एकरेखीय
देवनागरी
मुद्राक्षर अभिकल्प

Design of a
Monolinear
Devanagari
Font in multiple weights

IDC School of Design, Project III

Design of a Monolinear Devanagari

Font in multiple weights

By–
Ashish Kumar
156250004
M. Des 2015 – 2017
Visual Communication

Guide–
Prof. G. V. Sreekumar

IIT Bombay

Acknowledgment

I would like to express my heartily gratefulness to those who have been a part of my design journey at IDC.

My guide, Prof. G. V. Sreekumar for his immense support and guidance throughout the project. For sharing his invaluable experience, knowledge of typography and giving me a positive energy.

Prof. Girish Dalvi, for giving his support, encouragement and guidance in my project. He gave me a different perspective to see and analyze my own work.

Mr. Muthu Nedumaran, for helping me to get this font workable.

Prof. Raja Mohanty, Prof. Alka Hingorani, Prof. Sudesh Balan and Prof. Mandar Rane of Visual communication for their constructive opinions and criticism.

Ek Type, for giving me an opportunity to do internship and work with them. Sarang Kulkarni and Noopur Datye, for sharing their experience and knowledge in typeface design.

A heartfelt note of thanks to IDC, and all the faculty, for cultivating a holistic design sensibility within.

Last, but not least, I would like to thank my mother and family for their continuous support and encouragement. To my late father, Subhash Chandra Thakur thank you for teaching me the value of every small thing.

The material of typography is the black, and it is the designer's task with the help of this black to capture space, to create harmonious whites inside the letters as well as between them.

—Adrian Frutiger

Contents

Preface

There are blank spaces which need to be filled with fonts for Indic scripts.

In communication multilingualism is a part of everyday life in context of India. It is a magnified version of bilingualism and not a new or rare phenomenon, but a normal necessity across the world due to globalization and wider cultural communication.

India is a multilingual country and regional languages are deeply personal. We think in them, we dream in them, we laugh in them, these are the languages of our resentment, anger and tears. It can not be expressed in Latin script. So there is a need of harmonious fonts which can support multiple scripts.

Designing a Devanagari font offers a challenge due to its complexity. Lack of good Devanagari fonts, being from a Hindi medium background, familiarity with the script, encouraged me to design a Devanagari font in multiple weights. Multiple weights can support different typographic needs with only one font family.

Aim of the Project

The objective of this project is to design a Devanagari font in multiple weights. Basically, this project is the continuation of my previous project; designed a matching Devanagari font for Univers (Latin) for bilingual communication. This is an attempt to bring visual uniformity in diversity of scripts. It is very important in bilingual or multilingual communication to establish a harmony among the scripts.

Multiple weights are being designed for various typographic need. For example– If we are designing a book, we need to set the hierarchy of content of writing for a better and easy reading. Multiple weights can be helpful to establish hierarchy without loosing visual harmony. A bold or light weight can work well for display. Regular or book weight and even a light weight can perform well for body text.

There are few Devanagari and other Indic fonts are available with multiple weights. This project is an attempt to bridge the gap between text and display typefaces. So the different typographic needs can be met with only one font family in the context to create a visual harmony.

1 Letter writing to type design

1.1 PAINTED LETTERS

It won't be true if I say that from my childhood I always wanted to make fonts and I know about type design from that age. Yes, I had always loved to stand hours and hours and see a signboard painter making letters just next to my home. One day I asked my father and took permission from him to join the painter's studio after my school time. He allowed me to work there. There I began to write letters with a long hair flat brush with enamel paint. From number plate to banners, banners to signboard (see Fig.1, 2), I worked there for 3.5 years. Later I got admission in B.F.A. in Applied Arts at Benaras Hindu University. Until then, I had no idea about typography and type Design. But in the second and third year, we had two mandatory courses, creative calligraphy and typography. In calligraphy we had to explore strokes, but in a very informal way not as serious letter writing as I had done previously on signboards. In typography, we got a brief introduction without practical work. My curiosity towards typography enhanced when Prof. Mahendra Patel and Rajeev Prakash Khare took workshops in 'Kalakshar'[1] at BHU. I talked with Rajeev sir about my interest in typography and he encouraged me to work forward.

Figure 1 & 2: Hand painted letters (2008)

[1] 'Kalakshar' is an annual event started by Dr. Manish Aroro (Asst. Professor, Department of Applied Arts, FOVA, BHU)

Figure 3: Hot metal printing, done in 2014.

1.2 TYPE SETTING WITH PHYSICAL METAL TYPE

Letters Gather in to words, words gather in to sentences.

We had metal typefaces (including Univers) and two printing machines in our typo lab and I wanted to experience in setting type with tangible metal type. Only problem was that those machines were not in good condition and not being used for a long type. Typefaces were not complete but I managed to set some words with the mixture of Gotham and Univers together (I know this is so stupid). In setting type, metal letters were selected one at a time and lined up in what was called a composing stick until it was almost full. Then, by using pieces of type with no face on them, spaces between words were adjusted to bring the line to the required length. At that time I started understanding and exploring typography and knew that I will be designing a font in my post graduation or may be for a lifetime.

2

Previous Project: Designing a Monolinear Devanagari Font

Journey so far

Over the past few months, I have been working on this project. It has started as my Project two with the title of Designing a Monolinear Devanagari Font. The aim of the project is to design a matching Devanagari font for Univers (designed by Swiss designer Adrian Frutiger) for bilingual communication at IDC, Scohool of Design.

Previously, basic Unicode glyphs have been designed in regular weight. The design process has involved the various stages that are given below.

- Reading about Univers and its designer.
- Imitation (sketching) of letters of Univers typeface to understand the structure and key features of it.
- Study of existing matching Devanagari font for Univers.
- Study of the anatomy of Devanagari letters and traditional letter writing.
- Drawing of Devanagari letters based on the key features of Univers typeface.
- Determining the proportion and primitives for Devanagari font.
- Drawing the basic Unicode character set on FontLab.
- Tweaking for better legibility and checking the consistency in Devanagari itself and with Univers as well.
- Spacing.
- Testing.

Figure 4: Initial Sketches.

Basic Unicode Character

ऄ अ आ ॲ अं आं औ अु अू ऑ ओ ओ औ

इ ई उ ऊ ऋ ऌ ऍ ऐ ए ऐ क क़ ख

ख़ ग ग़ घ ङ च छ ज ज़ झ ञ ट ठ

ड ड़ ढ ढ़ ण त थ द ध न ऩ प फ

फ़ ब भ म य य़ र ऱ ल ळ ऴ व श

ष स ह ऋ ऌ ० १ २ ३ ४ ५ ६ ७

८ ९ ज़ ष ग्र ज्र ड्र ब्र ₹

3 Completion of regular weight

OPEN TYPE FEATURES

In Devanagari it is not possible to work with only the Unicode character set. For working well with Devanagari font, we need additional glyphs: conjuncts, alternate matras, alternates for different language support.

Conjuncts with half forms create uneven spacing in running text. Frequently used conjuncts can be converted into akhand form (conjunction of two letters or more) to balance the negative space. Akhanda form can be substituted in OTF encoding. Around 600 extra glyphs have been designed with this font which have encoded in the open type features format.

3.1 CONJUNCTS

A conjunct is the combination of two or more than two consonants. Conjuncts may have full forms, and half forms or only the full form. Akhand ligatures may or may not involve the base glyphs.

There are three types of conjuncts ligatures have been designed with this font. Two letters conjunct, three letter conjuncts and four letter conjuncts.

