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Typography in Publication Design

Designing a Devanāgarī text font for newspaper use

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Abstract: In this paper, we describe a methodology used to design a new Devanāgarī typeface for newspaper use. The main aim of this exercise was to find a balance between aesthetic and functional requirements of newspaper text typefaces. It was designed intentionally for Hindi, Marathi and basic Sanskrit. This typeface has been made functional keeping in mind today's requirement of economic printing and online usage of newspaper. Our design mainly focuses on issues such as advantages and disadvantages of using modulated versus mono-linear typefaces for text in newspapers, structure of Devanāgarī script, functional requirements of newspaper body-text typefaces, aesthetic parameters of developed Devanāgarī type design, work process for developed design, comparative analysis of developed design in terms of the economy of printing, legibility and readability of characters, users' aesthetic preference in letter designs, impersonal behavior of characters and effective functionality for online usage i.e. e-papers.

Key words: *comparative study of newspaper fonts, Devanāgarī typefaces, type design legibility, economy.*

1. Introduction

A newspaper is a scheduled publication containing news of current events, informative articles, diverse features and advertising. It communicates authentic, unbiased and transparent information. Type used for newspaper sets the tone and mood for its communication with the readers and so this 'voice' of newspaper needs to be carefully considered and crafted. Type plays a memorable role in newspaper design.

In Devanāgarī, fonts are differentiated in Modulated stroke fonts and Mono-linear fonts. Currently, Devanāgarī newspapers are set in fonts like ITR Mitra, CDAC Surekh, Shree Lipi 701 for text and display sizes. Text fonts such as Surekh are derived from the Modulated stroke approach of calligraphic writing.

in Latin, and hence decide on whether Modulated stroke font or Mono-linear font should be designed for Devanāgarī newspaper.

2. Serif vs. San serif

Earlier research in Latin presents certain arguments in favour of Serif typefaces, and gives reason as to why probably people prefer Serifs over San serifs:

1. Serifs are used to guide the horizontal “flow” of the eyes; the lack of serifs is said to contribute to a vertical stress in sans serifs, which is supposed to compete with the horizontal flow of reading. [De Lange, R. W., Esterhuizen, H. L., Beatty, D. (1993)]
2. Serifs are used to increase spacing between letters and words to aid legibility. [Rubinstein, R. (1988); Sassoon, R. (1993)]
3. Serifs are used to increase contrast (and irregularity) between different letters to improve identification. [Reynolds, L. (1979)]
4. Serifs are used to bind characters into cohesive 'word wholes'. [Poulton, E.C. (1965)]
5. Readers prefer the traditionalism of body text set in serif typefaces, so they must be more legible. [Lund, O. (1999)]

There are also some arguments in favour of Sans serif typefaces, these include:

1. Sans serifs are robust in nature and better at small sizes. Sans serif fonts are better suited to survive reproduction and smearing because of their simple forms. [Morris, R. A., Aquilante, K., et al. (2001)]
2. Sans serif is better on the web hence it can be better adopted for the online PDF's of newspapers (e-paper). [Poulton, E.C. (1972); Reynolds, L. (1979); Bernard, M., Mills, M., Peterson, M., Storrer, K. (2001)]

These important arguments lead us to choose Modulated stroke approach for a font for Devanāgarī newspaper. We also observed that reader's preference and likeness in terms of reading choice always differ. Readers like Mono-linear fonts as they look simple in terms of forms and are readable. But when it comes to reading a Devanāgarī newspaper body text; readers prefer Modulated stroke fonts.

This led us to following conclusions:

1. Devanāgarī newspaper should follow modulated text type approach:
Modulated text type face reflects the discipline, convention, tradition, something that to be taken seriously. The root of this approach lies in our early manuscripts which are calligraphed with the help of various tools like cut nib pen, brushes, stylus etc. Some manuscripts didn't have word spacing associated with them. Instead, various types of

punctuation and cantillation marks were used to show pauses and tones in reading. The sentences were closed with 'Danda' mark. The use of thick and thin strokes in letters enriches the beauty of complex Devanāgarī character forms. It is an old practice and should be cherished in terms of type development.

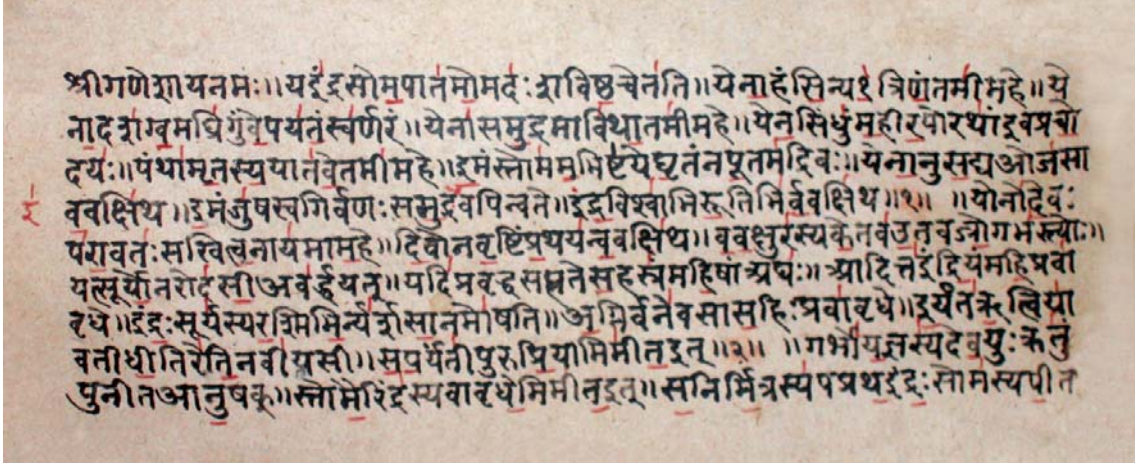


Figure.3 Example of Sanskrit Manuscript (Source: 'Arvachya Prachin Vibhag' library, Thane)

2. A text face is not supposed to be noticed:

We read the article and the typeface disappears into the background. It's not supposed to draw our attention. A headline typeface on the other hand is meant to grab attention and keep it. Headline typeface can be loud and expressive. But body text is where letters comes in cluster hence irregularity in letters is necessary to improve identification. Here, characters play a silent role.

