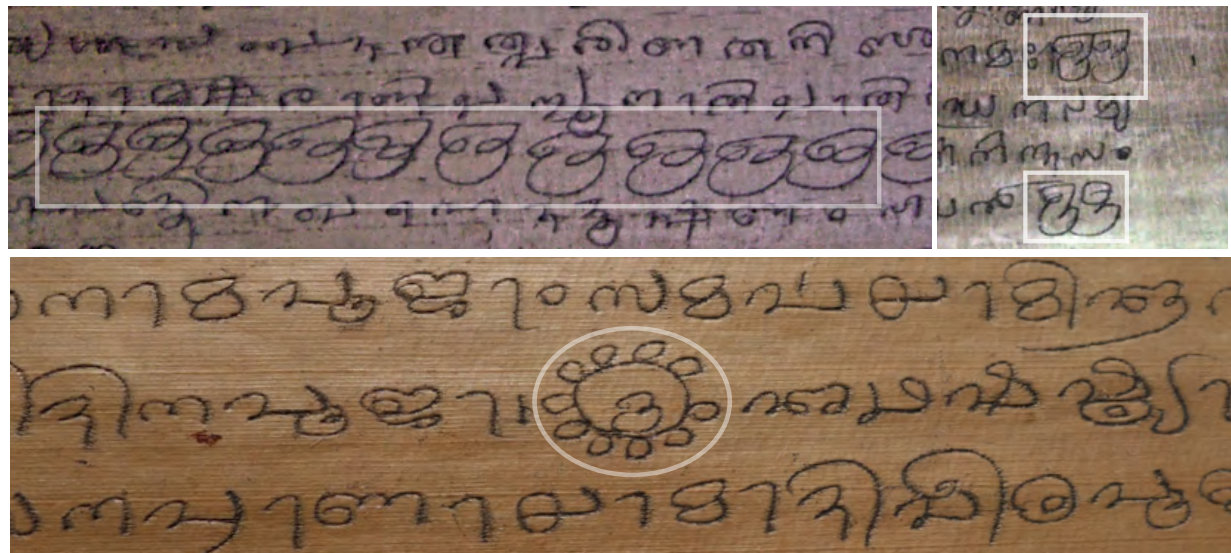
FIGURE 23.

Examples of *Alankaara* '𑄧'.

SOURCE

Private collection, Mangalore district.
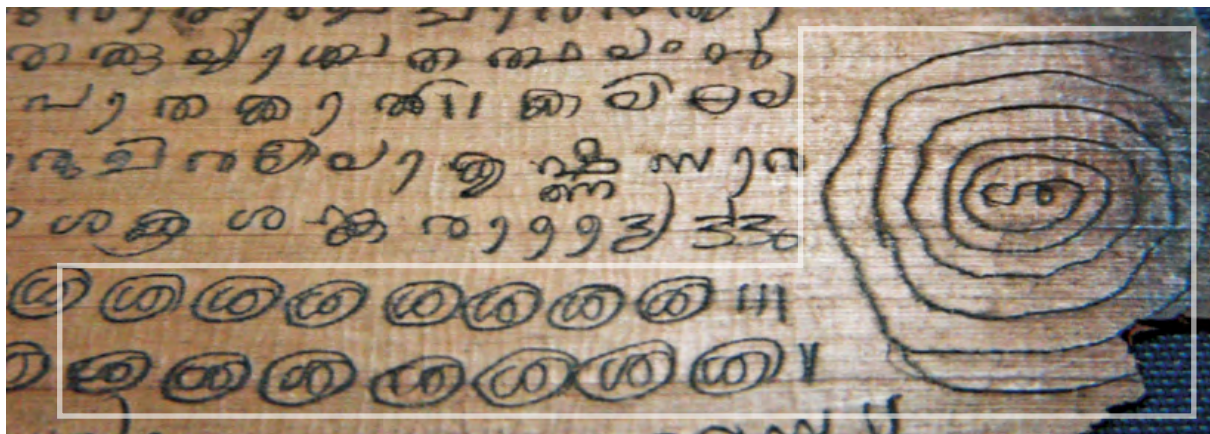
FIGURE 24.

Example of *Shrii* '⟨image⟩' used as space filler and an ornament.

SOURCE

Private collection, Mangalore district.
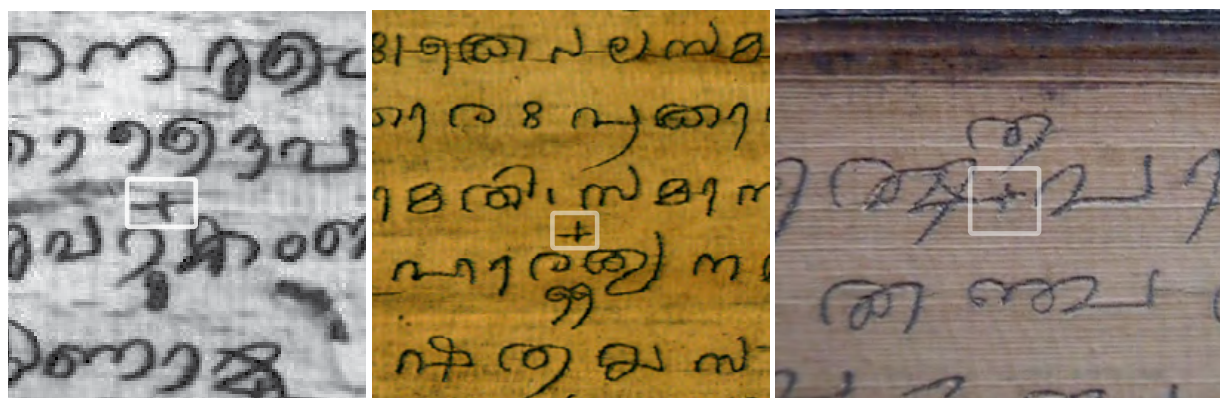
FIGURE 25.

Example of *Tiddu* marks with corrections appearing above and below the baseline.

SOURCE

Mahaitarayopanishatt Bhashya, Location: Udupi Mutt. Digitised by Taraprakahana, Bangalore.
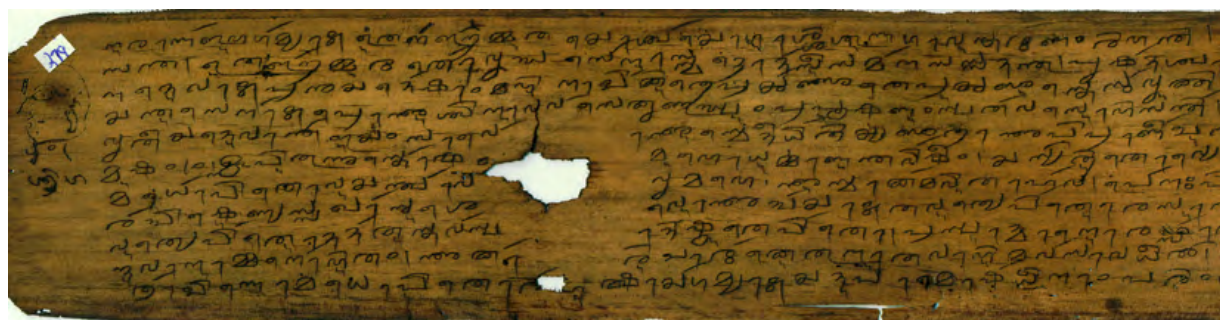
FIGURE 26.