3.2 ALTERNATE MATRAS

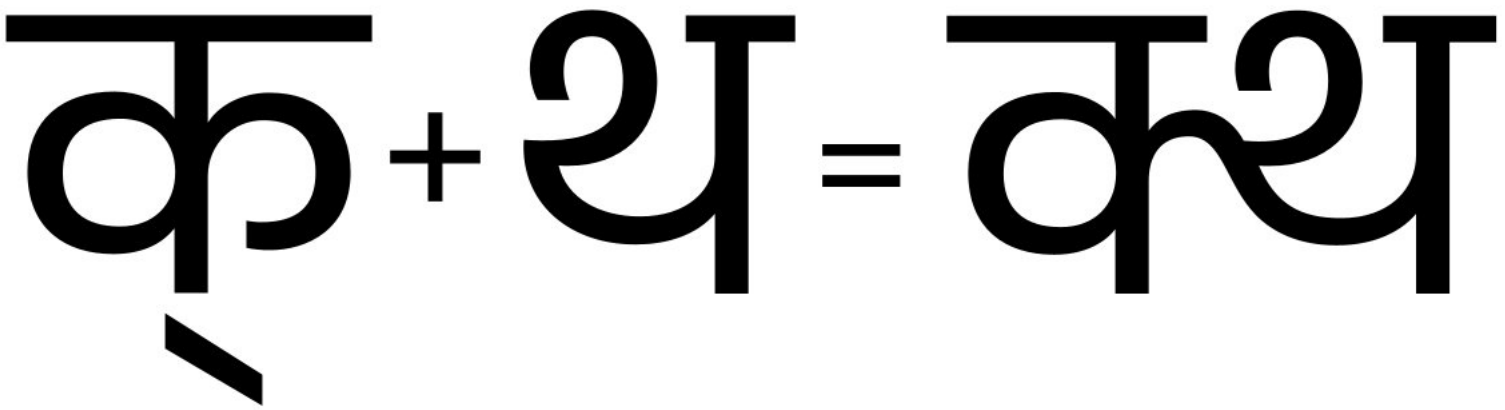
25 Pre-base and 3 post-base 'ikar matra' have designed for the various character widths. One matra for all widths never can be a justice with characters. Matras according to different character widths give an even space and it also can help in enhancing the readability.

3.3 MARATHI LETTERS

In the Devanagari script for Marathi language, there are some letters, which have different shapes from the Hindi language. Marathi श (Sha) and ल (La) have different shapes from Hindi श and ल.

Conjuncts

Conjuncts have designed very consciously, it is designed separately instead of just putting a half form and a full character.



Ka is tweaked according to the shape of 'Tha', the right part of 'ka' is pulled down to maintain the counter space.

Figure 5: Two letter conjunct and making process.

क्क क्ख क्च क्ज क्झ क्ट क्ण क्त क्थ क्द क्न क्प क्फ क्म क्य क्ल क्व क्श
क्स ख्ख ख्त ख्म ख्य ख्व ख्श ग्ग ग्घ ग्ज ग्ण ग्द ग्ध ग्ब ग्भ ग्म ग्य ग्ल ग्व ग्स
घ्म घ्य च्च च्छ च्म च्य ज्क ज्ज ज्झ ज्ट ज्ड ज्त ज्द ज्ब ज्म ज्यज्व झ्म झ्य ज्छ
ञ्श ण्ट ण्ठ ण्ड ण्ढ ण्ण ण्म ण्य ण्व त्क त्ख त्थ त्प त्फ त्म त्य त्ल त्व त्स थ्य
थ्व ध्म ध्य ध्व न्क न्ग न्च न्छ न्ज न्ट न्ड न्त न्थ न्द न्ध न्प न्फ न्भ न्म न्य न्व न्श
न्स न्ह प्छ प्ट प्त प्न प्प प्फ प्म प्य प्ल प्व प्श प्स फ्ज फ्ट फ्त फ्थ फ्प फ्फ फ्य
फ्ल फ्श ब्ज ब्झ ब्ड ब्त ब्द ब्ध ब्ब ब्भ ब्य ब्ल ब्व ब्श ब्स ब़्ज भ्य भ्ल भ्व म्त म्द
म्प म्फ म्भ म्म म्य म्ल म्व म्श म्स म्ह य्य ल्क ल्ख ल्ग ल्च ल्ज ल्ट ल्ठ ल्ड ल्ढ
ल्त ल्थ ल्द ल्प ल्फ ल्ब ल्भ ल्म ल्य ल्ल ल्व ल्श ल्स ल्ह ल़्ज व्य व्व ड व्य
व्ल व्व व्ह श्क श्छ श्ट श्त श्म श्य श्श श़्क ष्क ष्ण ष्प ष्फ ष्म ष्य ष्व ष्ष स्क

Figure 6: Two letter, three letter and four letter conjuncts

स्ख स्ज स्ट स्त स्थ स्द स्न स्प स्फ स्ब स्म स्य स्ल स्व स्स स्क्र स्त्र स्प्र क्प्र त्क्र
त्त्व क्त्र त्ख्र त्ख्र त्त्य न्य ह्य क्ष्म क्ष्य क्ष्व त्क्ष क्ल क्श ख्श ग्ल ञ्श त्ल न्श प्ल प्श
फ्ल फ्श ब्ल ब्श भ्ल म्ल म्श ल्ल ल्श व्ल श्क श्छ श्ट श्त श्म श्य श्श स्ल ह्क ह्न
ह्म ह्य ह्ल ह्व छ्र्य ट्र्य ठ्र्य ड्र्य ढ्र्य द्र्य द्य द्ध्य द्म्य द्र्य द्व्य ध्य न्य भ्य श्य ष्ट्य ष्ठ्य
छ्य ङ्य ट्य ठ्य ड्य ढ्य द्र द्द द्ध द्र द्ब द्म द्म द्य न द्व ख्र ग्न घ्न च्न ज्ञ ज्ञ ध्न न्न ब्न श्न
म्न श्च छ्व श्ल श्व ष्ट ष्ठ ञ्च ञ्ज ङ्क ङ्ग ङ्म ट्ट ट्ठ ट्व ठ्ठ ड्ड ढ्ढ ढ्ढ क्ष्म्य क्स्प्र क्स्प्ल न्स्क्र त्स्न्य
न्फ्ल्य न्ल्य न्स्म्य ब्स्ट्र क्त्य क्त्व क्व्य क्स्ट क्स्ड क्स्त क्स्प ग्ध्व ग्ध्य ग्र्य ग्भ्य
ग्र्य च्छ्व ज्ञ ज्ज्यज्ज्व ज्ञ्य त्क्य त्क्व त्प्ल त्म्य त्स्फत्स्य न्क्स न्त्य न्त्स न्थ्य न्थ्व
न्द्व न्ध्य न्ध्व न्भ्य न्भ्व न्म्य न्ह न्स्ट न्स्य न्ह्य प्त्य ब्ज्य ब्ध्व ब्ल्य म्ब्य म्भ्य म्भ्व
ल्क्य ल्क्य ल्थ्व ल्ल्य ल्ड्ड ल्ह्य ष्ण्य ष्म्य स्क्व स्त्य स्त्व स्थ्व स्म्य क्स्प्ल त्प्ल

Figure 7: Two letter, three letter and four letter conjuncts

Alternate matras for various charactar width

Alternate 'mataras' help in balancing the negative space. If we use a single matra for all characters and conjuncts, there can be a high chance to get confused with the spellings.