3. Impression behind type or the subconscious impression it leaves with the reader:

All typefaces give the reader a certain feeling or impression. Most readers won't consciously notice that the font is conveying anything more than the words on the page. The robust and neutral typeface can also make a subconscious aesthetic impression. The text in well designed typeface transmits complex intellectual and emotional messages in a very concise and precise way.

3. Functional requirements for newspaper body-text

- Font should be absolutely legible and readable- "*Legibility* is a rate by which a type character can be identified" while "*Readability* is the ease of reading printed page or message. It refers to arrangement of type. Readability involves design of total visual entity, the complex interrelations among type, symbols, photos and illustrations".

[Berryman, 1984, p.28]

- Economy of the typeface in newspaper should be considered- Due to rapid growth in technology and easy acquaintance with digital media; readers are exposed to various sources to get the single information or news. Newspaper reading on internet or on digital media like tablets or phones is much cost and time saving. This has affected the economy of print media. The cost of a newspaper, number of pages, content, designing, amount of advertising through newspaper, etc. are the factors which affect the economy of newspaper. Hence it becomes important to test the efficiency of text type to accommodate maximum content in lesser space.
- Significant difference in reading pace of the reader- Consideration of reading pace in type testing really matters in today's fast life, where people really get any time for newspaper reading or they hardly take some effort to go through a complete news.
- Font should play the silent role and should not draw reader's attention to the design- It should give importance to the content rather than its form itself. Hence neutrality of the font is very necessary.
- Online usage of the font for e-paper should also be taken into consideration while designing it- Due to rapid growth in digital and electronic media, an increasing amount of text is being read directly from CRTs, LCDs and TVs. Corporate people, businessmen, travelers always prefer to read news on their mobile screen, tablets or laptops rather than investing an extra time with printed newspaper. Hence this rapidly growing era of digitalization demands a newspaper typeface to be functional for its digital usage also.

4. Structure of Devanāgarī script in Modulated fonts

Calligraphic study of manuscripts helped us to understand the structural characteristics of letters, flesh construction around the structure, axis for letters, contrast within the character, loops, nodes, grey value or weight of characters, turns etc.

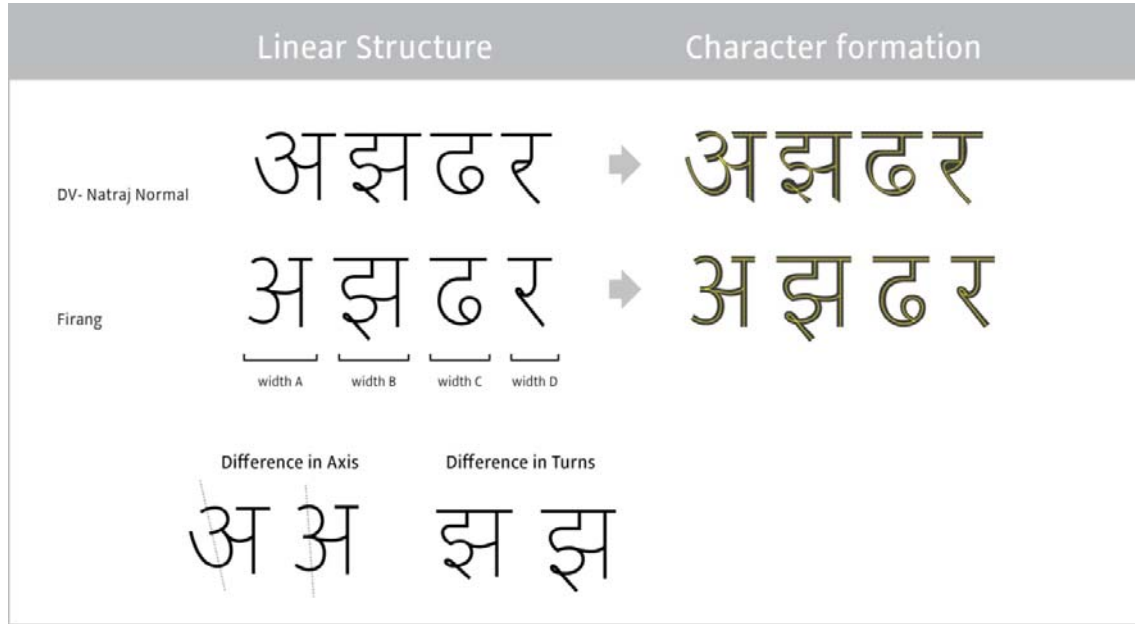


Figure.4 Character formations from their respective distinct linear structures

Study of basic handwriting and formal calligraphy led us to learn differences in structural widths of different letters like र (Ra), क (Ka), छ (Cha), ढ (Lla) etc. In ‘Conceptual Model of Devanāgarī Typefaces’ by Dr. Girish Dalvi, structure of letters are differentiated into Root Letters and Derived letters, where it shows, ten letters अ, इ, ए, ख, त, भ, द, ध, थ, ष can almost capture all the properties of remaining Devanāgarī letters. This character form grouping has helped us in our font design process to develop characters sharing similar structural properties in right manner.

Root Letter	Derived (Letters with Similar properties)	
अ	आ उ ऊ औ औं अं अः	ज
इ	ई झ	ड ड
ए	ऐ	ह
ख	र स	क व व
त	ल	श
भ	ग न म	
द	ट ठ ढ क्ष	ळ
ध	घ ध छ	च ज
थ	य	
ष	प ष फ ण	

Table 13: Root letters capturing maximum properties and their derived letters

The same derivation can be depicted visually as follows:



Figure 62: Letters derived from इ

Figure.5 Root letters and Derived letters classification and Visual example of Root letter इ
(Source- 'Conceptual Model of Devanāgarī Typefaces'-Dalvi 2010)

The height and guidelines of Devanāgarī fonts are not completely defined by above and below base matrā proportions. Several key letters, glyphs, conjuncts, diacritical, vocalization and cantillation marks are required to set the vertical proportions. The nomenclature used in the below image is defined by (Gokhale 1983).

(9) Development of font into 8 weights from Light to Black.

6. Font design process

We started our development with study of handwriting structure. This was a stepping stone in the development. It helped us to analyze stroke variations in characters, their starting and end points, joineries, balance in inner and outer counter space, achieving right amount of grey value though character, word and line spacing, etc.

