Structure - Part A (General Introduction)

A1 - What is a type font, a type face, how does it differ from Art lettering and Calligraphy ?.

Type font is a set of letters having some common elements resulting into a distinctive style of lettering, and is used to compose a linguistic text.

A standardized digital version of a typefont is usually designed by a type designer and released or marketed by a type founding firm. The terms typefont and a typeface represent a common concept of prefabricated lettering styles.

The difference in type font and type face is of technological nature. In early days of hot metal technology an image of a letterform had to be transferred on to the top (face) of a rectangular metal piece called a type. Hence the term the typeface. The term typefont is indicative of the typeface created through using digital technology consisting of bits and bytes. It also reflects the new profile of a typeface which contains, digital information of a lettering style, and is not an object or an analog image of a letterform. An operating system stores the information of digital fonts through an application such as a word processor. A user can select a typefont of his/her choice and generate, view, edit, process, print and transmit linguistic text.

The difference between Art lettering and a type face can be at two levels. Art lettering is constructed by a lettering artist for a given purpose and for single use in short headline. It is not a permanently documented lettering style, whereas a type face is a design activity of a permanent nature and can be used for various purposes. A variety of documents can be created using typefaces.

Calligraphy is handwriting as an Art. The expressive and aesthetic visual qualities can be associated with Calligraphed lettering as compared to hand drawn lettering. Calligraphed letters are usually the authentic outcome of writing tools and the sensitivity of a Calligrapher. Once manifested, Calligraphy cannot be (or should not be) retouched or modified.

What is the difference between type design and typography ?

Typography is a discipline - It is the Art and Science of laying out the text as per the requirement of the content/theme. Various typefaces are used in a printed document to create the required effects through typographic design. Typography will make use of prefabricated typefaces/fonts. Type design is a discipline which deals with planning, designing, executing and testing letter forms for a given purpose in a required script. Type design activity requires the sensitivity towards aesthetics of letterforms, as well as knowledge of typeface production technology.

What is the difference between type designer, typographer and Calligrapher ?

A type designer is a professional responsible for the type designs. A typographer uses his understanding about type faces and technology of text composing. He is responsible for designing the text. A calligrapher through his or her commitment to the aesthetics of letterforms, draws/paints spontaneously letters, words, sentences and/or statements; with maximum expressive quality using appropriate writing tools and writing surfaces. He or she would produce a single master of artistic work.


A2 - What is the role of type fonts in communication, printing, publishing and information industries?

Without a type font, no printed text will ever exist. The effectiveness of written communication will depend upon the visual qualities of a written text. The proper use of type fonts and effective typography would result into an effective piece of written communication, in any language, in any script, anywhere, anytime. The role played by type fonts in printing is at its maximum level. Printing technology caters to both text and images. In context to text composition and text printing, type fonts are vital input elements. The publishing industry can establish its unique identity, if needed; through a specific type
font style. Reputed newspapers have initiated type designs according to their requirements. For example: Times Roman designed by Stanley Morrison was initiated by Times London as their new identity.

Information technology and information design are two vital sides of the information industry. The usage of innovative ideas in information technology, as well as creatively designed and typographically well presented text/images as part of information design; are the two key factors that enhance the quality of content marketed by the information industry. Well chosen type fonts as well as well presented visuals, play an important role in information design.

A3 - What are the different categories of Fonts?

There are different categories of fonts which are designed to suit different purposes. These can be classified briefly as follows:

1. Text fonts (for continuous text)
   1a. System font
   1b. Application font

2. Headline Fonts (for short text)
   2a. For headlines in text
   2b. For signage

3. Fonts based on Indian historical Landmarks such as Brahmi letters, Gupta letters, Chalukya letters, Muqshali letters, Bhoja letters, Peshwa letters etc. (for typical ancient/period based text)

4. Indian Fonts based on Roman script fonts such as Times Roman, Arial etc. (for text used in Advertising & Communication industry)

5. Specialized Fonts:
   5a. Transliteration fonts (to render transilliterated text from any Indian language to Devanagari Script)
   5b. Mathematical fonts. Special font in Devanagari to take care of advance math signs (including Greek marks such as theta etc.)
   5c. Fonts for composing text related to a specific faith (such as Jainism, Buddhism etc.)
   5d. Multilingual Technology Model fonts to demonstrate oddities, features, rules in all Indian scripts.
   5e. Comprehensive fonts for reproducing Vedantic text in Sanskrit (including Samaveda).

6. Bilingual fonts
   Devanagari font based on another Indian script such as Bengali, Nandalal, Malayalam, etc.

7. New era – Computer technology fonts
   7a. Dot matrix – bitmap fonts scalable nonscalable (with one or many passes)
   7b. Segmentation fonts (where each segment will be of varied type)
   7c. Digital fonts using formats such as PS (postscript), TT (TrueType) and OT (OpenType) etc.