Svarita and *Anudatta* are marked in the above manuscript.

SOURCE

Private collection, Mangalore district.
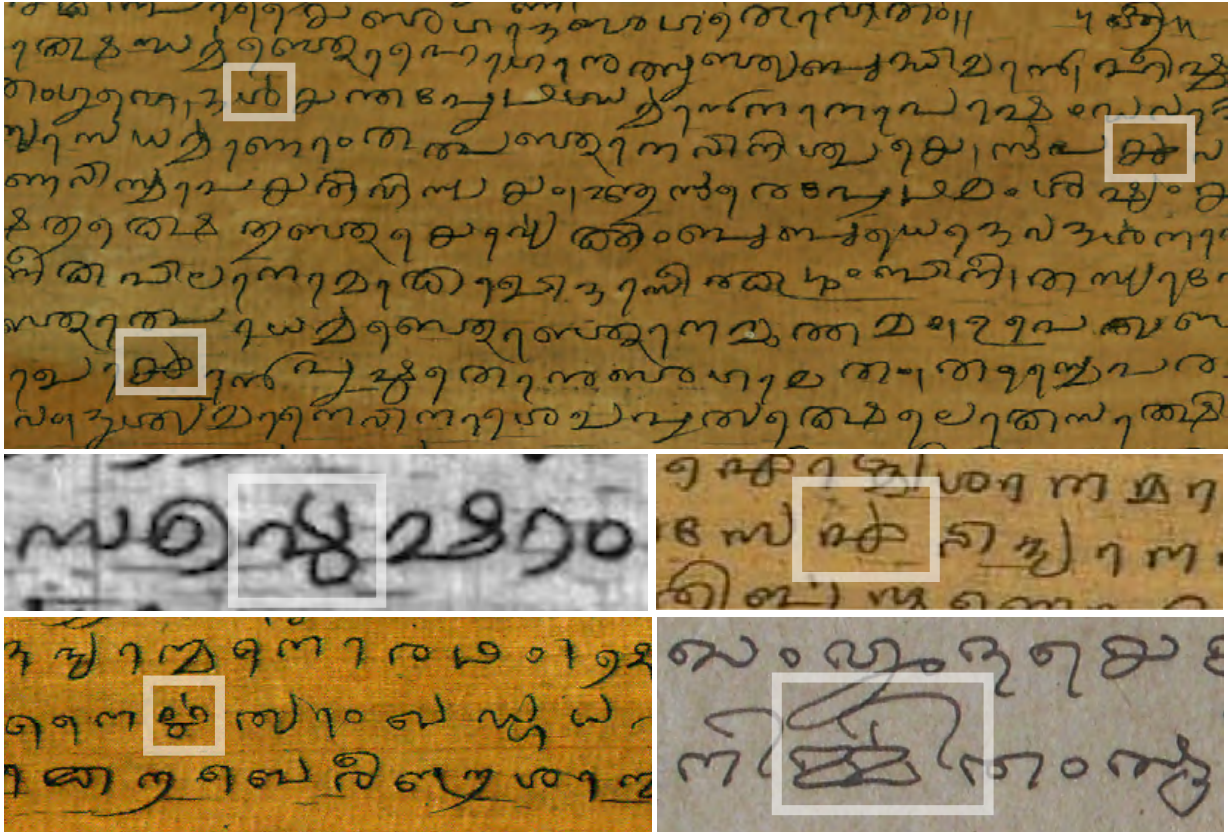
FIGURE 27.
(TOP)
Ligature form YA+*Reph* (�’). Also note the Tigalari Letter SHA forms a ligature with *Reph* here. Not to be confused with a SHA+*Virama chillu* form as seen in Malayalam U+0D7E.
SOURCE
Private Collection, Kasargod.

(MIDDLE RIGHT AND LEFT)
The two forms of VA+*Reph* ligature fond in Tigalari.
SOURCE
Left : Sarvamoola Grantha, Udupi Mutt. Digitised by Taraprakashana, Bangalore
Right : Srinidhi

(BELOW LEFT)
Repha combining with Vocalic R. From the word NAIRRTYAAM नैर्ऋत्यां.
SOURCE
Private Collection, Udupi.

(BELOW RIGHT)
[MA+MA]+*Reph*+I
SOURCE
Dharmasthala Samshodana Pratishtana, Dharmasthala.
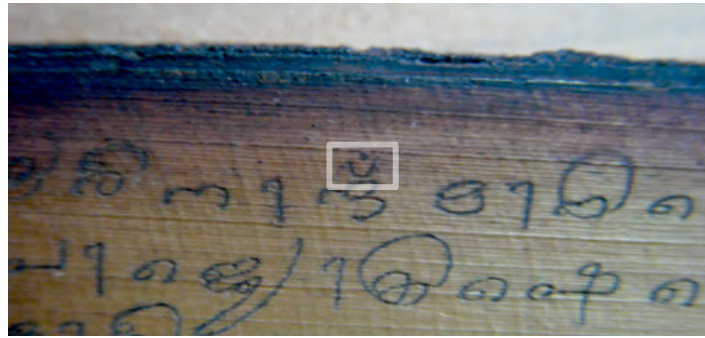
FIGURE 28.
Candrabindu style *Anunaasika* character seen used in a Tulu language manuscript. This symbol is used experimentally here in an attempt to indicate the half unrounded U sound which is otherwise associated with a *Candra Virama* form.
SOURCE
Tulu Ramayana, Dharmasthala Samshodana Pratishtana, Dharmasthala.

NOTE :

