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Calligraphic analysis of the Jain Manuscript Style.

Pradnya Naik, Industrial Design Center, Indian Institute of Technology Bombay, India, pradnyanaik17@gmail.com
Girish Dalvi, Industrial Design Center, Indian Institute of Technology Bombay, India, girish.dalvi@iitb.ac.in

Abstract: This paper describes the process we followed for the analysis for a particular Jain manuscript called the Kalpasūtra (created 1404 CE). Calligraphers and type designers have studied manuscripts mainly to appropriate the calligraphic styles found in these writings. Work done in this domain has been limited to personal calligraphic style explorations and studies. The primary objective of our study was to understand the visual structure of the Devanāgarī letterforms from a particular Kalpasūtra manuscript. The conceptual model for Devanāgarī typefaces (Dalvi, 2010) was used to examine the style found in this manuscript. Through this analysis we find uncommon variations within the morphological features of this style. Our study discusses the features and uniqueness of this calligraphic hand. We hope that these distinctive visual features from the Jain manuscript calligraphic tradition can serve as an inspiration to contemporary designers.

Key words: Jain manuscripts, Calligraphy styles, Calligraphic analysis, Devanāgarī letterforms

Introduction

Kalpasūtra is a frequently illustrated Jain text of the Śvetāmbara sect. This Sutra is recited by Jain devotees during the holy month of Paryushana. These manuscripts are well known for their beautiful illustrations, unique text layouts and distinct calligraphic styles. They are also finely illuminated with gold and natural pigment colours hence have a spiritual as well as artistic value.

This Kalpasūtra is a popular manuscript for study amongst artists and researchers. Earlier researchers have analysed the language, content and illustration styles of various Kalpasūtra manuscripts—as of now several distinct styles of illustration have been identified. Jain manuscripts are also source of inspiration to calligraphers and type

designers. Calligraphers have studied the exquisite calligraphic styles from these manuscripts (Joshi, 1983) (Gokhale, 2000). These studies have however been limited in their scope and scale, and a thorough analytical study of calligraphy from these manuscripts is yet to been seen in literature.

In this study, we analysed the letterforms on the basis of their visual features. We analysed the visual style of a particular Kalpasūtra manuscript across the following dimensions:

a. Tool to draw letters
b. Ink and surface used
c. Grid, layout and page proportions
d. Study of the letterforms

We essentially tried to understand the factors that were responsible for the exquisitely drawn letters. Within the Kalpasūtra manuscript (created 1404 CE) our study focused on the analysis of the text within the section of Mahāvīra (Jainpedia, 2015) (Fig.1). The text is written in Prakrit/Sanskrit and rendered in the Devanāgarī script. The influence of Brahmi–Bangla script is seen on the Devanāgarī used in this manuscript. The script style is પડિમાત્રા (Prushthamatri Devanāgarī) (Punyavijayji, n.d.); this script is also known as જૈન લિપી (Jain Lipi, Jain Script) (Punyavijayji, n.d.). Unlike Balbodh Devanāgarī where all the words are joined together with the Shiro-Rekha (Horizontal Top-line), the letters in this style are written separately and the Shiro-Rekha does not join the letters together. Overall the calligraphic style is square-like, with individual letters having large proportions.

In order to understand the structure of these characters it is essential to know the tools, materials, inks and surfaces that might have been used to create the manuscript. These elements directly influence the style of the manuscript.

Figure.1 Kalpasūtra—section on Mahāvīra manuscript folio 16-verso. Source: Jainpedia.

1. Tool

Text in the Jain manuscripts was written with a traditional tool called ‘Boru’ (a reed) (Fig.2). According to contemporary Jain calligraphers this boru called as ‘Tajia Boru’[1]. Prima-facie this Boru seems to be the stem of a Pomegranate tree. The contemporary Boru is approximately 12–15 cm long, with a diameter of around 5mm. The unsharpened Boru is rough at one end, the other end is pointed.

Figure.2 An Unsharpened Boru

The person who draws the letters is called ‘લહિયા’ (Lahiya). The Lahiya’s sharpen and sculpt their own Borus using a metal cutter, after sharpening the tip, is cut at an angle of 35°–42° (Fig.3).

Figure.3 Sharpened Boru with the cut of around 35°: the tool used to write the Jain manuscript.