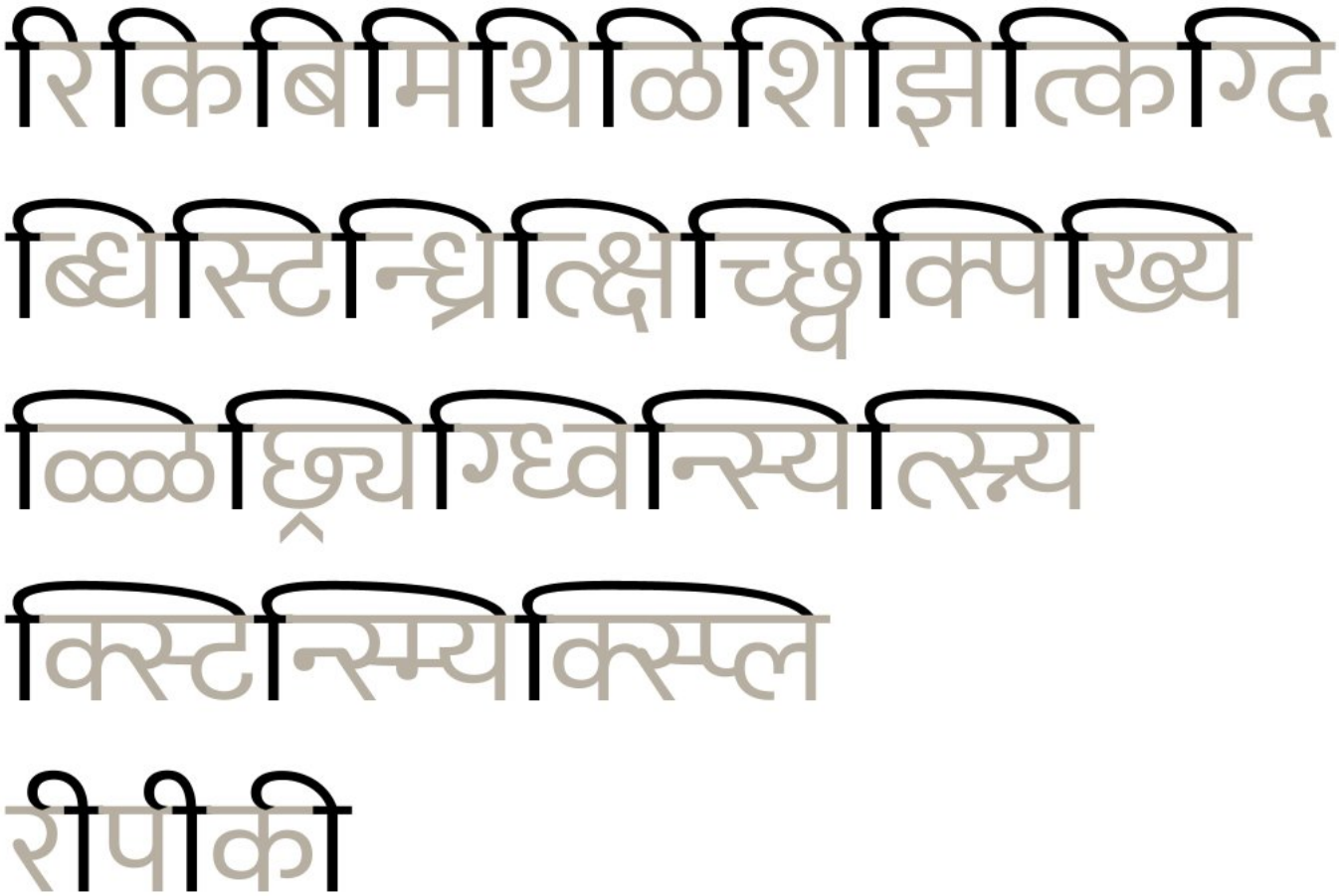


Figure 8: Two letter, three letter and four letter conjuncts

Breaking Rules for a change

4

I agree that we must learn the rules before breaking them. I also feel that the rules should be updated. They can be broken, wherever the need is, but in a positive way. Sometimes some rules of tradition don't work for a specific piece of work. In that situation we should not be hesitant to break them for a change, but it should not affect the function.

I'm highly inspired by the sentences written by Robert Bringhurst in his book: 'The Elements of Typographic Style'. He said, "If you use this book, by all means leave the road when you wish. That is the precisely the use of a road: to reach individually chosen points of departure. By all means break the rules, and break them beautifully, deliberately and well. That is one of the ends for which they exist."

The other thought, which inspires me is **"works of art make rules; rules do not make works of art"** by Claude Debussy (a French music composer). By reading this, I think that if we inject our work with creativity, challenging the typical traditional methods of the time period than we may come with new results. And That can lay the foundation for the next generation.

I studied several Devanagari fonts for inspiration. I went deeply and looked that how they have been constructed. I tried to understand the rules and parameters followed by their designers. I asked questions myself, would the same rules work for my font or I need to set my own rules. In all the fonts, I could see the similar traditional approach for the basic structure of letters; I'm not talking about the key features like– curvatures, primitives, texture and etc. Of course they are very different from each other and followed very conscious design decision in terms of function and aesthetic as well.

Some conjuncts like– ह्म ह्ड ह्भ ल्भ व्ड क्श फ्श ल्श can be constructed cleverly to balance the inner and outer space without loosing their legibility. In this context rules can be broken, if the changes don't harm the function and adding a new feature. Changes in conjuncts are explained in the next page with the help of visuals.

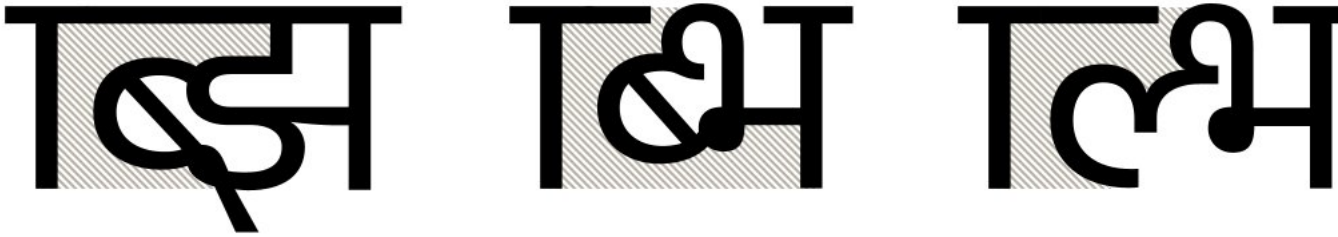
The half letters in the Ek Mukta font placed on the knot or either on the upper part of the base character. This approach works well in Ek Mukta.

Traditional approach, Ek Mukta font

When I followed the same approach in my font, it did not work. By doing that, knots became unnecessarily heavier and the negative space got imbalanced

Traditional approach, IDC Ashish

With the help of a new approach, I could balance the negative space and the amount of black on knots.



New approach, IDC Ashish

This approach allowed me to maintain the shoulder line and knee line for conjuncts. It enhanced the harmony and gave an even flow.

New approach, IDC Ashish

Spacing

5.1 RHYTHM

The rhythm of the type is equal or can say much more important than the shape of characters. A typeface with beautiful characters can be extremely hard to read if it is badly spaced. However, if the shapes of the letters are not so good, but perfectly spaced, then the type can be fairly easy to read.

The white spaces inside the letters (counter) and in between letters define the rhythm of the typeface. So white space should be in consideration, when we create the black. White is more important but can not be exist without black.

For example, there has to be a relation between the space inside a 'प' and the space between the 'T' vertical bar and the 'प' (see figure 9). In the top row, we can see the space inside the 'प' is smaller than the space in between the 'प' and the 'T'. In the bottom row, they are much more equal, and in this way we get a much better rhythm and more harmony in a line of text.