Figures 29, 30, 31, 32, 33, 34, 35, 36, 37, 42 and 43 are collected samples of Tigalari alphabet by individuals and organisations. There are several inconsistencies in a few of these images with the current research. However, it makes for an interesting collection to study the various representations.
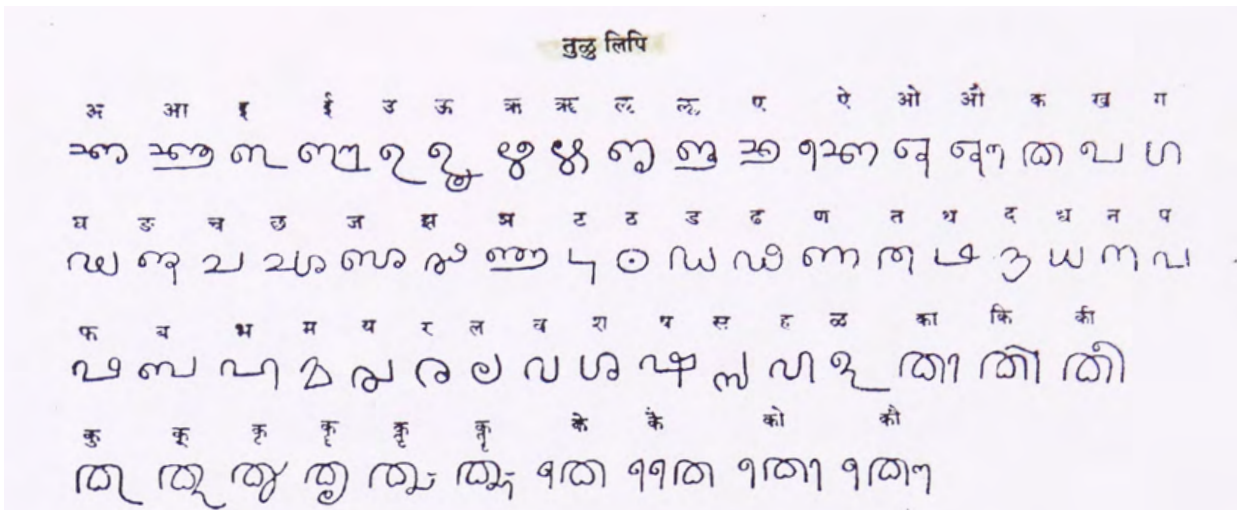
FIGURE 29.
Tigalari alphabet
SOURCE
Ojha, Gauri Shankar Hirachand. Bharatiya Prachin Lipimala (The Palaeography of India). Delhi : Munshiram Manoharlal, 1918. Print.

FIGURE 30.

Tigalari (Tulu) script as recorded by A C Burnell. (This book has heavily influenced several scholarly works on Tigalari.)

SOURCE

Burnell, Arthur Coke. Elements of South-Indian Palæography, from the Fourth to the Seventeenth Century, A. D.; Being an Introduction to the Study of South-Indian Inscriptions and Mss.;. London: Trübner &; [Mangalore, Basel Mission], 1878. Plate XVI. Internet Archive. Web. 31 July 2015.

FIGURE **31.**
Dr Venkataraja Puninchathaya was one of the early scholars to study this script closely in the recent times. He called this script Tulu script and was also responsible for translating several Tigalari script, Tulu language original literature into Kannada. Tigalari script taught in schools today by Tulu Sahitya Academy follows his style of writing Tigalari.
SOURCE
Unknown

FIGURE 32.
Handwriting Sample of the Tigalari character-set and vowel marks.
SOURCE
Poornaprajna Vidyapeetha, Bangalore.

Vowels :

Consonants :

Semi-Vowels :

KA+Vowel Marks :

Alternate Forms :
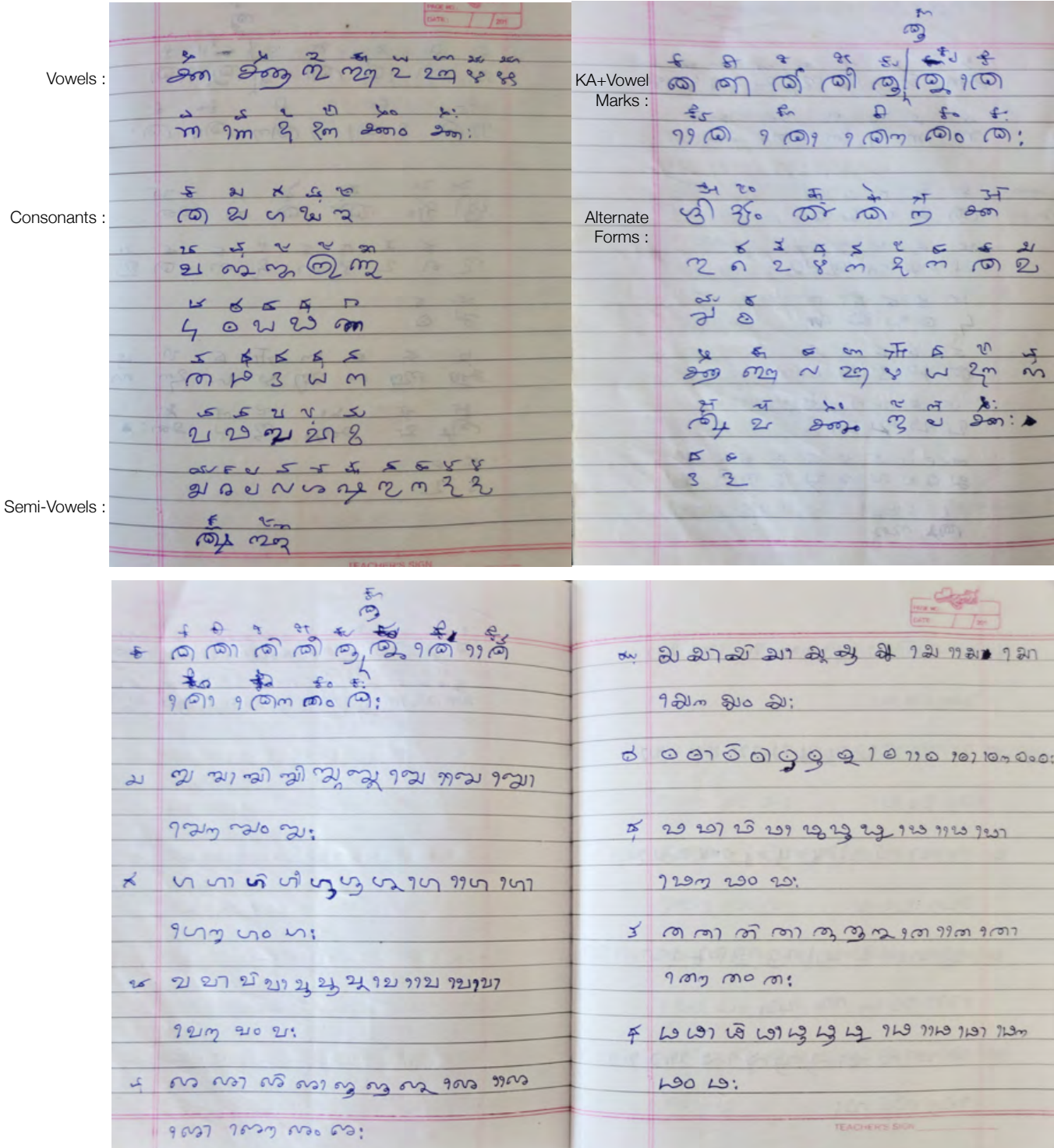
FIGURE 33.

Gunda Jois and his son, Venkatesh Jois established a Museum a Keladi that houses several Tigalarai manuscripts. They have studied this script for several years now. Images 33, 34 & 35 capture the Tigalari orthography as seen in several manuscripts that were read by them.