During this process s/he constantly checks the angle by drawing practice strokes. This helps them to gauge the appropriate angle. The aim is to get a sharp and crisp terminal in the stroke terminals. This preparation of the tool is an important part of the calligraphy process as the shape of the tip directly influences the structure of the letterforms.

[1] Tajia Boru is a reed pen found in the state of Assam, India.

2. Inks and Surface

Kalpasūtra manuscripts are rich and extremely colourful in their decoration. The paintings in these manuscripts are painted with gold, black, red, white, yellow, green and blue ink. Text is predominantly written in black whereas red colour is majorly used for the borders and illustrations. Red ink is seen at the centre of a manuscript page where the thread-hole is made. These colours are made from natural pigments (Punyavijayji, n.d.). Black ink (Fig. 4a) is made by mixing lamp-black and sesame oil. Red colour is made with 'હિંગળોક' (Hinglok)—a pigment of mercury (Fig. 4b). Yellow is usually used for text correction and is made from a pigment called 'હરતાલ' (Hartal) (Fig. 4c).

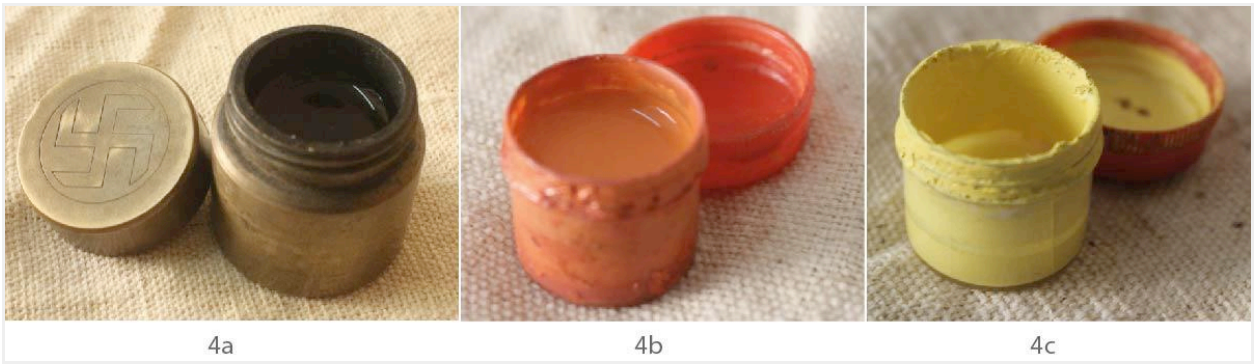


Figure.4 Black, Red and Yellow natural inks in metal and plastic containers.

Along with the tools and inks, it is essential to study the surface, which used to write the text of the manuscript. Here, this particular manuscript was written on paper. Earlier Jain Sūtras were written on Palm-leaves, these palm□leaf manuscripts were in rectangular shape having a proportion of 2:1, text in these manuscripts was written in long horizontal columns. A similar style for the text layout and page orientation was used for paper manuscripts.

3. Grid, layout and Page proportions

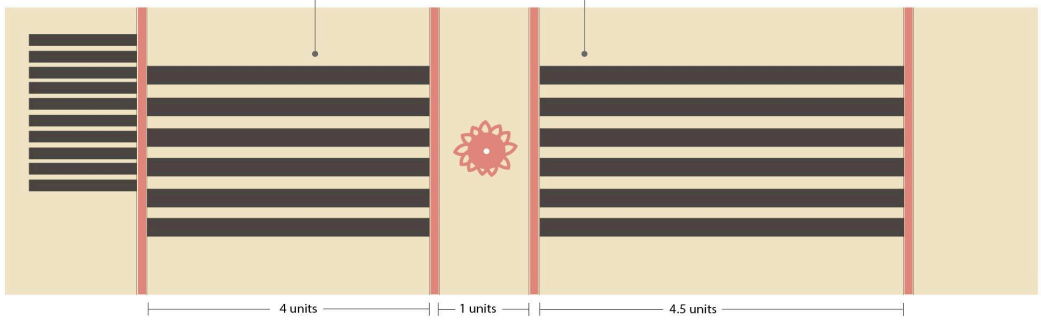
The manuscript, which we examined, has a fascinating text composition style, image areas and marginalia. We noticed that a specific grid system has been followed in all the pages. There is a systematic way in which the illustrations, text and symbols have been laid out in this manuscript.