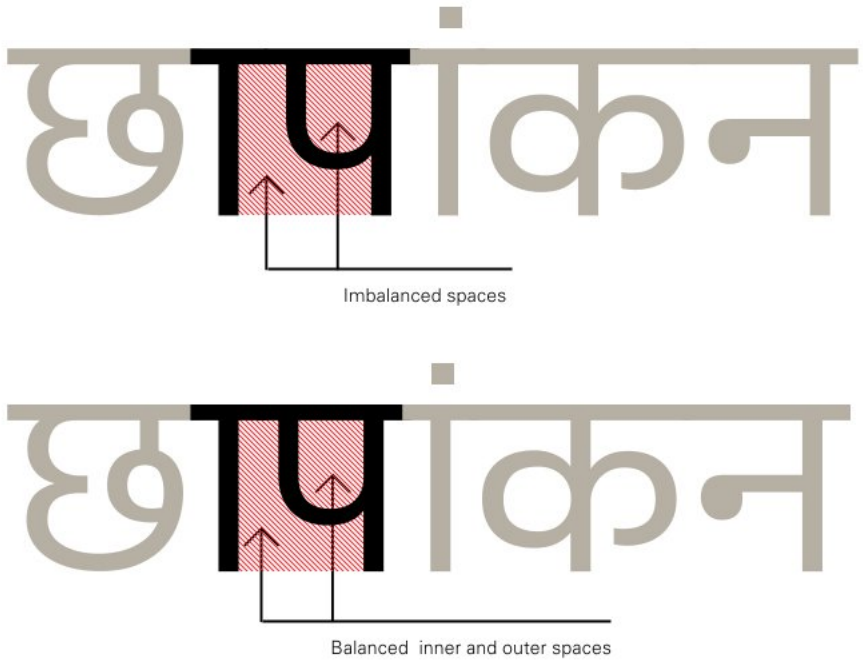


Figure 9: Relation between inner and outer spaces

5.2 ALL DISTANCE ARE NOT THE SAME

Eye Judgments are more important than any arithmetic parameter.

Every character has a different shape, and they are surrounded by the unique amount of white space. If we keep arithmetically equal space between the characters, they would not be balanced because they are different shapes from each other. In that case eye judgments are much more important to balance the space between letters.

There are different shapes (see figure 10). In the top row spacing is arithmetically equal, but it does not seem that they are equal. And in the bottom one spacing is done visually to maintain the harmony. The same thing has applied in this font to set the positioning of side bearing.

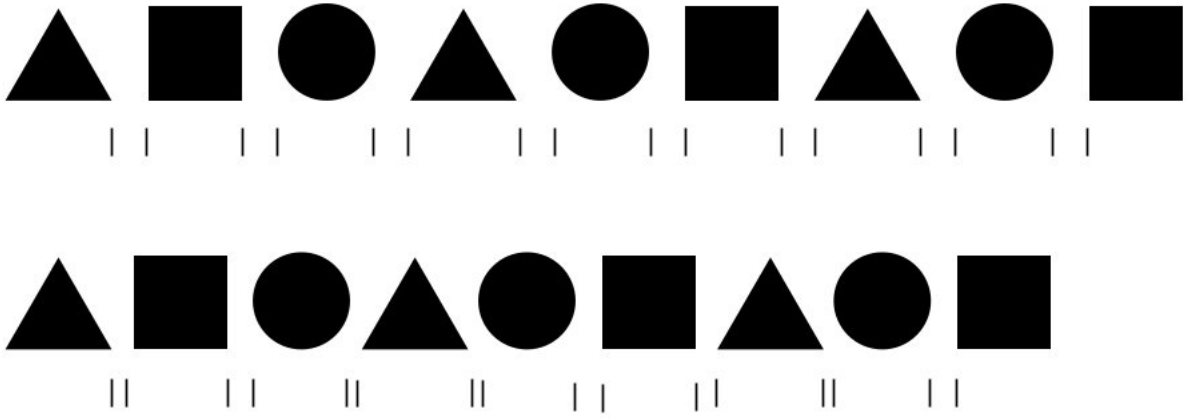
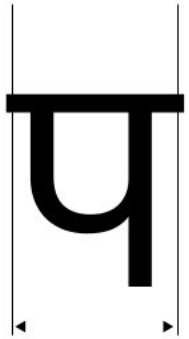


Figure 10: Visual spacing

5.3 METHODS

Every character sits on an invisible rectangular. Spacing is decided by the width of the side bearings, the distance from the character shape to each side of the rectangle.



To set the side bearing, we make metrics classes to group the characters according to the similarity between them. All letters which are similar from the left side can be one group and which have the same right side can be another group.

For Example, once we have the left side bearing of the letter 'ग', we have got the left side bearings of the letters ग़ ग्र ग्ग ग्घ ग्ज ग्ण ग्द ग्ध ग्न ग्ब ग्भ ग्म ग्य ग्ल ग्व ग्स ग्ध्व ग्ध्य ग्ऱ्य ग्भ्य ग्ऱ्य ग्ल ग ग़् as well. Using the same method, side bearings have positioned for all the characters.