SOURCE

From the personal notes of Dr Keladi Venkatesh Jois, Keladi Museum, Keladi.
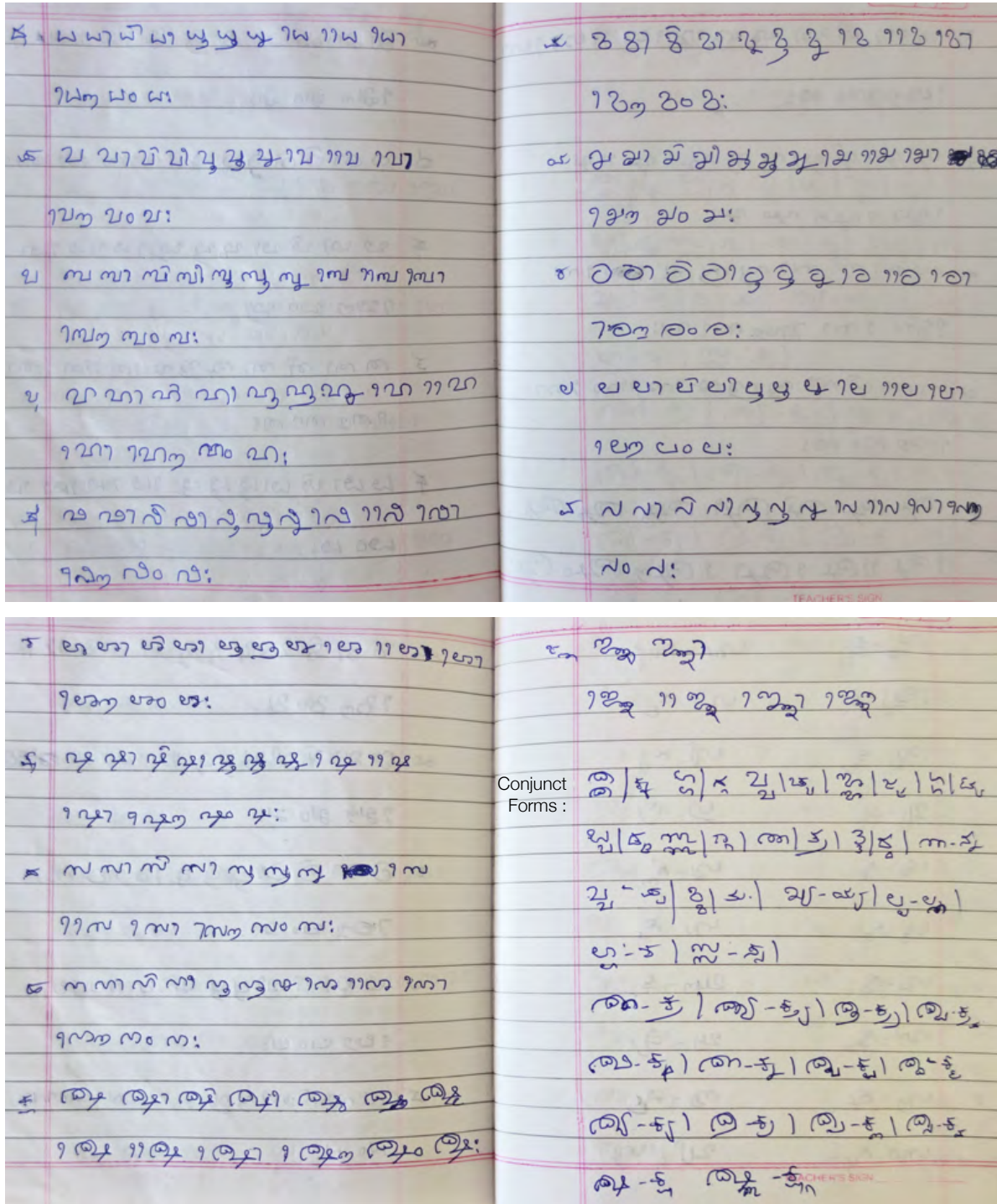
FIGURE 34.
Consonant+Vowel mark combinations and Conjunct forms in Tigalari.
SOURCE
From the personal notes of Dr Keladi Venkatesh Jois, Keladi Museum, Keladi.
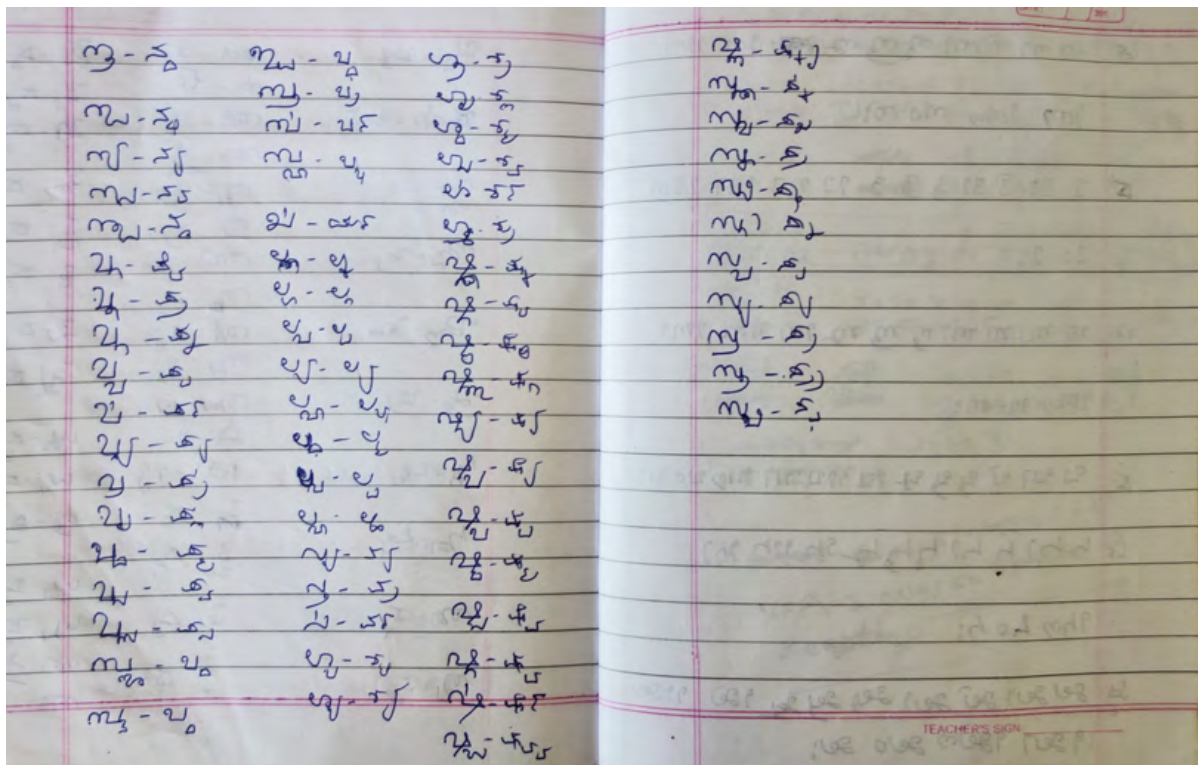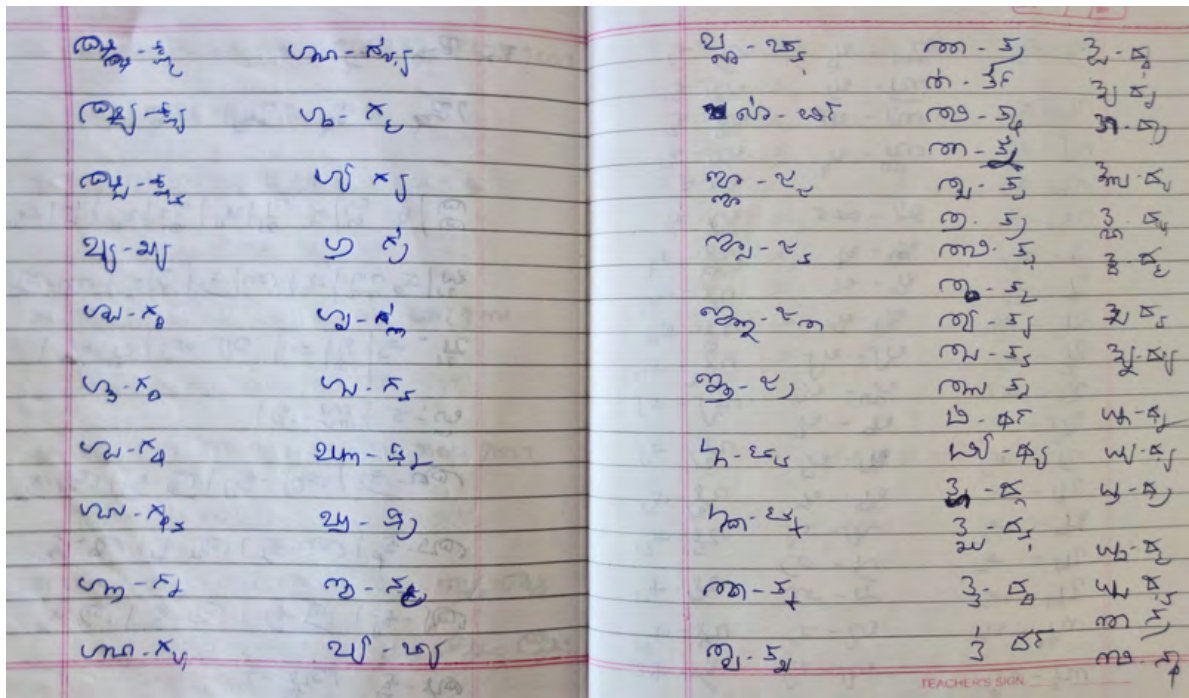