The width of this Kalpasūtra is around 325mm with a height of 94mm (Fig.5.3); the proportions of the manuscript pages are 4:1 (Fig.5.3). Text is typically arranged in two columns; this remains consistent amongst all the folios. The horizontal page orientation influences the width of the columns. The proportion of the page and the size of the total text area is approximately 4:1 (Fig.5.3).

Fig. 5.1

(5b) Red and black border
(5a) Main Text
(5c) Sidenotes / Marginal Text
Column 1
Column 2

Fig. 5.2



4 units
1 units
4.5 units

Fig. 5.3

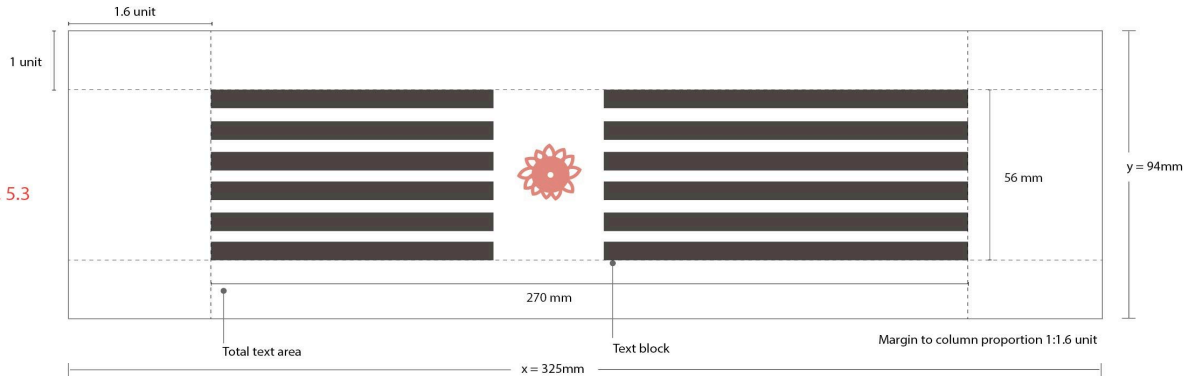


Figure.5 Manuscript page proportions and layout

In this layout, we observed that the text-column on the left is smaller in width than the column on the right (Fig.5.3). Text blocks have a fine 5mm border. This border is decorated with thin black double-outlines that are filled with red colour (Fig.6d). The borders define the columns within this page layout. The proportion of the margin is 1.6:1:1.6:1 from right fore-edge to upper - to left fore-edge to foot edge (Fig.5.3).

Folio numbers are placed in the margin space and this is laid out in the center of the margin area (Fig.6c). Page numbers are written on the red circle on the right (Fig.61). A hole was made in the center of the page to tie together the loose manuscript folios. A string was then passed through all the folios to hold them together. This circle is seen in the centre of the page; this circle has been drawn with a wide gutter space between the

two columns with a circular pattern, this is to avoid the damage from the wear and tear of the string (Fig.6.1).

The illustration area bleeds into the top and the bottom margin of the page (Fig. 6.1) this makes the layout of the page quite interesting. The image area divides the two-column grid into the three columns wherever there are images (Fig. 6.2). There are around six lines of text per column. Marginal text can sometimes be seen in the wide margin area of a page layout. These notes are written in a smaller size than the main text (Fig.5.2). The calligraphic style of the side notes is slightly different from the main text style. This is probably to differentiate the main content text from the notes and also to ensure legibility at small sizes. The line height of the main text is around 6▫7 mm, the line gap between two lines is around 4 mm.