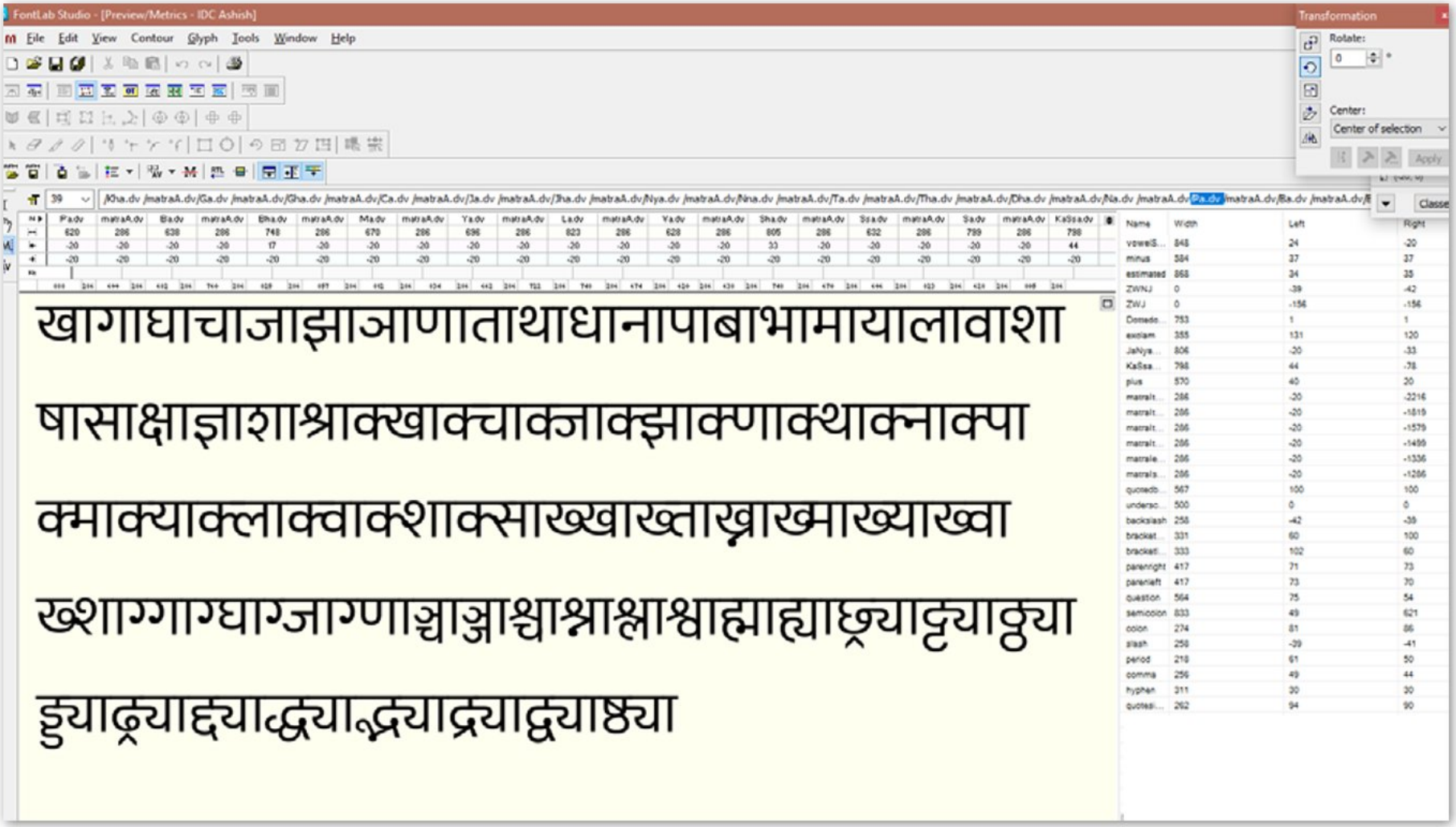


Figure 10: Spacing 'Kana' and full verti-bar Letters

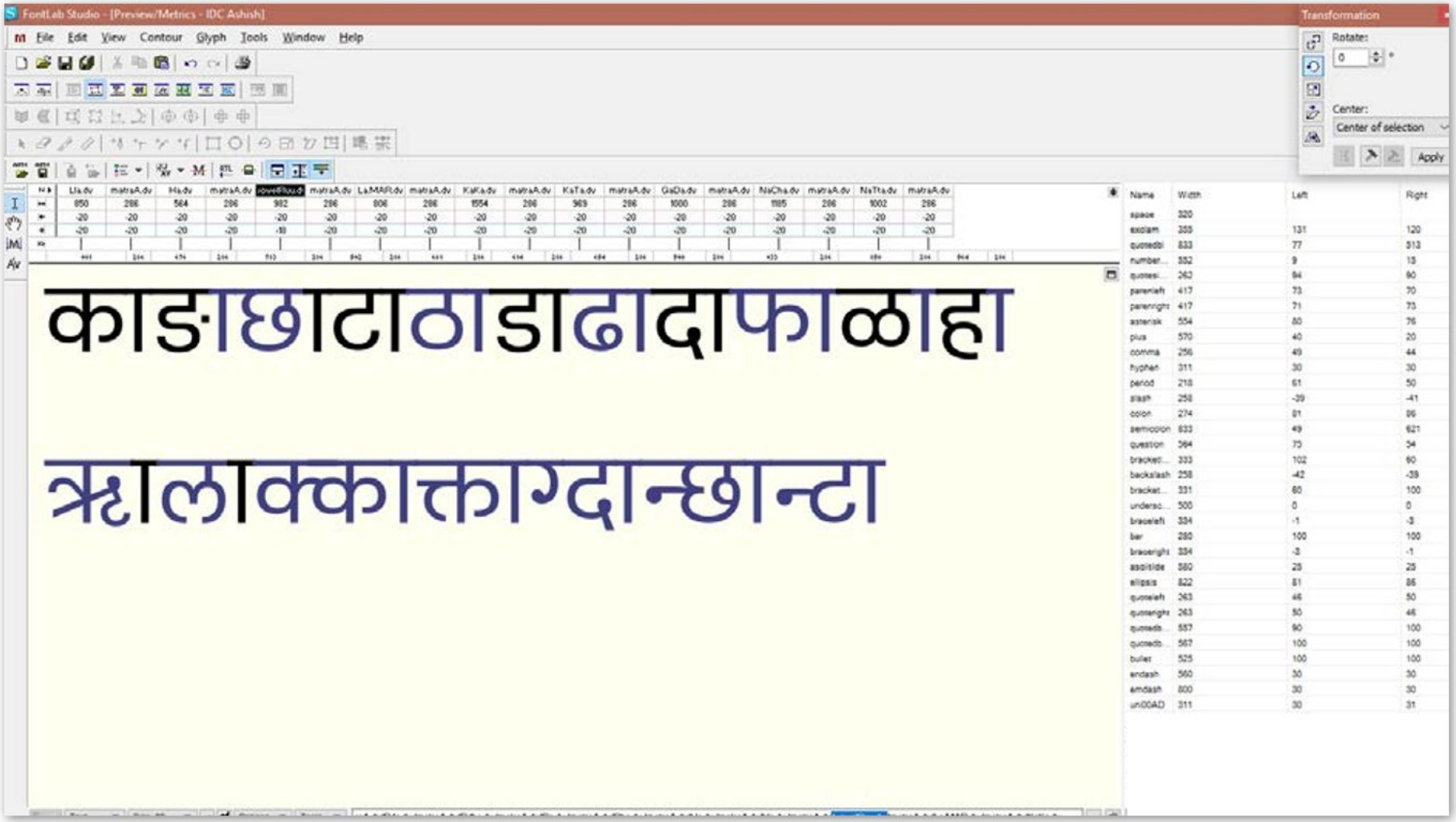
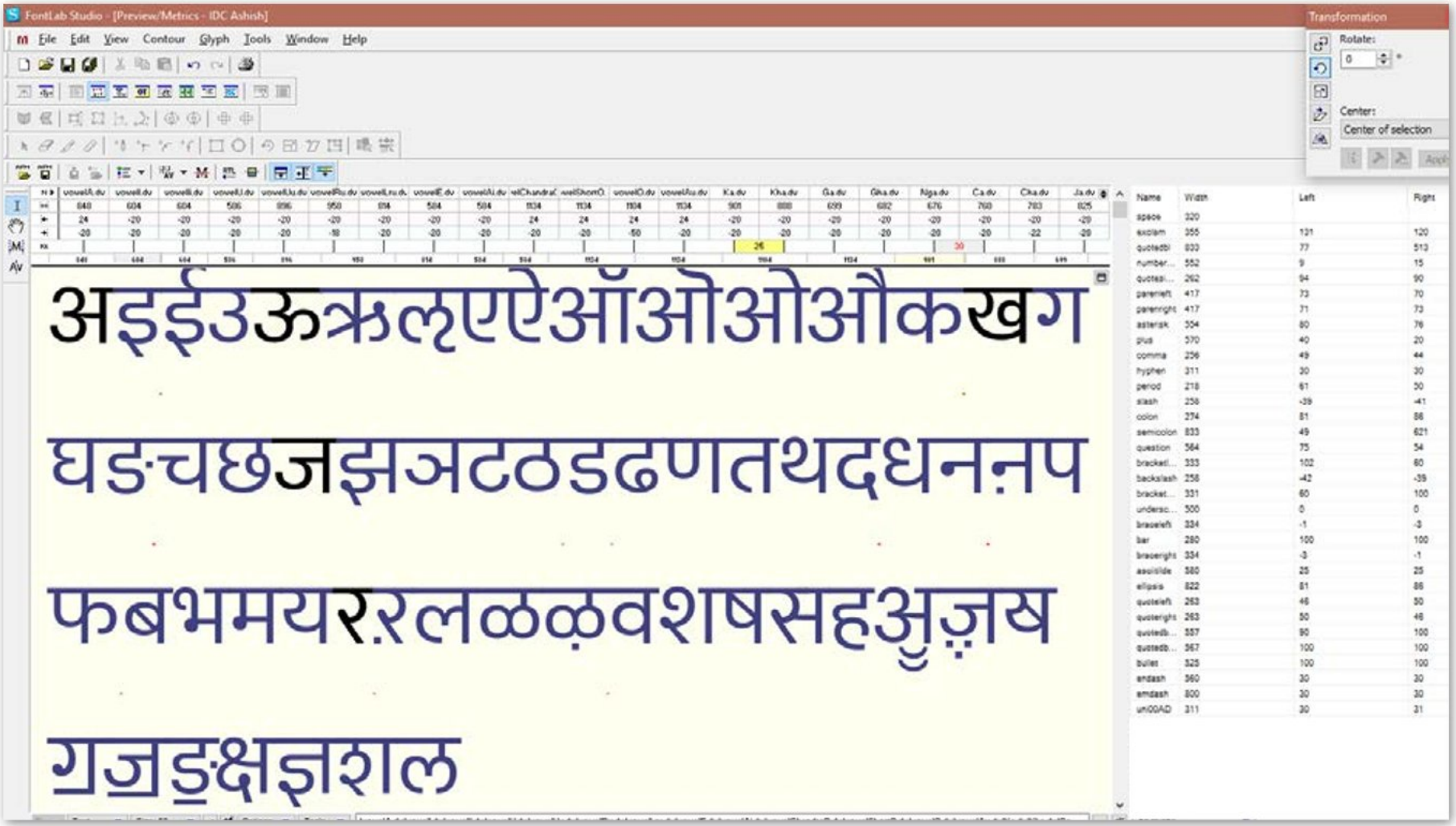