मराठीत यापूर्वी कविचरित्र, चरित्रकोश, मराठी वाङ्मयसेवक यांसारखी कामे झालेली आहेत; वाङ्मयाचे इतिहास लिहिले गेलेले आहेत. प्रस्तुत कोशाच्या सिद्धतेसाठी या सर्वच साधनांचा निश्चितच उपयोग झालेला आहे. खानोलकरसंपादित मराठी वाङ्मयकोश आणि अर्वाचीन मराठी वाङ्मयसेवक चे अनेक खंड, वि. ल. भावेकृत महाराष्ट्र सारस्वत, पांगारकरकृत मराठी वाङ्मयाचा इतिहास, डॉ. अ. ना. देशपांडे यांनी लिहिलेले प्राचीन आणि अर्वाचीन मराठी वाङ्मयाच्या इतिहासाचे अनेक खंड, महाराष्ट्र साहित्य परिषदेने प्रकाशित केलेले वाङ्मयेतिहासाचे खंड उपयुक्त ठरलेले आहेत. याशिवाय रंगभूमी आणि नाटक, नियतकालिके, मुद्रण-प्रकाशने यांच्या इतिहासांचेही साहाय्य झालेले आहे. शंकर गणेश दातेकृत ग्रंथसूची आणि नियतकालिक-सूची, दोलामुद्रिते यांसारखी अत्यंत महत्त्वाची अशी प्राथमिक सामग्री कोशाच्या रचनेसाठी साहाय्यभूत ठरलेली आहे.

Figure.7 Handwritten paragraph in linear structure

We took the inspiration from Sanskrit manuscripts, calligraphic artworks, etc. and tried to emulate such sample in Devanāgarī calligraphy by adding weight in structure of initial paragraph with the help of cub nib tool. It gave us the right judgment of proportions of stroke width to character height, optical balance in positive and negative space, etc.

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Figure.8 Same paragraph in Devanāgarī calligraphy

During design process, the aim was to design a structure which has a modulated stroke but experimenting with a newer formal feature which is unlike existing Modular stroke fonts. The design which we arrived at was a hybrid between Modulated strokes and Monolinear strokes; which looked Modulated but had lesser stroke contrast, had slightly inclined axis with a condensed horizontal width. In order to achieve this, we required to have higher base height to stroke width ratio. This was done to make it more functional for print as

well as screen. Below slide shows how linear structure of character and various interim options in desired direction is worked out.

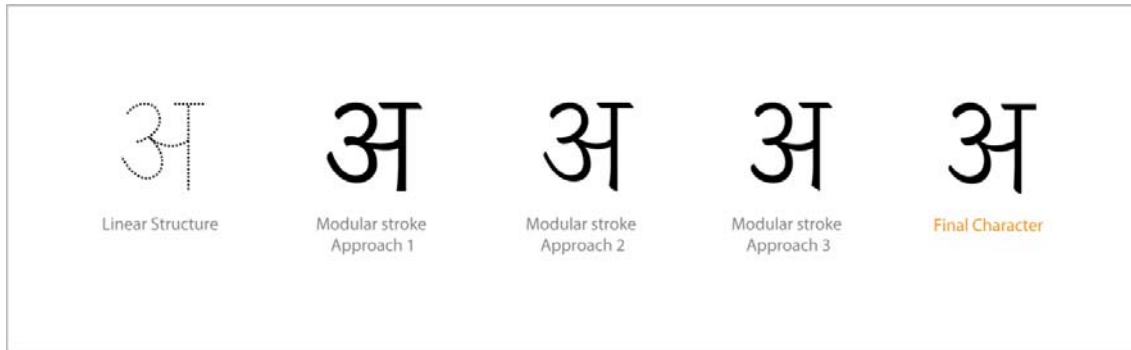


Figure.9 Character development and form progression

As a part of a process, we studied the influence of calligraphy on font development of modulated fonts like Natraj, Surekh and monolinear fonts like Yogesh and Firang. Also their inter comparison to understand dependency of structures within character with character widths, character heights, stroke widths to character height proportion, difference in stroke widths within a character, character axis, balance of inner and outer character space, etc. helped us substantiate our font structure.

		Character axis, inner and outer counterspace	Base character height to Kana Stroke width ratio	Observation
Modulated stroke fonts	अ ITR Natraj		1:9.5	Axis is much tilted. Still structure is designed in such a way that character width is less. Counters are closed on terminals.
	अ CDAC Surekh		1:9.5	Character has a wide structure. counters are closed on terminals.
	अ Shree lipi 701		1:8	Character has a wide structure. Axis is tilted. Counters are closed on terminals. Font weight is in moderate ratio of stroke and height.
Mono-linear fonts	अ CDAC Yogesh		1:10	counters are closed on terminals. character width is large.
	अ Firang		1:11	Character structure is condensed. Counters are open on terminals. Structure, weight and outer counter space is well balanced.
	अ Artha		1:13	Character structure is condensed. Counters are open on terminals which is helpful for legibility at lower point sizes. Structure and outer counter space is well balanced.

Figure.10 Structural comparison with Modular and Monolinear existing fonts in Devanāgarī

'Vertical proportions' (figure 11) for our font are set considering base character height, Vertical conjuncts, above base and below base matrā and cantillation marks. The x-height and below base height is almost set same in proportion considering the vertical conjuncts with below base matrā.



Figure.11 Vertical proportion of our font (Artha)

7. Comparison of font features

The below comparisons are some of the important features which define the characteristics of a font. The terminologies for font features are defined by (Dalvi, 2010).

- The 'neck joinery' can be identified in letters such as ढ, ठ, द, ढ. It's a junction where neck and character stroke meets. Joinery can be angular or horizontal. In Yogesh, all ढ, ठ, द, ढ can be seen horizontal. In our font Artha, ढ, ठ has angular joinery while द, ढ has horizontal one (figure 12). This structural influence is taken from handwriting. It is an authentic way to show such turns at joineries. Also angular joinery of ढ, ठ helps to make these characters more legible.