FIGURE 35.
Listing the conjunct forms in Tigalari.
SOURCE
From the personal notes of Dr Keladi Venkatesh Jois, Keladi Museum, Keladi.
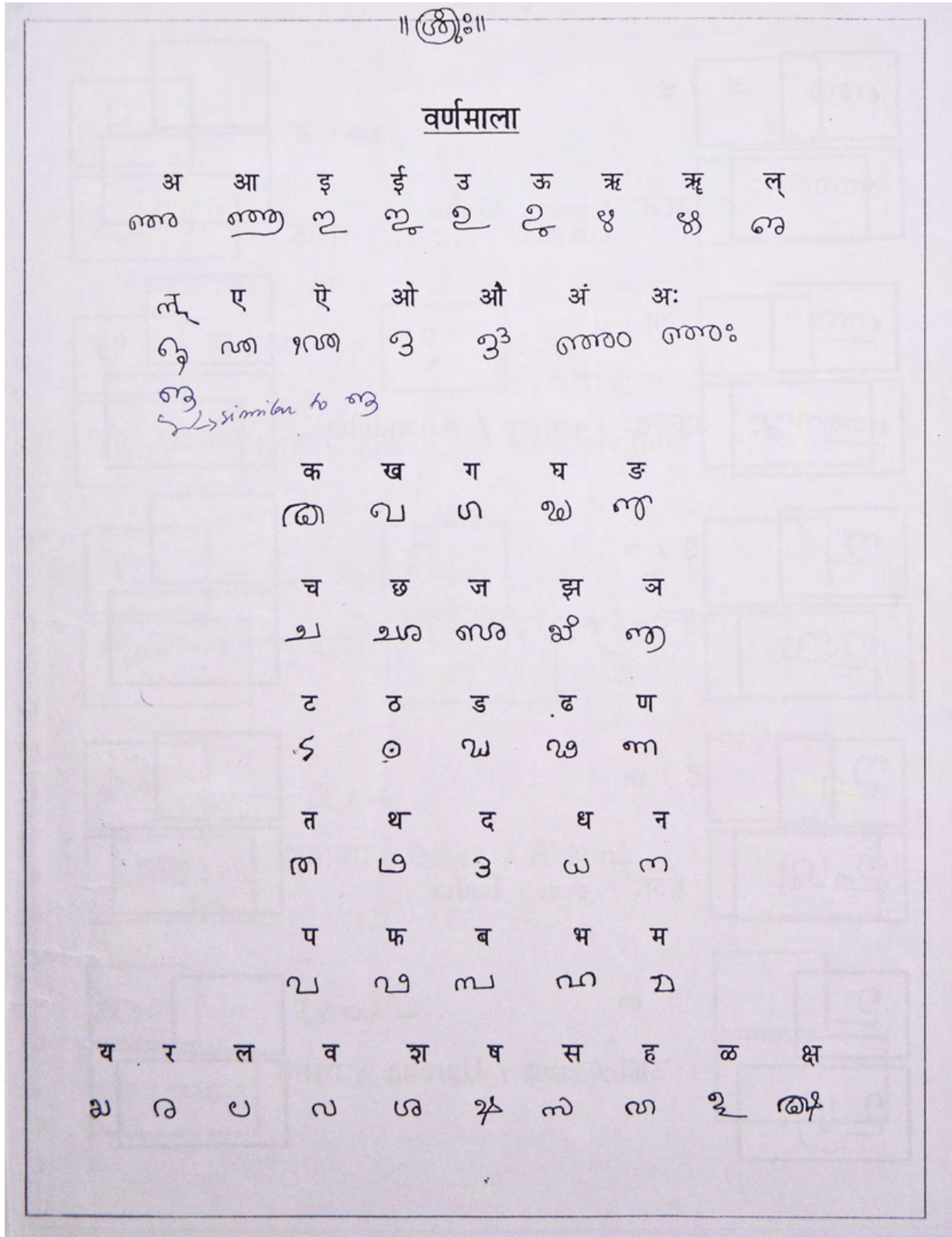
FIGURE 37.
Tigalari vowel marks and ligatures. Belongs to the workshop hand-out set seen in the previous page.
SOURCE
The Poornaprajna Samshodhana Mandiram, Bangalore.