Fig. 6.1

Fig. 6.2

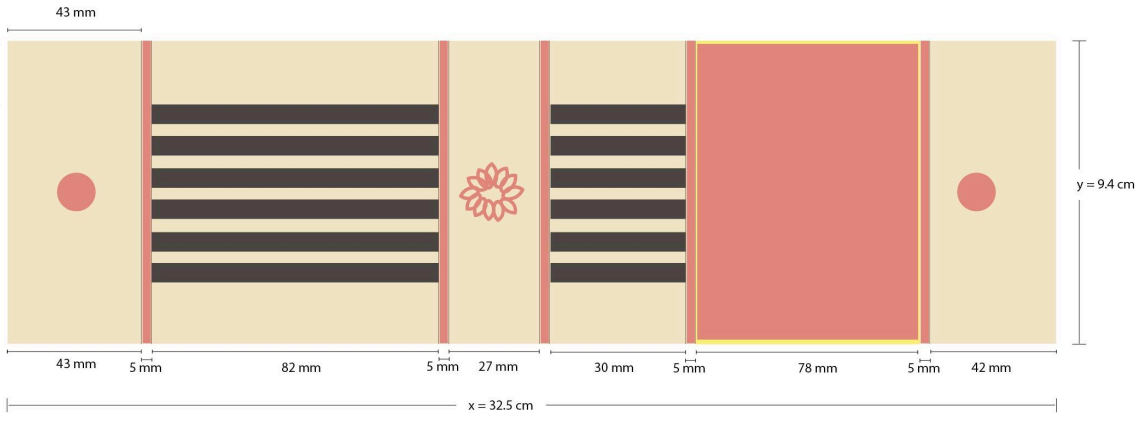


Figure.6 Manuscript page with illustration

Overall the manuscript text has a dark grey texture; this dense texture is balanced well with the wide margins. The composition of text, images and calligraphy is simple and balanced to look.

4. Study of the letterforms

In the earlier sections we discussed the layout of the manuscript, along with this it is essential to analyse the ductus (stroke-sequence) of the letters.

4.1 Tool

The Boru creates a canted vertical stroke with angular terminals (Fig. 7); the angle of the vertical terminal depends on the cut of the pen and the pen-hold of the Lahiya. A well sharpened Boru gives precise, well-defined, thin, sharp strokes, which have a medium contrast. These strokes are distinctly different from strokes made from other tools such as metal nibs where the contrast achieved is far more extreme than that of the Boru.

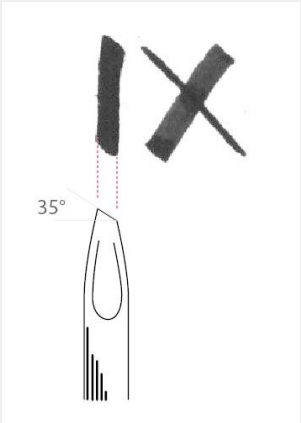


Figure.7 Vertical and diagonal strokes drawn with Boru.

The pen stroke is uninterrupted and solid in its flesh. In letters ▫, ▫, the stroke is interrupted by a pen lift. In ▫, the stroke of the bottom curve is achieved by drawing the Shiro-Rekha and Kana first, after which the remaining body of the letter was drawn (Fig. 8b). This type of stroke treatment in a letterform is unique to this calligraphic style, and is not seen in Balbodh Devanāgarī (Fig.8)

Figure.8 Letter ▫ and ▫ from Jain manuscript and Balbodh Devanāgarī calligraphy

The contrast of a stroke is the difference between the thick and the thin stroke (Fig. 9a). In this manuscript we see a high contrast in the letters. When the stroke of a pen rotates from left to right in circulation direction, we notice a right inclined axis. Vertical axis letters are widely seen in these manuscript writings, which we never encounter in Balbodh

Devanāgarī letters (9.b). These straight vertical strokes show symmetry and rhythm in letters.

Figure.9 Straight Vertical strokes in Jain manuscript style

The tool significantly influences the shape of the terminals. Our analysis shows that there are several distinct horizontal terminals that have been created in the manuscript. We found that the Shiro-Rekha has been treated in multiple ways; the treatments have been identified as follows:

a. Simple stroke: The horizontal pen stroke travels from left to right and creates an angle at 42°— this is same as the cut of the Boru (Fig. 10a)
b. Terminals that travels from left and later turn back a bit, are directly moved downward as a Kana of a letterform. This is convenient as the pen does not need to be lifted and the vertical stroke can be drawn quickly.
c. We found that a special movement was used to create the initial portion of the Shiro-Rekha. Here, the pen travels in three directions (Fig. 10c.) and creates a pointed triangular wedge terminal; this triangular wedge is a distinctive feature of the Jain manuscript style.
d. Letters क,इ,ई have been drawn with the initial wedge terminals and at the end of the horizontal terminal the tool turns inside, and creates a shape similar to a knot (Fig. 10d). This knot might have been created to fill up the empty space and to balance the letterform.