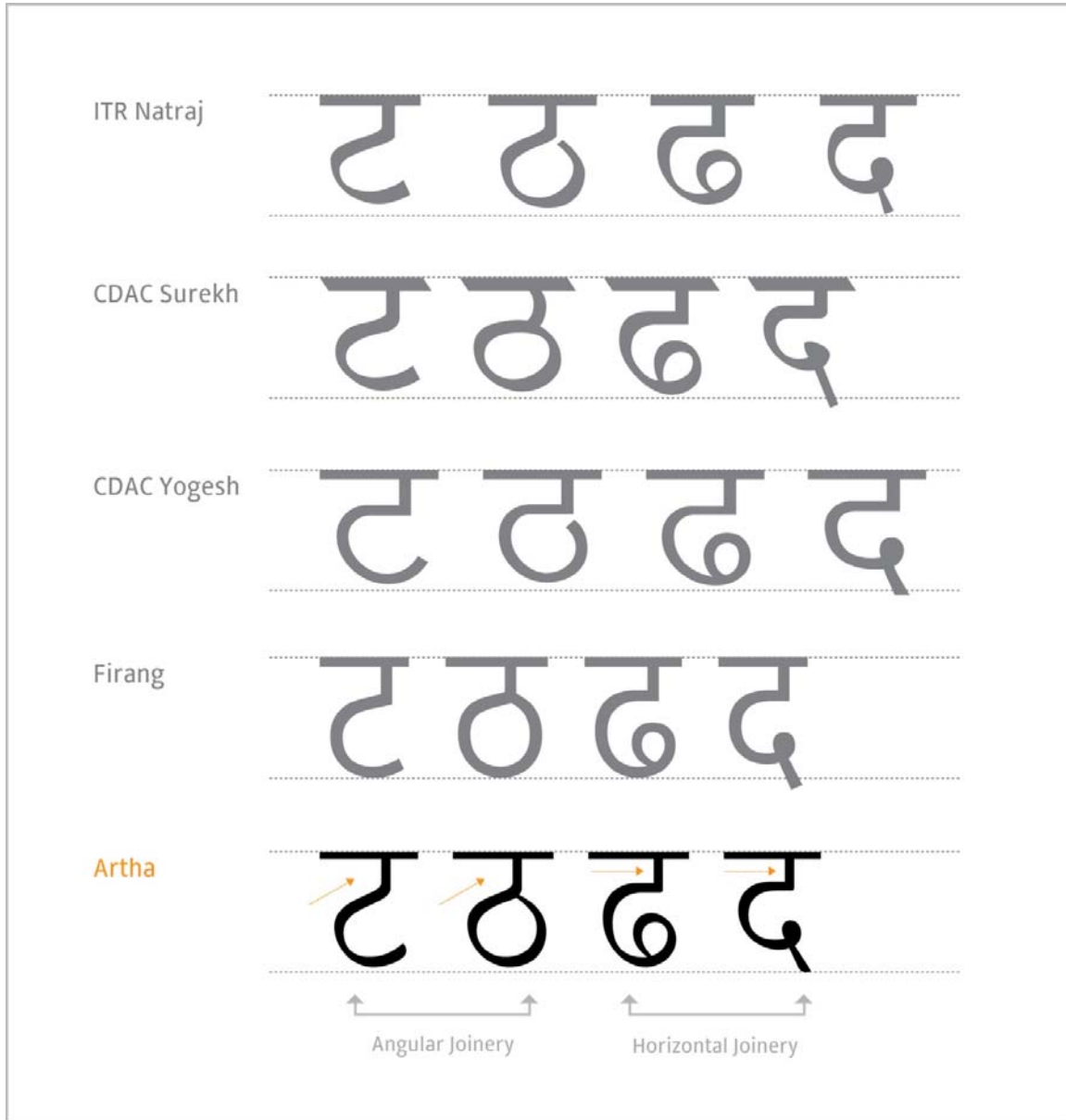


Figure.12 Comparison in Neck joineries

- The 'counter' is the negative space seen in the letters such as क, व, ब. The Marathi and Hindi nomenclature for counter is विवर (first recommended by Gokhale, 2004). Counters could be of two types i.e. Close counters and Open counters. It is said that open counters increase the readability of the characters. But it could be just a matter of choice. The closed counter character can still be readable depending upon how it is designed. We have designed closed counter as it is authentic way of writing a character (figure 13).