VOWEL SIGN U -

Consonant			
ku			–
gu			–
chu			–
ju			–
ṭu		–	
ṇu			
tu			–
nu		–	
bhu			–
ru			
śu			–
hu			–

VOWEL SIGN UU-

Consonant		
kū		–
gū		–
chū		–
jū		–
ṭū		
ṇū		
tū		–
nū		
bhū		–
rū		
śū		–
hū		–

FIGURE 38.

Tigalari vowel marks U and UU vary according to the characters they combine with. Also these forms change across manuscripts. This is a tabulated form of these variations put-together by Srinidhi A.

SOURCE

Srinidhi A.

ALPHABET

The letters of the alphabet adopted and the method of their transliteration.

	Kannada	Roman	Nearest English equivalent in pronunciation wherever available
Vowels:			
	ಈ	u̞	
	ಈೕ	u̞u̞	
	ಅ	a	u of cut
	ಆ	aa	a of calm
	ಇ	i	i of bit
	ಈ	ii	ee of keep
	ಉ	u	u of put
	ಊ	uu	oo of shoot
	ಋ	r̞	
	ಋೕ	r̞r̞	
	ವ್	ε	a of man
	ವ್ೕ	εε	a of mat
	ಎ	e	e of bet
	ಏ	ee	a of mate
	ಒ	o	o of obedience
	ಓ	oo	oa of coat
Dipthongs:			
	ಐ	ai/ ei	i of like
			ai of main
	ಅಯ್	ayu̞/ ay	
	ಆಯಿ	ayi	
	ವಯಿ	eyi	
	ಔ	au/ ou	ov of love
			ov of stove
	ಅವ್	avu̞/ av	
	ಅವು	avu	
	ಒವು	ovu	
Stops unaspirated:			
	ಕ	ka	k of skin
	ಗ	ga	g of get
	ಚ	ca	ch of church
	ಜ	ja	j of jet
	ಟ	ṭa	t of heat (with the tip of the tongue curled back)
	ಡ	ḍa	d of curd (with the tip of the tongue curled back)

ಮೀಂಕ್

	ತ	*ta*	
	ದ	*da*	
	ಪ	*pa*	p of copy
	ಬ	*ba*	b of big
Stops aspirated:	ಖ	*kha*	
	ಘ	*gha*	
	ಛ	*cha*	
	ಝ	*jha*	
	ಠ	*ṭha*	
	ಢ	*ḍha*	
	ಥ	*tha*	
	ಧ	*dha*	
	ಫ	*pha*	
	ಭ	*bha*	
Alveolar stop:	ಸ್ತ	*sṭ*	treated as a cluster of s and ṭ
Nasals :	ಙ	*ṅa*	ng of sing
	ಞ	*na*	n of bench
	ಣ	*ṇa*	
	ನ	*na*	n of name
	ಮ	*ma*	m of man
	ಂ	*m*	ṅ before k,kh,g,gh
			ñ before c, ch,j,jh
			ṇ before ṭ,ṭh,ḍ,ḍh
			n before t,th,d,dh
			m before p,ph,b,bh
			Also before non-stop consonants and finally
Semi-vowels trills, laterals and fricatives:	ಯ	*ya*	y of yard
	ರ	*ra*	r of tree
	ಲ	*la*	l of light
	ವ	*va*	v of very
	ಶ	*śa*	sh of sheep
	ಷ	*ṣa*	
	ಸ	*sa*	s of see
	ಹ	*ha*	h of head
	ಳ	*ḷa*	
	ೞ	*ḻa*	
	ಃ	*ḥ*	
Also note	◌	*stands for u̱ after consonants*	
	◌	*stands for ɛ after consonants*	
Avagraha	೧	*stands for deleted vowel in texts*	

FIGURE **39.**

(Previous page & Above) Tulu Orthography in Kannada Script as listed in the Tulu Lexicon. Tuḷu has a few additional vowels which are frequently used as discussed earlier: short un-rounded 'u̱' (A + *Virama*), long un-rounded 'u̱u̱' (AA + *Virama*) and short 'Ɛ' (E + *Virama*), long 'ƐƐ' (EE + *Virama*). These additional phonemes referred to in the above image are already being used in Kannada script for Tuḷu language.

SOURCE

Tulu Lexicon, Volumes 1-6, Rashtrakavi Govinda Pai Research Centre, M.G.M. College. 1988.

CHAPTER - 1

PHONOLOGY

1.1. INVENTORY

The overall phonemic system of Tulu is as follows:

<u>Vowels</u> :

	Front		Central		Back	
High	i	ii	ṳ	ṳṳ	u	uu
Mid	e	ee			o	oo
Low	ɛ	ɛɛ			a	aa

<u>Consonants</u> :

Stops and affricates :

voiceless	:	p	t	ṭ	c	k
aspirated	:	ph	th	ṭh	ch	kh
voiced	:	b	d	ḍ	j	g
aspirated	:	bh	dh	ḍh	jh	gh

<u>Sonorants</u>:

nasal	:	m	n	ṇ	ñ	ṅ
oral	:	v	l	ḷ	y	
trill	:	r				
sibilant	:		s	ṣ	ś	
fricative	:					h

The following phonemes have marginal status:

<u>Consonants:</u>

ph	th	ṭh	ch	kh
bh	dh	ḍh	jh	gh
		ṣ	ś	

FIGURE **40.**
Tulu language phonetic system. The additional phonetic values are listed here as-well. It is very useful to have these additional characters included in Tigalari as-well.

SOURCE
Kekunnaya, Padmanabha. "Chapter 1." A Comparative Study of Tulu Dialects. Udupi, Karnataka: Rashtrakavi Govinda Pai Research Centre, 1994. 21. Print.

22 A COMPARATIVE STUDY OF TULU DIALECTS Chapter - I

Table - 1 (Contd.)

Distribution of Phonemes

Vowels	Initial	Medial	Final
ṳ	+	+	+
ṳṳ	-	+	+
a	+	+	+
aa	+	+	+
u	+	+	+
uu	+	+	+
o	+	+	+
oo	+	+	+

Illustrations :

Vowels	Initial		Medial		Final	
i	irɛ	leaf	kidɛ	cow-pen	aḍi	bottom
ii	iiṇ	You (hon.sg)	niiṇ	water	pii	human excreta
e	edɛ	chest	cembu	copper	aaye	he
ee	eeḍu	goat	keeḍu	harm	kaḍee	to grind
ɛ	--	--	--	--	tarɛ	head
ɛɛ	--	--	dɛɛnsṳ	dance	baalɛɛ	O! my dear child
ṳ	ṳnda	Lo! take	naḍṳgṳ	to tremble	kaaḍṳ	forest
ṳṳ	--	--	pooṇṳṇde (Nb)	he told: it has gone	tindṳṇṳ	it has eaten
a	aṅgi	shirt	karɛ	side	kara	earthen pot
aa	aanɛ	elephant	naalṳ	four	tinpaa	to cause to eat
u	umi	husk	kuḍu	horsegram	sappu	leaf
uu	uurṳ	native, village	nuulu	thread	skrṳu	screw
oo	oṅji	one	kodɛ	umbrella	tooṭo	garden
oo	ooṇi	lane	koodi	corner	suṳpoo (Sb)	to show

FIGURE 41.