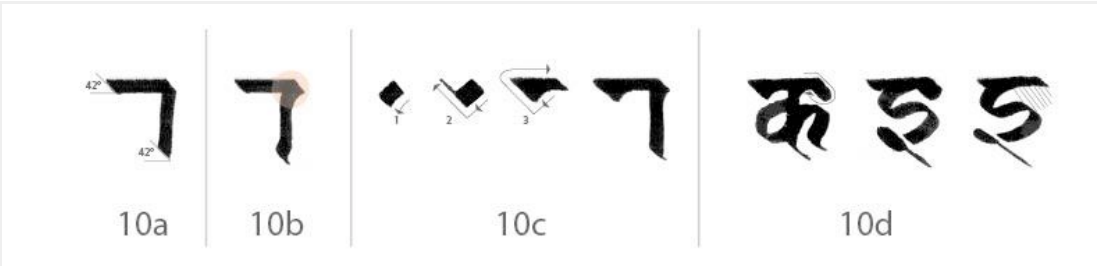


Figure.10 Horizontal Terminals

Similarly, multiple ways of tool handling can be seen in the vertical stroke.

a. Vertical down-strokes end at a 35° angle; this angle of the terminal seems to have been achieved through a pen-lift. The angle is the same as the angle of the pen-nib (Fig.11a).
b. In some cases, vertical strokes swerve before the baseline and terminate with a thin canted terminal with a slightly smaller angle (around 30°) (Fig.11b.).
c. Sometimes, vertical strokes start with (an inside) curve. This stroke then goes straight down and near the end of down-stroke it takes an outside curve ending with a thin angular stroke. The angle is observed to be around 25°-30° (Fig.11C).
d. In letters such as प, व, य, ध, घ etc. a specific stroke is noted. The vertical down-stroke is manipulated in such a way, that it looks like the bottom curvature of the letter (Fig.11d). This is achieved by changing the natural angle of the tool.

Figure.11 Shiro-Rekha with Kana.

Through the analysis of the tool we see a careful and deliberate manipulation of the original pen angle of the Boru in several letter strokes. This manipulation might be a deliberate aesthetic decision of a Lahiya or it might also serve as a functional mechanism to remove the excess ink from the tool.

4.2 Hand

Letterforms from the Jain manuscript style have a certain novelty in their characters, which make them distinctly different from Balbodh Devanāgarī. This particular hand is commonly seen in the earlier Kalpasūtras. This hand is not used in contemporary Jain manuscripts.

The 'वळन' — used in this manuscript is squarish in nature. In most cases the strokes turn at 90° angles when the strokes change their direction (Fig.12). This is a remarkable feature of the Jain manuscript style calligraphy. Such distinctive structures of the letters are aesthetically appealing to a calligrapher, letterer and type designer. This style could have been the Lahiya's handwriting mannerism or a style that might have gained popularity during a specific time period.

Figure.12 Right angles in stroke transitions.

In this style most of the strokes are either vertical or horizontal. We see that even strokes in letters such as क, ब, व, य, ढ, द (Fig. 13) have been drawn with straight lines. Such structures are not usually employed while writing in Balbodh. Counters of the letterform are closed at some places and at times they have left some space at the joining with a vertical stroke (Fig. 14). These alterations add a pleasant visual diversity to text.