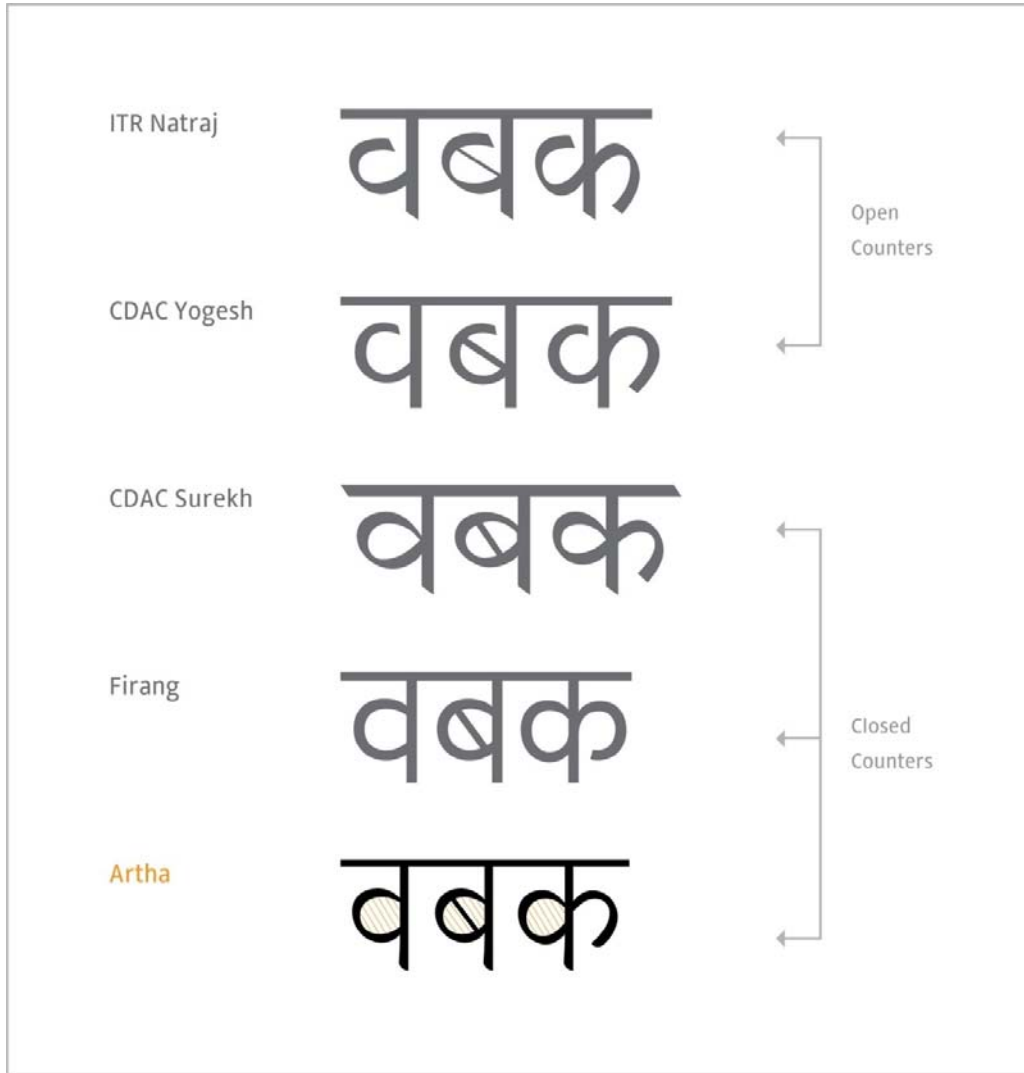


Figure.13 Comparison of counters

- The '*loop*' is the manner in which the stroke of the letter touches or overlaps over another stroke but not cross over; usually to create small counter space. In Hindi it is known as फांसा and in Marathi it is called फास or पाश. The size of loop can add a significant personality to the character. In Artha, we have kept letter व open looped like Monolinear fonts such as Firang and Yogesh. It helps the character to balance the inner counter space with the character structure. Other closed loops are optically designed in such a way that it will show same size counters.



Figure.14 Comparison in Loop sizes and their formations

- A 'knot' is the nature in which one stroke overlaps over another and transverses ahead in letters such as ढ, ङ, ढ. In our font, the size of knots is kept lesser (*figure 15*). This design call was taken considering when font is used below 10pt, the knots should not shout and should create an even grey. Comparison between Modular stroke ITR Natraj, Monolinear Firang and Artha shows that moderately designed knots in Artha does not shout at lower point size.



Figure.15 Comparison in knot sizes

- As we can see in *Figure 16*, the 'axis' of each weight changes from less inclined to more inclined on left side, from Light to Black weight. It helps to balance the inner and outer counter space of each character with each weight without any expansion in linear structure of characters. Also to retain the beauty of the typeface at bold sizes, modulation between thick and thin stroke widths of the character increase with increase in each weight. Hence Black weight shows maximum modulation while Light weight show extremely moderate modulation in stroke widths. This show how just shift in axis and modulation in stroke widths can create harmonious weights without

disturbing structure of the character. This also prevents an expansion of font while working with bold weight.