Analysis and examples of the retroflex A, AA, E & EE in Tulu language.

SOURCE

Kekunnaya, Padmanabha. "Chapter 1." A Comparative Study of Tulu Dialects. Udupi, Karnataka: Rashtrakavi Govinda Pai Research Centre, 1994. 22. Print.

FIGURE 42.

Additional Tigalari vowels E and O as proposed by Dr Devarakonda Reddy. The need for these two characters have been clearly stated here. However, the character shapes experimented with in the above image disrupt the traditional Tigalari character representation. Vowels EE & AI assume new forms. Vowel O is replaced by AI character shape.

SOURCE

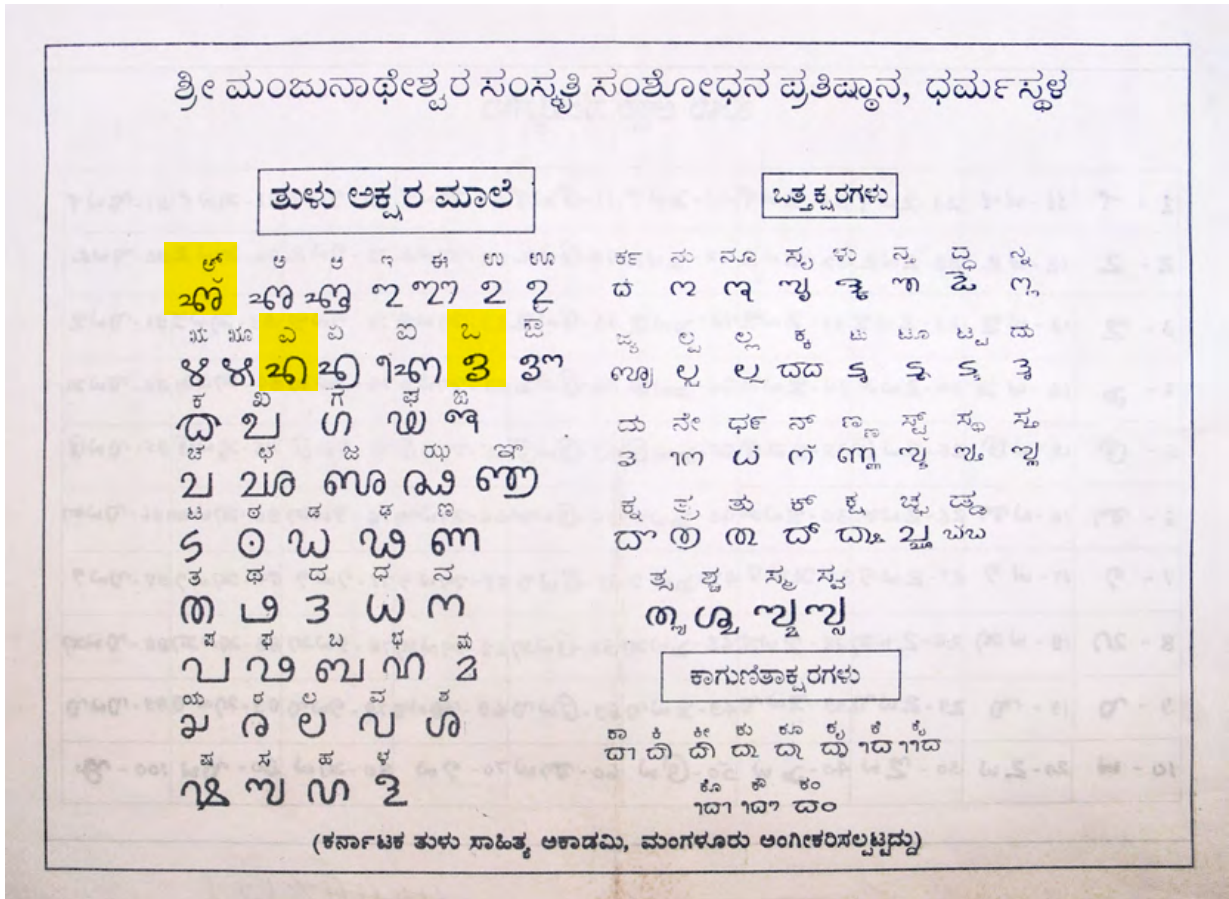Hasthaprathi Adhyayana, Samavesha Sanghatana, Volume 1, Page 60, 2012.

FIGURE 43.

Leaflet distributed by Dharmasthala Samshodana Pratishtana, Dharmasthala to encourage the adoption of Tigalari script for Tulu language. Here we see the recently added vowel E as proposed by S R Vighnaraj. Also the Tigalari long vowel OO is interpreted as short vowel O. This is a mistake that might have arisen from the author's familiarity with the Malayalam script. A + *Virama* combination is also included.

SOURCE

Dr S R Vighnaraj, Dharmasthala Samshodana Pratishtana, Dharmasthala.

FIGURE 44.
Tigalari (Tulu) characters provided as reference along with the digitised Tulu language manuscripts. Here we once again see the characters proposed by S R Vighnaraj.

SOURCE
S.A. Krishnaiah, Oriental Research Centre and Gallery, Udupi.

FIGURE **45.**
Tulu (Tigalari) primer 'Tulu Aksharamaale' published by Karnataka Tulu Sahithya Academy (Pg. 7, 13, 21, 26); Mangalore. The characters and orthography seen here is once again roughly based on Puninchattaya's work published as a book called 'Tulu Lipi'. The glyph shapes appear to be the similar to Figure 44 and carries forward the same errors.

SOURCE
http://www.tuluacademy.org/en/category/tulu-alphabets/

ಪಾಠ ೧

ತುಳು	ಕನ್ನಡ
	ಲೄ
	ಅ
	ಆ
	ಇ
	ಈ
	ಉ
	ಊ

ತುಳು	ಕನ್ನಡ
	ಮ
	ಏ
	ಐ
	ಒ
	ಜೆ
	ಅಂ
	ಅಃ

ತುಳು ಲಿಪಿ /7

ಪಾಠ ೨

ತುಳು	ಕನ್ನಡ
	ಕ
	ಖ
	ಗ
	ಘ
	ಙ
	ಚ
	ಛ

ತುಳು	ಕನ್ನಡ
	ಜ
	ಝ
	ಞ
	ಟ
	ಠ
	ಡ
	ಢ

ತುಳು ಲಿಪಿ /9

ತುಳು	ಕನ್ನಡ
	ಣ
	ತ
	ದ-ಥ
	ದ
	ಧ-ದ
	ನ
	ಪ

ತುಳು	ಕನ್ನಡ
	ಫ
	ಬ
	ಭ
	ಭ
	ಮ

ಪಾಠ ೩

ತುಳು	ಕನ್ನಡ
	ಯ
	ರ
	ಲ
	ವ
	ಶ

ತುಳು	ಕನ್ನಡ
	ಷ
	ಸ
	ಹ
	ಳ
	ಕ್ಷ

ತುಳು ಲಿಪಿ /11

ಪಾಠ ೪

ವರ್ಗಮಾಲೆಯ ಕೆಲವು ಪಾಠಾಂತರಗಳು
ವಿಶಿಷ್ಟ ರೂಪಗಳು

ಕಾಗುಣಿತಗಳು

ತುಳು	ಕನ್ನಡ	ತುಳು	ಕನ್ನಡ	ತುಳು	ಕನ್ನಡ	ತುಳು	ಕನ್ನಡ

ಪಾಠ ೬

ಒತ್ತಕ್ಷರಗಳು

ತುಳುವಿನಲ್ಲಿ ಒತ್ತಕ್ಷರಗಳನ್ನು ಮೂರು ರೀತಿಯಲ್ಲಿ ಬರೆಯುಬಹುದು.