Figure 11: Spacing between 'Kana' and letter without verti-bar


FontLab Studio - [Preview/Metrics - IDC Ashish]
File Edit View Contour Glyph Tools Window Help
Transformation
Rotate:
Center:
Center of selection
अइईउऊऋऌॠऍऎऑऒओऔकखग
घङचछजझञटठडढणतथदधनऩप
फबभमयरऱलळऴवशषसहॐज़ष
ग्रज्ञड्ढक्षज्ञशल
Name Width Left Right
space 320
exclam 355 121 120
quotedbl 833 77 513
number... 552 9 15
quotesi... 262 94 90
parenleft 417 73 70
parenright 417 71 73
asterisk 504 80 76
plus 570 40 20
comma 256 49 44
hyphen 311 30 30
period 278 61 50
slash 258 -39 -41
colon 274 81 86
semicolon 833 49 621
question 564 75 54
bracketl... 333 102 60
backslash 258 -42 -39
bracket... 331 60 100
undersc... 500 0 0
braceleft 334 -1 -3
bar 280 100 100
braceright 334 -3 -1
asciitilde 580 25 25
ellipsis 822 81 86
quoteleft 263 46 50
quoteright 263 50 46
quotedb... 557 90 100
quotedb... 567 100 100
bullet 525 100 100
endash 500 30 30
emdash 800 30 30
uni00AD 311 30 31

5.4 KERNING

Kerning is the process of adjusting the space between characters for optical reasons. In simple words: when one certain character is followed by another character we can define a different space in between these two characters. This space can vary from the normal spacing. The difference can be positive or negative; we can add more space for a certain combination or we can reduce the space. And we can tell the computer to remember the spacing when those specific pairs come together.

In some cases kerning is inevitable and necessary. When letter 'र' is followed by a lowercase 'ग' a big white space appears which cannot be solved by adapting the spacing of the characters. If we change the spacing, it can be messed up when these characters would come with other characters again. For that occasion kerning is needed (see figure 13). We can kern letters with their individual pairs or with kerning classes as well according to our convenience.

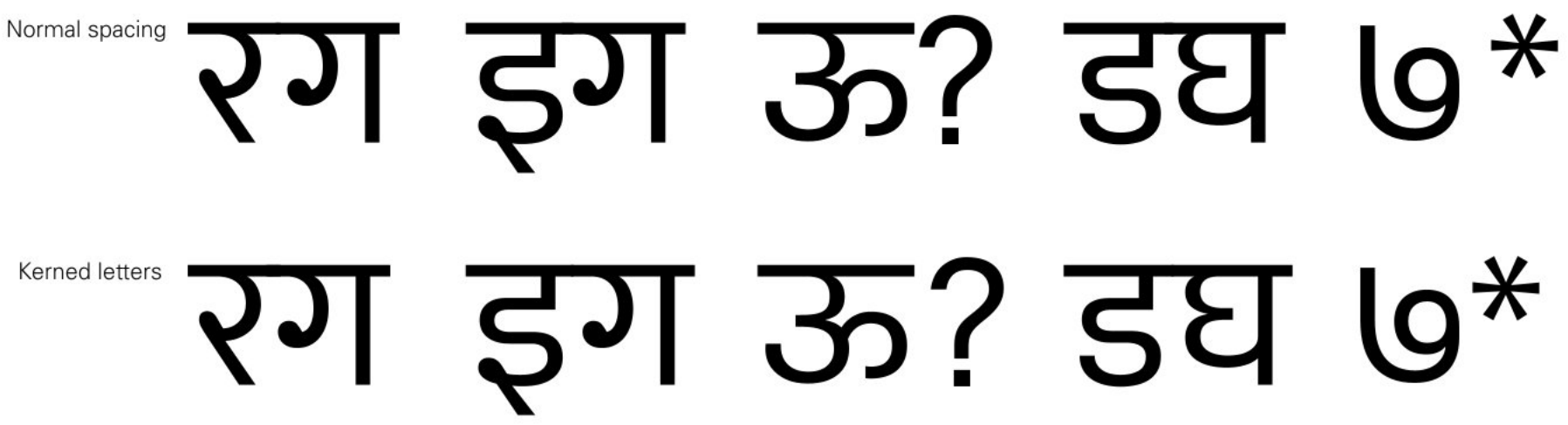


Figure 12: Kerning

There are around 600 kerning pairs have been created with this font. Some of them are individual pair and some of them are done with kerning classes.

इअ इग उअ उण उश ऊख ऊग ऊद ऊप ऊब ऊर ॠ) ॠ? ऊ) ए) एउ एग क) क. कअ कउ कख कघ कड कत कब कम कय कर ङउ ङख ङच ङम र/ र? छअ छख छघ छब छळ टख टड टब टभ टय ठख ठग द: ठट ठब ठभ ठर डड द) डत ढच ढट ढल द? दख दघ दञ दड दध दश दह रग रज छ) रट रड रढ रत रन रब रभ रर द(ळघ हख हट हड हत हप हब हभ हय हश ३अ ०# १# १३ ३५ ४८ ५' ५९ ६४ ७८ ८९ ८७ ८२

Figure 14: Kerning Pair

Being Bold

When you have already designed a regular weight, bolder weight would depend on your regular weight. If you did not notice that your counters are too short while designing regular weight. And you did not think about that, what would happen to your font when you move on to bolder weight. For sure, the characters simply would look like one big black mass in bold weight. So it is important to make sure that your regular weight has enough white space inside the characters.

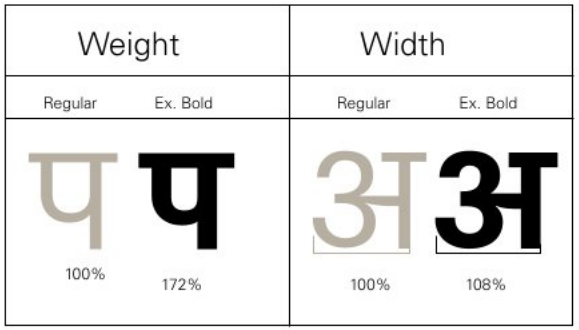
6.1 DECISION TIME

These are the basic question have been asked before designing the bold weight: What would be the width of bold character? Where would add the weight? How much heavier than the regular weight? And what is a good size for smallest counter/ aperture such as inside of the letter 'ढ'?

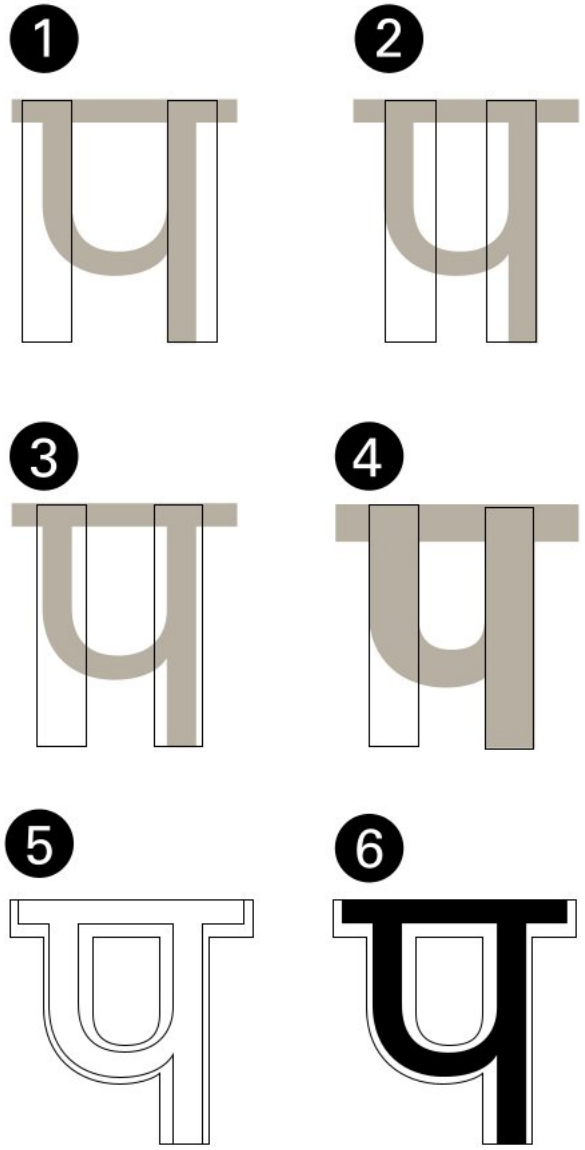
6.1.1 EXTRA BOLD

Reason behind creating extra bold was the interpolation of new weights between regular and extra bold. We can use a very bold design and the regular weight we started with and blend a new weight somewhere between the two. That's fairly easy. Extrapolating extra black versions from regular and bold, on the other hand, is a mess. Shaping the silhouette of extra bold letters is different from shaping the line quality of the regular weight.