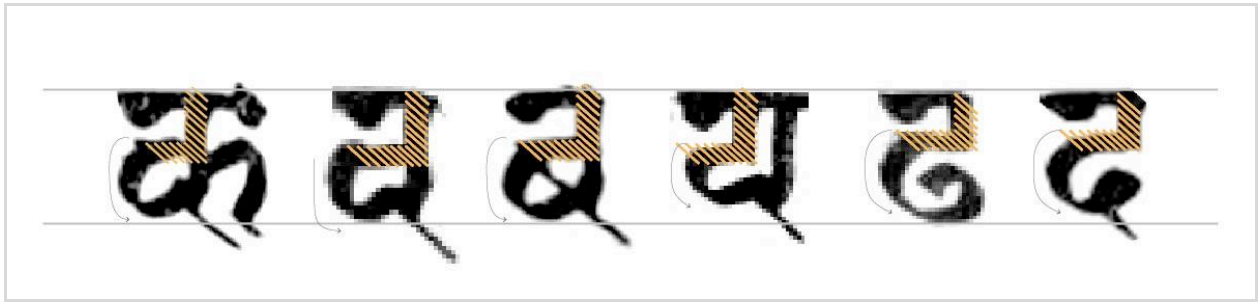


Figure.13 Right angular transition in curves क, ब, व, य, ढ, द

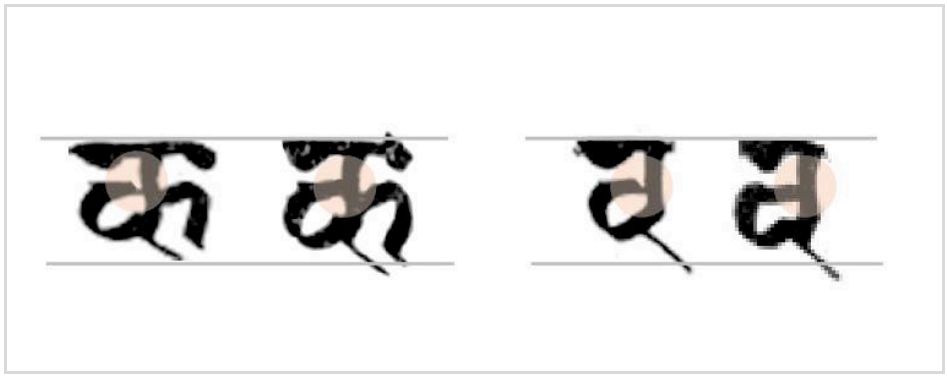


Figure.14 Counters from letter क and व

We also studied the joineries of the letters. In Balbodh, letters ऊ, घ, ध have two curvilinear strokes that join each other in looped/unlooped fashion. Here, in letter घ, ध first left curve is replaced with a vertical straight stroke that is positioned just above the second angular stroke. (Fig.15).

Figure.15 Curve joinery in letters ▫ and ▫

अल्पदंडयुक्त (Pegged) letters like ढ, द, ठ, ट are less frequently found in this particular manuscript, amongst these we marked the letter ढ. Several letters were seen in straight and squarish forms, inherently the Lahiya had tried to keep round ductus letter characters in a similar style. Accordingly letters ढ, द, ठ (Fig. 16) have maintained horizontal neck joins that matches well with other elongated rectangular letterforms.

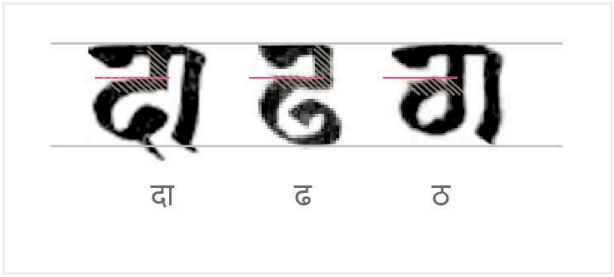


Figure.16 Horizontal neck joinery in letterforms द, ढ, and ठ.

Devanāgarī letterforms such as ध, श, ढ are looped characters. In this particular Kalpasūtra we could find letter ध with a filled loop character (Dalvi, 2010). This filled loop is subtly different than that घ and ध (Fig. 15), which makes these characters, looks similar to each other. Unlike the letter ध, letter ढ has a prominent open loop (Fig. 17). This decision might have been taken to avoid stroke complexity. Shape of the letter श (18a) is closer to the Marathi style (18b) since it does not have an initial loop. Even though the Marathi श (Fig. 18b) and the Jain style श (Fig. 18a) look similar; the manner in which they are drawn (ductus/stroke sequence) is distinctly different.

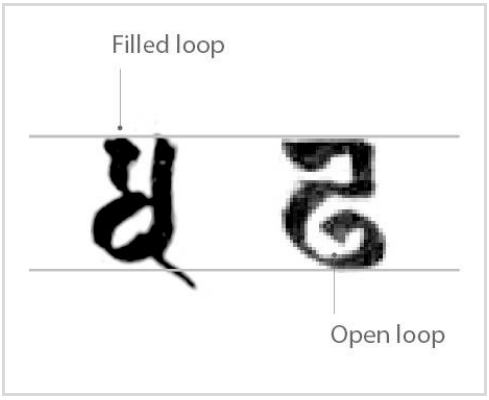


Figure.17. Horizontal neck joinery in letterforms द, ढ, and ठ.

Figure.18 Letter ◻ from Jain manuscript Style and Balbodh Devanāgarī Style

Knots are a significant feature of the Devanagari letters. The knot is the treatment of strokes, which overlap each other and crossover each other (Dalvi, 2010). We find knots in letters such as ग, र, स, इ, म, and न. In this style, the dark filled knots are responsible for the thick and dense texture for the text. Certain knots with thin diagonal terminals seem to have been created by manipulating the original tool-angle (Fig.19). Such masterful handling of the tool and subtle manipulation of the pen angle, suggests that a skilled hand developed these letters with an in-depth knowledge about individual letterforms.