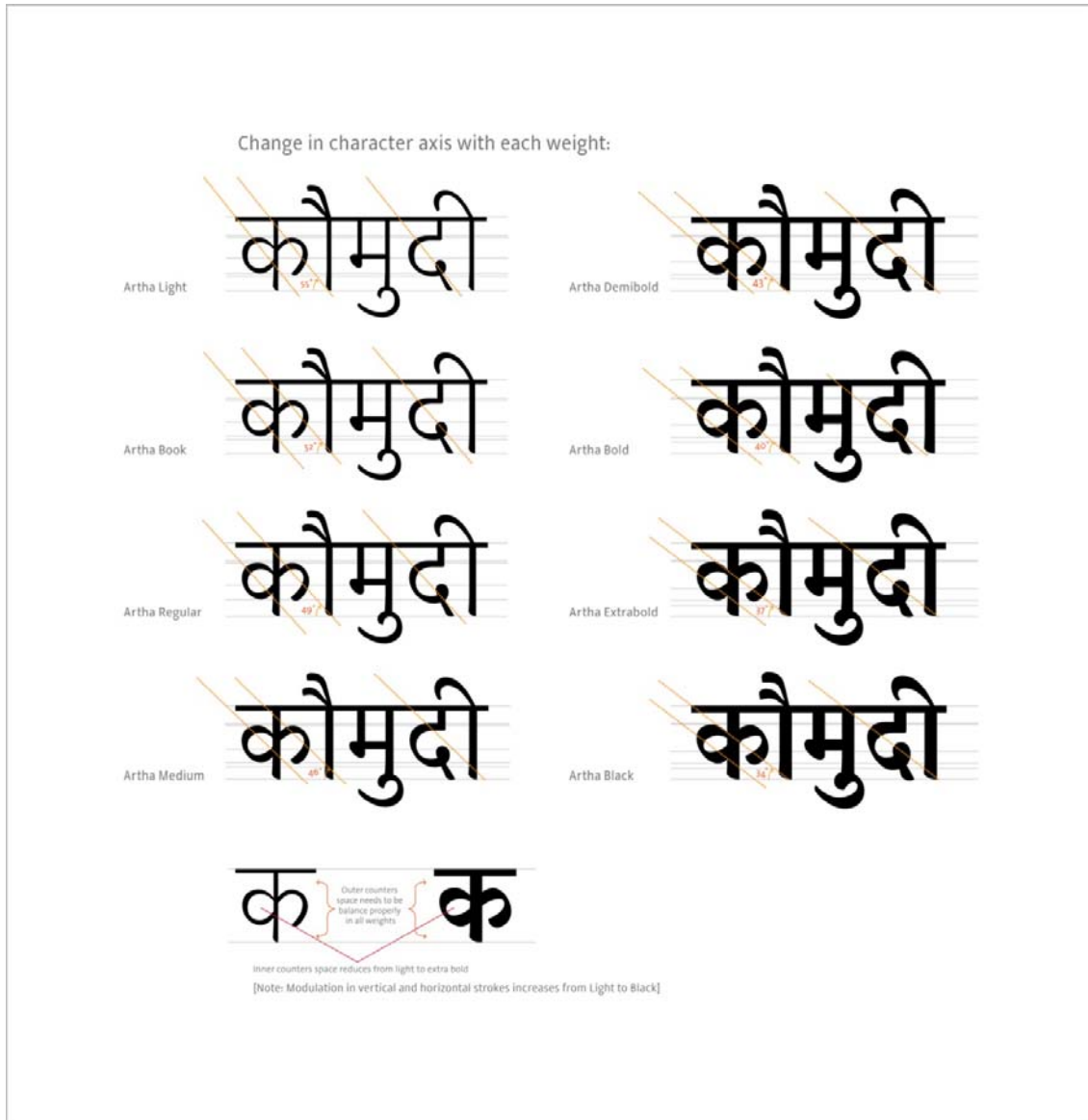


Figure.16 Change in character axis with each weight

8. Font features of Artha

- Important form feature of Artha is that, the joineries where circular strokes meet vertical strokes are comparatively thinner. The outer curves flow inside towards vertical terminals. In the below image, forms in dotted circles show details of these curves. In all weights, thin strokes comparatively remain same while thick strokes show significant width difference. Angular stress increases from Light to Black. The joineries where two strokes create less than 30° angle has ink traps. Letters like अ, झ has ink

traps. In this font, all vertical, horizontal and angular terminals of characters have smooth round curves. We have tried to retain as much of convention as possible while introducing these experimental elements. This unusual approach in newspaper type design let us think how far we can push typographic limits.



Figure.17 Letterform feature

- Form and size wise difference between Nuktā, Bīndu and Purnavīram helps in improving legibility. In our font Bīndu and Nuktā is diamond shaped while Purnavīram is in square shape.

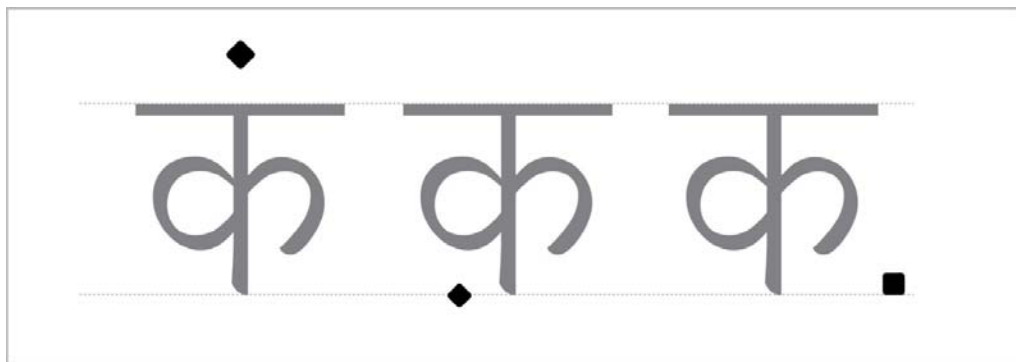


Figure.18 Difference between Nuktā, Bīndu and Purnavīram

- We have designed Linguistic alternative numerals like Hindi and Marathi.

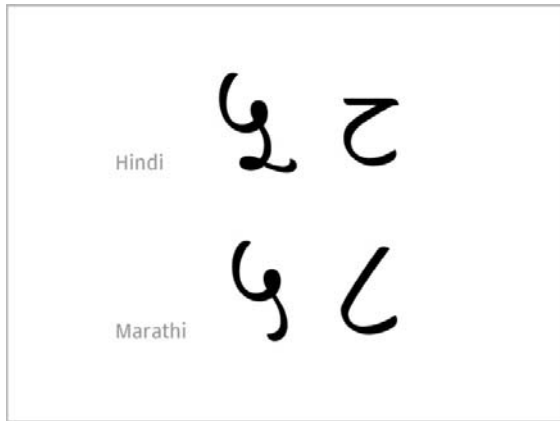


Figure.19 Linguistic alternatives

- Making provisions of design alternatives for characters like 'Sha', 'La' was essential.



Figure.20 Design alternates

9. OTF Development

Artha is developed into OTF font.

- In OTF type development, it came to our observation that frequently used conjuncts can be converted into akhanda forms. Conjuncts with half forms create uneven spacing in running body text. While using akhanda forms the amount of negative space can be balanced easily. Also whole akhanda form can be substituted in OTF encoding. Our font Artha compiles 380 frequently used conjunct ligatures.

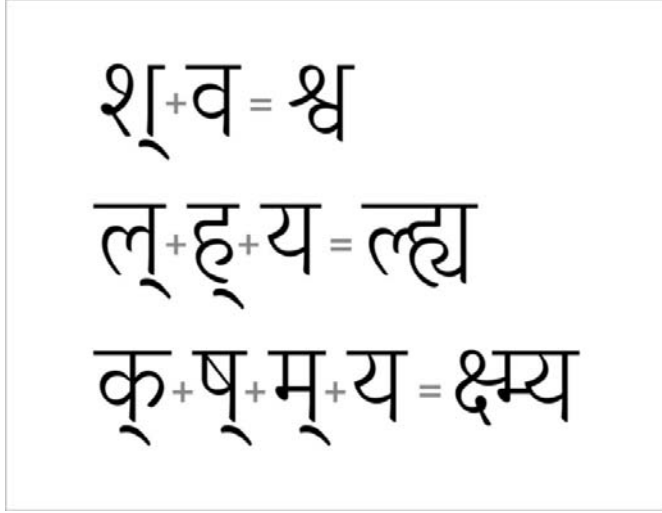


Figure.21 Two words, three words ad four words Conjunct Ligatures

- Defining difference between character widths and setting the groups of them has helped us in positioning of pre-base and post-base Ikār Mātrā. For this, all the letters and Akhanda conjuncts are measured for their character widths. Then grouped together into various sizes. This has helped us to standardize exact number of pre-base Ikār Mātrā. There are total 13 pre-base Ikār and 3 post base Ikār Mātrā in the glyph set.