The extra bold weight is three-fourth heavier of the Regular weight, the width is 108% of the regular weight and the stroke thickness of extra bold is given the chart.



Strokes	Regular Width= 100 %	Extra Bold Width= 172 % of Regular
Siro Rekha	68	110
Vertical stroke	86	146
Horizontal Curve	72	112
Vertical Curve	90	148
Bar/ Horizontal	70	111



6.1.2 WHERE DOES THE WEIGHT GO?

Most of the weight we add to a design of regular width goes on the inside. Usually, a bold weight looks all right without a lot of white counter space.

The 1st example shows how weight would be added to the outside of the letter 'प'. In the 2nd example, all the weight would go on the inside. Both the example would not work. Somewhere between the two extremes is a shape that would work. The width of the character of extra bold have decided which is 108% of the regular width. The 3rd example shows the right way to add the weight. 4th is the example of extra bold with the 108% width of the regular weight. 5th and 6th are the comparison between regular and extra bold weight.

*This may not be the standard way to add the weight for all glyphs. the method can be vary according to the complexity of the character. This method has worked well for this typeface.

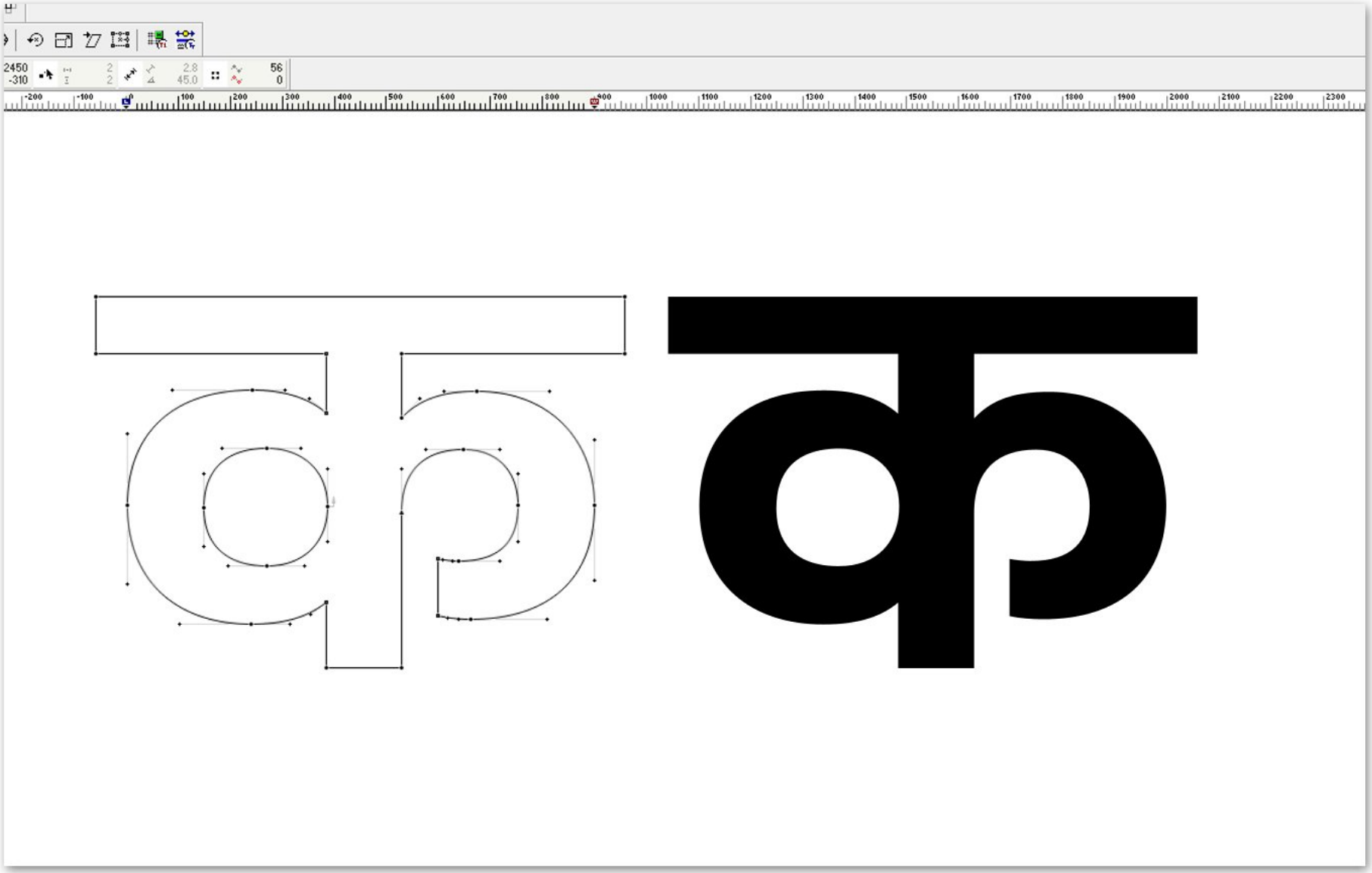


Figure 15: Construction of letter 'Ka'