1. ಒಂದು ಮೂಲಾಕ್ಷರದ ಕೆಳಗೆ ಅಥವಾ ಅದಕ್ಕೆ ಜೋಡಿಸಿ ಇನ್ನೊಂದು ಮೂಲಾಕ್ಷರವನ್ನೇ ಬರೆಯುವುದು.

2. ಒಂದು ಮೂಲಾಕ್ಷರಕ್ಕೆ ಸಮಗೆ ಚೇತಾದ ಮೂಲಾಕ್ಷರದ ಸಂಕೇತವನ್ನು ಜೋಡಿಸುವುದು.

3. ಒತ್ತಕ್ಷರದ ಮೊದಲ ಅಕ್ಷರವನ್ನು ಆ ಕಾರತ್ಕಕಮಾಗಿ ಪರಿವರ್ತಿಗುವುದು.

4. ಒತ್ತಕ್ಷರವು ಮಹಾಪ್ರಾಣವಾಗಿದ್ದರೆ ಮೊದಲುಕೆಯ ಅಕ್ಷರವ ಅಲ್ಪಪ್ರಾಣವಾಗುತ್ತದೆ.

5. ಅನುಸ್ಕಾರಯುಕ್ಕವಾದ ಅಕ್ಷರಗಳನ್ನು ಎರಡು ರೀತಿಯಲ್ಲಿ ಬರೆಯಲಾಗುತ್ತದೆ.

3. ತುಳು ಪ್ರೊಂಜಿ ಎಲ್ಲೆ ಬಾಸೆ

4. ಕೊಡವೂರುದ ಅರುಣಾಬ್ಜ ಕವಿ ತುಳು ಮಹಾಭಾರತೊನು ಬಲೇಯೆ.

ಈ ಕೆಳಗಿನ ವಾಕ್ಯಗಳನ್ನು ಕನ್ನಡ ಲಿಪಿಯಲ್ಲಿ ಬರೆಯಿರಿ.

FIGURE 46.
(Previous Page & Current Page)
The first ever book published solely to teach Tigaglari script by Venkataraja Puninchathaya on which several later Tigalari characters were based. This book also popularied the term 'Tulu Script' for Tigalari

SOURCE
Puninchathaya, Venkataraja. (Cropped scans frrom several pages) Tulu Lipi. Mangalore, Karnataka Tulu Sahitya Academy. Print.
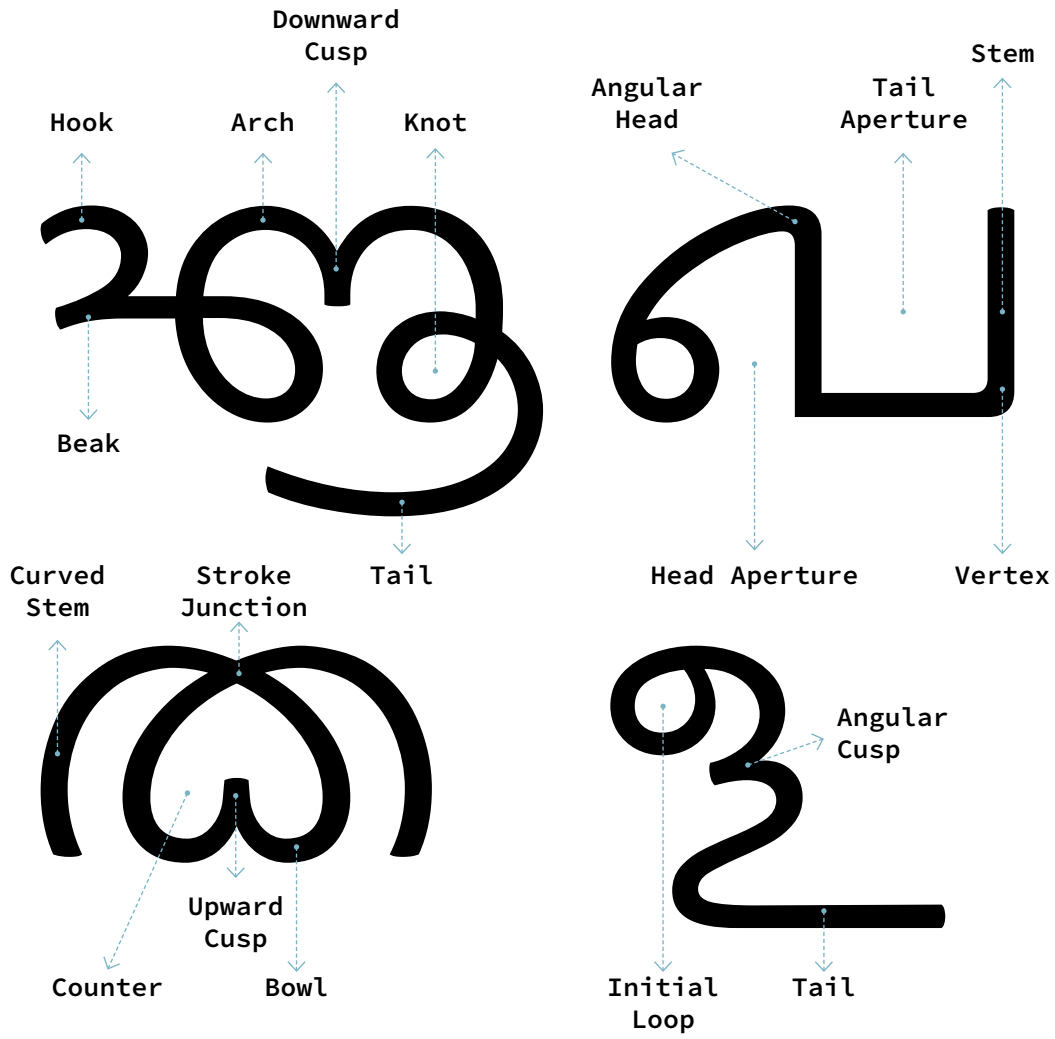
FIGURE 47.
Tigalari character anatomy.