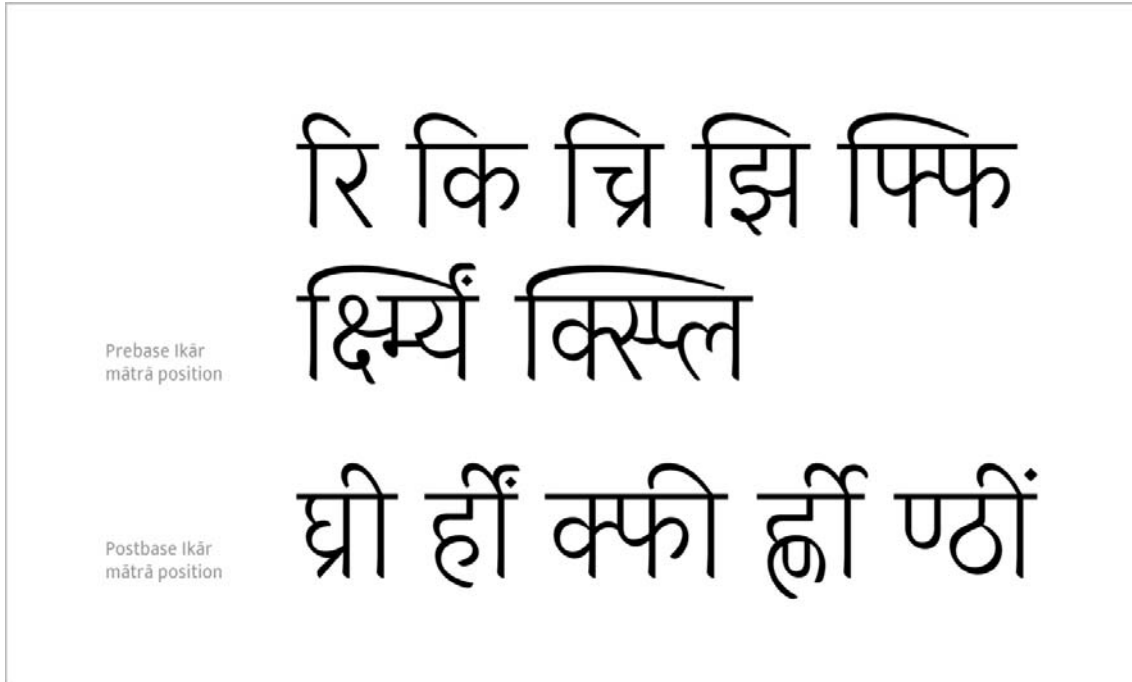


Figure.22 Various character widths with pre base and post base Mātrā positions

- Artha is generated into total eight weights from Light to Black. Light, Book, Regular and Medium weights are designed for body text. While Demibold, Bold, Extrabold and Black weights are for Display purpose.

भुकंपाचे झटके, मृतांचा आकडा १३५ Demibold

नई दिल्ली। देश के ६३वें गणतंत्र दिवस के मौके पर गुरुवार को राष्ट्रपति प्रतिभा पाटील ने राजपथ पर तिरंगा फहराया। इस मौके पर मुख्य अतिथि के रूप में थाईलैंड की पहली महिला प्रधानमंत्री यिंगलक शिनावाना सहित कई गणमान्य व्यक्ति मौजूद थे। ध्वजारोहण से पहले राष्ट्रपति ने इंडिया गेट स्थित अमर जवान ज्योति पर शहीदों को श्रद्धांजलि दी। गणतंत्र दिवस समारोह पर आतंकी हमले की आशंका को देखते हुए राजधानी में जमीन से लेकर आसमान तक कड़ा पहरा बिठा दिया गया। सीमाओं को आधी रात के बाद सील कर सभी सार्वजनिक स्थानों पर सुरक्षा बलों की कड़ी चौकसी बरती जा रही है। Book

सहसा विदधीत न क्रियां अविवेक परमापदां पदम् ।
वृणुते हि विमृशकारिणं गुणलुब्धा स्वयमेव संपदः ॥ Light

आशीर्वाद Black

अण्णा हजारे करणार
मुख्यमंत्र्यांकडे तक्रार Extrabold

'मराठी' हा शब्द उच्चारताच आपल्या दृष्टीपुढे कितीबरी गोष्टी उभ्या राहतात! महाराष्ट्रभूमी, मराठी माणसं, मराठी माणसाची मराठी मनं, मराठी माणसाची संस्कृती, संत कवी, लेखक, नाटककार, अभिनेते, क्रिकेटपटू, चित्रकार, कुस्तीवीर, मराठी मातेच्या कीर्तीमान सुकन्या, पण आज आपण केवळ 'मराठी' भाषेचाच ओजस्वी भाषेचा विचार केलातरी अभ्यास संशोधनानंतर कळतं की, अनेक विचारवंतांनी आपल्याला मराठी भाषेला आपल्या मनातील विचारसौंदर्य बहाल केलं आहे. आद्य कवी मुकुंदराज, आद्य नाटककार विष्णुदास भावे, आद्य कांदबरीकार बाबा पद्मनजी, आद्य पत्रकार बाळशास्त्री जांभेकर, आद्य क्रांतीवीर वासुदेव बळवंत अशी नुसती 'आद्याची' नामावली सुद्धा दहा पृष्ठांची होऊ शकेल. Regular

सत्य और अहिंसा Bold

मोदी गुजरात में ही रहे तो बेहतर होगा : विनय कटियार Medium

Figure.24 Representation of Artha font weights

- We have defined the limit of lowest point size that can be used for each weight. This testing helps to understand maximum lowest point size at which font can still remain readable and legible.

Recommended lowest point sizes for each weight:	
Artha Light 7pt	अआइईउऊऋऌलृएऐओऔअंअं कखगघङचछजझञटठडढणतथदधनपफबभमयरलवशषसहळ ०१२३४५६७८९
Artha Book 8pt	अआइईउऊऋऌलृएऐओऔअंअं कखगघङचछजझञटठडढणतथदधनपफबभमयरलवशषसहळ ०१२३४५६७८९
Artha Regular 9pt	अआइईउऊऋऌलृएऐओऔअंअं कखगघङचछजझञटठडढणतथदधनपफबभमयरलवशषसहळ ०१२३४५६७८९
Artha Medium 10pt	अआइईउऊऋऌलृएऐओऔअंअं कखगघङचछजझञटठडढणतथदधनपफबभमयरलवशषसहळ ०१२३४५६७८९
Artha Demibold 11pt	अआइईउऊऋऌलृएऐओऔअंअं कखगघङचछजझञटठडढणतथदधनपफबभमयरलवशषसहळ ०१२३४५६७८९
Artha Bold 12pt	अआइईउऊऋऌलृएऐओऔअंअं कखगघङचछजझञटठडढणतथदधनपफबभमयरलवशषसहळ ०१२३४५६७८९
Artha Extrabold 13pt	अआइईउऊऋऌलृएऐओऔअंअं कखगघङचछजझञटठडढणतथदधनपफबभमयरलवशषसहळ ०१२३४५६७८९
Artha Black 14pt	अआइईउऊऋऌलृएऐओऔअंअं कखगघङचछजझञटठडढणतथदधनपफबभमयरलवशषसहळ ०१२३४५६७८९

Figure.25 Readability and legibility of recommended lowest point size of each weight

10. Font Usage

We tried to set a page of Hindi financial newspaper in Artha to get a feel of font with newspaper design. The below composition has use of all weights of Artha for display size as well as body text.