Base letters

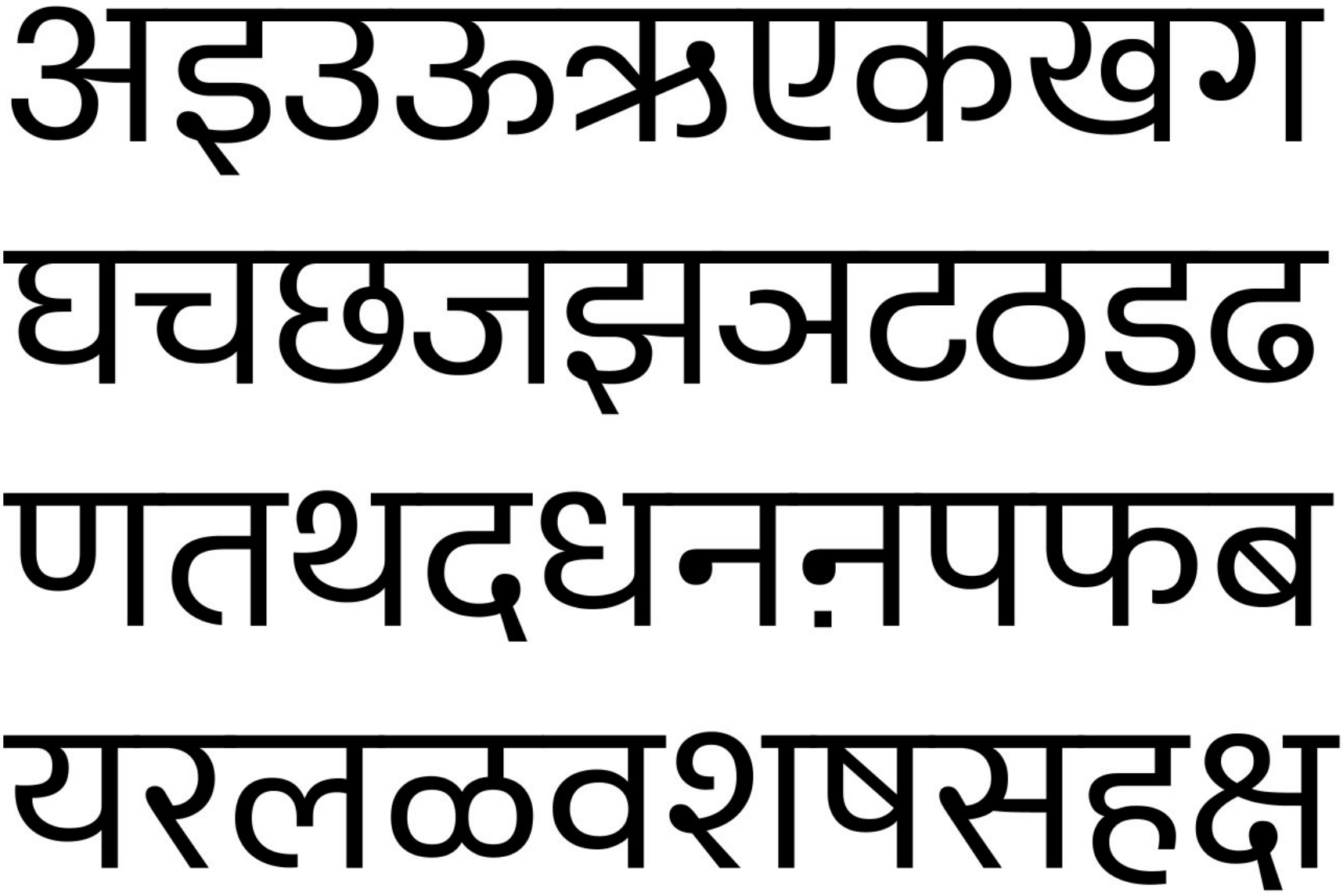


Figure 16: Base letters, Regular

Base letters

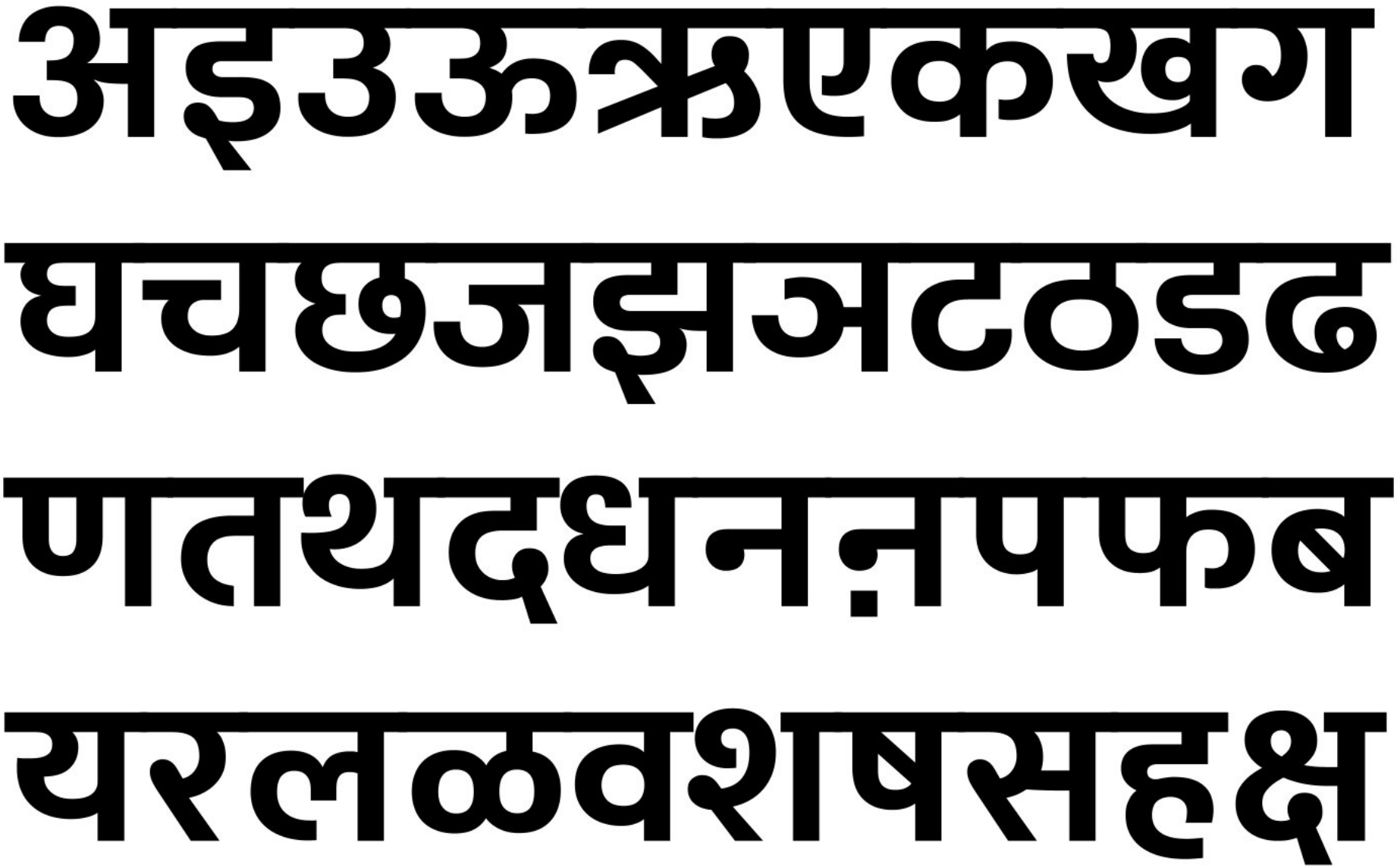


Figure 17: Base Letters, Extra Bold

Sample 1

पलाश Palash बावनकर Bavankar

आशीष Ashish मनीष Manish सालिक

Salik आशिका Ashika सचित Sachit

राहुल Rahul अभिजीत Abhijeet अरनब

Arnab दास Daas अनिरबान Anirbaan

Sample 2

एकरेखीय
देवनागरी
मुद्राक्षर अभिकल्प

Design of a
Monolinear
Devanagari

Sample 3


देवनागरी
मुद्राक्षर
अभिकल्प
IDC Ashish
This is a monolinear Devanagari typeface designed by Ashish Kumar as his graduation project in 2016-17. The typeface is designed for IDC, School of Design's official use. IDC Ashish presents itself as a clear and harmonious font.

Conclusion

Type designers work on their typefaces for years. It takes dedication and tremendous amounts of patience. Working on this project helped me deepen my understanding about the font design process. This project started with as a continuation of my previous project, The aim was to make a bolder version and completion of regular weight with open type feature.

Being a multilingual country India has many languages. For multilingual communication, we need good workable Indic typefaces. There are blank spaces which really need to be filled with Indic fonts.

References

Conceptual model for Devanagari typefaces

Ph.D. thesis by Dr. Girish Dalvi. 2010

Designing a bold typeface in Devanagari

Project report by Rajeev Prakash. 1990

Books

Adrian Frutiger - Typefaces: The Complete Works

Book by Adrian Frutiger and Heidrun Osterer

The Anatomy of Type: A Graphic Guide to 100 Typefaces Book by L. Stephen Coles

Some marginal notes on typography

Book by Hermann Zaph

Web

http://typographica.org/

http://designwithfontforge.com/en-US/Designing_Devanagari_Typefaces.html

http://66.147.242.192/~operinan/2/2.11/index.html

Font

Univers

Baloo

Maha

Chakra

Prakash

Ek Mukta Devanagari

Kohinoor Devanagari

Frutiger Devanagar

Yantramanav