Figure.19 Letterforms ग, र, स, इ, म, न with Knots.

After we studied the vertical stroke terminals within the letters, multiple stroke movements within vertical stems were seen.

a. The vertical stem that starts from the end of the Shiro-Rekha and goes in a downward direction ends with a canted terminal (a parallel vertical stem) (Fig. 20a).
b. Stems, which are parallel but with, extended terminals (Fig. 20b). This treatment is seen more or less in every stem. This gain might be a stylistic feature of the Lahiya's handwriting or it might an action to remove excess ink from the tool nib.
c. A stem that start with a slight curve goes straight then again curves slightly at the ends with a thin terminal (Fig. 20c). This is used in Viram (danda).

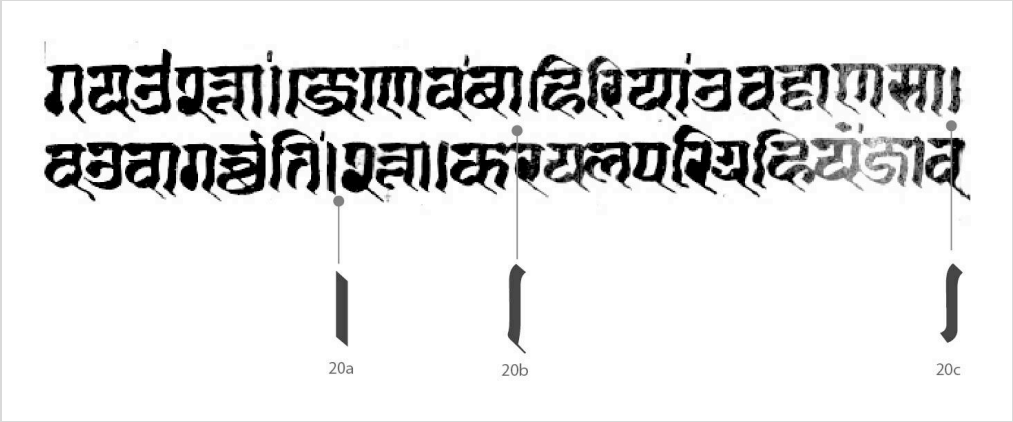


Figure 20. Types of Vertical stems across the text from Kalpasūtra manuscript.

4.3 Proportions

Proportions of the Jain Devanāgarī letters have not yet been discussed in the existing literature. In our study, we have focused on the horizontal and vertical proportion of the letters. The ratio of the line height and line gap is 2:1 across all the pages. The small line gap is due to the use of ઓડિયા (the grid tool), which is used in to create the guidelines on paper for writing. In the Jain calligraphy style text is written with no word spaces, in this case the Shiro-Rekha breaks with each individual letter. The shapes of these letters are rectangular. Since there is no word space between two consecutive letters, they create a dense dark texture in the text. This is an interesting feature of the manuscript.

The height of the base□letter is around 6–7 nib-widths. The base Kana-height is 6 nib-widths and 7th nib-width marked when the vertical stroke ends with thin terminals (Fig.21). The Kana-height is about 6mm and the leading (the space between consecutive parallel lines) is 3mm. The Boru nib□width is around 1mm. A small nib□width and large Kana-height makes the letterforms appear tall and condensed; resulting in a dark colour for the overall text.

We noticed that the इ matra's on first line of the paragraph are larger (around ⅔) of character height(Fig.21a) and more elaborate in their shape as compared to इ matra's on other lines. Similarly, anuswaras are also big on first line but later they are marked like a small nukta (a dot) above Shiro-Rekha (Fig.21b). This decision might have been taken by the Lahiya due to the narrow line spacing between the paragraph-lines. Short उ matra's are part of consonant letters which were written along with a character within the Kana-height and appear as a fused vertical letterform (Fig.21c). This is the unique feature of this style and is seen across all the folios. ए matra's have a thin slanting stroke placed over the Shiro-Rekha (Fig.21d) the angle is around 20°. Total matra proportion ratio is around 0.6 : 1 : 0 (Fig.22). These proportions are significantly different than contemporary Devanāgarī, where the space given to the lower matra zone is larger than that of the upper matra zone (Dalvi,
2010).