डॉलर रु. ५०.११ ▲ ४ पैसे | युरो रु. ६५.०२ ▼ ९ पैसे | १०० येन रु. ६५.०२ ▼ ५१ पैसे | सोना रु. २७,२४० ▼ १६५ रुपये | सेंसेक्स १७०७७.१८

पाठकों को गणतंत्र दिवस की बधाई। इस अवसर पर गुरुवार को कार्यालय में अवकाश रहेगा। अगला अंक शनिवार को प्रकाशित होगा।

एक नज़र

यूआईडी पर मतभेद दूर करेंगे प्रधानमंत्री

विशिष्ट पहचान पत्र यूआईडी को जारी रखने के संबंध में गृह मंत्रालय और योजना आयोग में मतभेद के बीच प्रधानमंत्री ने बुधवार को वरिष्ठ कैबिनेट मंत्रियों के साथ बैठक की। अब यूआईडी के विस्तार पर अंतिम निर्णय लेने के लिए शुक्रवार को मंत्रिमंडलीय समिति की बैठक बुलाई जाएगी।

शेयरों की बिक्री के लिए सेबी के दिशानिर्देश पर टिकी सरकार की नज़र

बढ़ेगी विनिवेश की गार्ड

संतोष तिवारी और ज्योति मुकुल
नई दिल्ली, २५ जनवरी

रक्कम जुटाने की कवायद

चा लू वित्त वर्ष में विनिवेश लक्ष्य ४०,००० करोड़ रुपये हासिल करने के लिए सरकार को खासी मशक़त करनी पड़ रही है। यही वजह है कि कुछ सार्वजनिक उपक्रमों की विनिवेश प्रक्रिया में तेजी लाने के लिए सरकार अगले माह के शुरू में एक कार्ययोजना को अंतिम रूप देने जा रही है। सरकार द्वितीयक बाजार में कंपनियों की कुछ हिस्सेदारी बेचने की योजना पर भी काम कर रही है।



प्रवर्तकों के शेयरों की नीलामी पर सेबी अगले हफ्ते जाएगी दिशानिर्देश	शेयरों की नीलामी और एफपीओ में तेजी लाने के विकल्प पर हो रहा विचार	सेबी के निर्णय के बाद विनिवेश विभाग उठाएगा कदम	ओएनजीसी, सेल और बीएचईएल का हो सकता है विनिवेश
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Figure.26 Use of Artha for newspaper design

- **Newspaper use**

For Newspaper body text content occupancy, Artha has been tested with currently used two Modulated newspaper fonts named CDAC Surekh and Shreelipi 701. It is also tested along with two Monolinear fonts named CDAC Yogesh and Firang by setting the text with the same content. In testing sample, fonts are compared by matching their character heights and not the point size. The below testing sample proves that Artha occupies lesser space in column size compared to both Monolinear and Modulated font samples because of its slightly condensed structure and larger stroke width to character base height ratio.

- Use for a book - 'Handbook of Devanāgarī Glyphs'

The beauty of Devanāgarī is that; for single conjunct can be written in two or more ways. The book, 'Handbook of Devanāgarī Glyphs' lists down the number conjuncts, their ways to be written and number of glyphs required to construct the conjunct while designing a Devanāgarī font. The book was type set in Monolinear (Firang) and Modulated (Artha). Their inter comparison shows the advantages that a Modulated font has over Monolinear font while designing text conjuncts. Here are two conjunct cases from 'Handbook of Devanāgarī Glyphs' by Dr. Girish Dalvi. It efficiently portrays the possible character variation of single conjunct. It also talks about the visual difference that can be observed while designing vertical conjuncts in Modular as well as Monolinear font with their comparisons.



(Artha)



(Firang)

Figure.28 Pages from 'Handbook of Devanāgarī Glyphs' by Dr. Girish Dalvi

Above example shows for conjunct like कत्र there could be 5 different interpretations or for conjunct like कक्व there could be 10 different writing interpretations possible. It would be a really complex to make all the interpretations possible on single keyboard. The comparison of these conjuncts in Firang and Artha can also show how modulated font can balance space with complex conjunct character structures also than Monolinear font.

- **Online usage**

Since we also considered the online usage, font has been in the process of being hinted and the preliminary results are promising. The font gives very good legibility across mediums such as LCDs, CRTs and TVs.

11. Conclusion

- (1) We feel, using Artha font text will occupy lesser space in news columns and hence more content could be incorporated in smaller space of columns. To certain extent, this might help to improve the economy of newspaper by saving the space required for content. This saved space can be effectively used for more content and hence indirectly improves effectiveness of newspaper.
- (2) Due to its semi-handwritten structure, larger stroke width to base height ratio, moderate modulation of strokes and large counter spaces; Artha is perhaps more legible and readable at smaller sizes.
- (3) Developed type design has balance in simple structure of characters, tracking and leading in the font. We feel it will help in improving reader's reading pace.
- (4) Although the font has been carefully designed in terms of its forms and curves; it does not draw reader's attention to its design. Perhaps it gives importance to the content, news or information in newspaper.
- (5) The design takes inspiration from traditional reed-pen dimensionality and hence it could give reader a 'feel' of traditional Devanāgarī while retaining a look of contemporary Devanāgarī typeface.
- (6) The lesser modulation in stroke widths, large character base height and larger counters has helped Artha in promising legibility required for onscreen reading across different types of digital screen displays. Hinting has further helped in finished rendering at different sizes on screen. Hence Artha could also be used for online usage of newspaper.

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