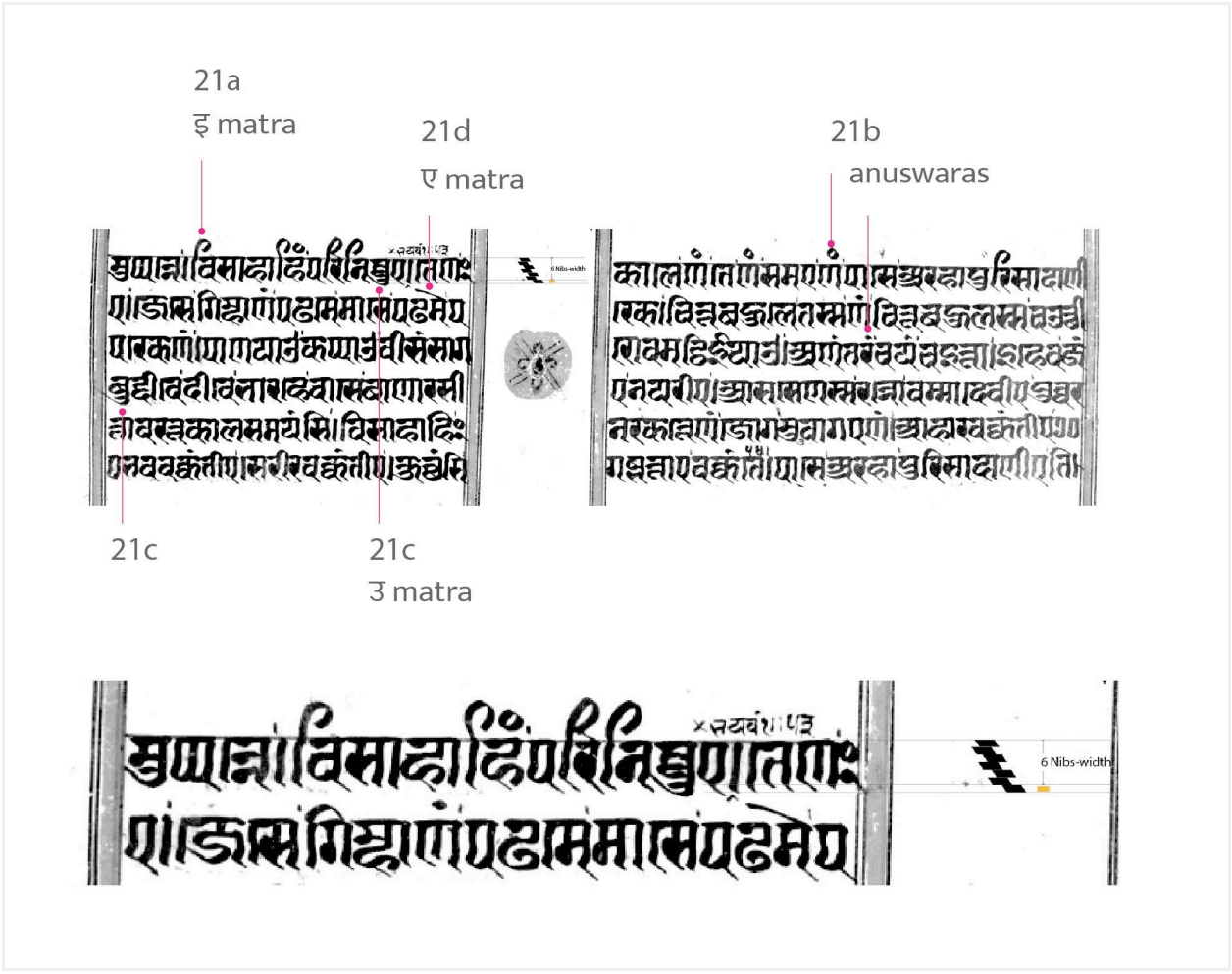


Figure.21 Base Proportions

Figure.22 Total Vertical Matra Proportions.

5 Conclusions

Specific visual features of the Jain style—wedge style horizontal beginnings, lack of word spaces, squarish counters, multiple treatments for the vertical stems, matra proportions of the letters etc. impart a unique look to this style. Existing type designers can take inspiration from these letters to create new typefaces in Devanāgarī. These letters can have the potential to distinctly differ from existing letter shapes. A further exploration in letter styles is possible by experimenting with the various visual features and marrying them with conventional calligraphic styles.

Just as we analysed a Jain manuscript, similar studies can be conducted in other Indian scripts. Through such studies other lesser-known calligraphic styles of India can serve as an inspiration to designers and hopefully they can find their place in contemporary typography.

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