8. Calli Fonts (based on Calligraphic styles of Indian scripts)
   8a. Personalised fonts (based on the handwriting based on the legendary personalities such as Sant Tukaram, Jaojee Dadalee etc.)

9. Decorative fonts
   9a. Script fonts – (based on running style of handwriting or cursive calligraphy)
   9b. Initial letters/fonts (to be used at the beginning of a text or a para)
   9c. Fancy decorative fonts (for festive text).

10. Machine readable fonts in Devanagari and other Indian Scripts

11. Corporate fonts (to be used in all levels of Communications in/for a corporation, industry, institute, company, organization).

In the above categories, many type font families need to be designed to create an exhaustive repertoire of type fonts for Indian Languages/Scripts. Such activity has already been undertaken and being
recognized as a profession in the Western as well as far Eastern countries.

**What is a typefont family?**

Typefont family consists of typefont members. The typefont family can be identified through its stylistic renderings of elements, weights, transformation variations and sizes. For example: Times Roman has thin smooth serifs at the end of vertical strokes, so this stylistic feature will be observed in all its family members. Different weights of a letterform such as extra light, light, medium, demi-bold, bold, extra bold can expand a given type family. The angular slope given to vertical strokes would result into italic variation of the same font. Extra condensed, condensed, expanded, extra expanded proportions of a letterform would form another feature of a typeface family. For example: Universe designed by Adrian Frutiger is an excellent example of a Sans Serif typefont family in Latin script. Nirmaysagar typeface - a pioneering style in Balabodh Devanagari is an excellent example of a typeface family in India.

Generally a light, medium and bold weight typeface along with its slant (Italic) versions are designed as a minimal font family.

(Appendix : Images: A3-1.TIF).

**A4 - Typefaces in Latin Script and Devanagari Script + Other Indian Scripts.**

Many excellent examples of typefaces exist in the Latin script. Some of them have been designed by great designers such as Caslon, Baskerville, Goudy, Bodini. Their typeface family is known by their names. Due to the available font design and production technology at those times, they could produce only one typeface family as their lifetime achievement and as a mission of artistic endeavours. Such pioneering examples will always be remembered in the history of type designing.

In recent times companies like Linotype, Monotype, Itek, Compugraphics, Bitstream etc. have contributed towards redesigning of typefaces from hot metal era and making them available in photo typesetting as well as on digital text setting. IKARUS, Bitstream, created their own type designing environment based on an outlined letter shape approach, whereas Dr. D. Knuth of Stanford University introduced metafont concept of designing fonts, and LaTeX text creation environment of a generic nature.

We see around us in print media examples of such and similar typefonts using various surfaces. Newspapers, magazines, printed books are the live carriers of typefonts. New media through its digital technology; exhibits, displays and prints arrays of typefonts for specific communication objectives. Typefonts if appropriately chosen can reflect the theme and the mood of the contents in information design.

On the Indian scene, Institutes such as Nirmaysagar typefoundry, Saraswati press, Gujarati typefoundry, Aryabhushan Press, National Foundry, Mauj type foundry have contributed significantly towards the activities of type designing and type foundry. In recent times ITR, NCSDCT (TIFR), modular systems, C-DAC, have contributed and enriched digital designing of fonts and font technology. NCSDCT pioneered digital font designing activity through its software called PaLatino (1980) which was further consolidated by NCST through the font design package called Vinyas using skeletal approach (1985). The sample of fonts designed by the foundries/institutes are available through their catalogues and promotional material.

(Appendix : Images: A4-1.TIF, A4-2.TIF)

The following two examples reflect the typefont designing and font technology activity at O/S level.

1. Windows environment (Windows 2000 onwards) introduced Indian language capabilities through a series of fonts at O/S level. Mangal (Hindi), Latha(Tamil), Tunga (Kannada), Gautami (Telugu) are some of the fonts (designed by Prof. R. K. Joshi) that are available.

2. Under IndiX project at C-DAC, Mumbai (formerly NCST) series of Opentype fonts such as SaralHindi, SaralMarathi, SaralTamil, Saral Sanskrit etc. have been designed by Prof. R. K. Joshi and his team. This would facilitate IndiX text processing in the GNU Linux environment.
Structure - Part B (Historical Background)

B1 - Invention of Movable types and its effect on human civilization.

It is a well known fact that copper plates, litho stones and or wooden blocks with images of pictures or linguistic signs were used as reproduction tools in early days. The concept of using an individual letter of a script again and again, as an individual master tool, was initiated by Guttenberg in M einz, Germany in the mid 15th Century. This revolutionary concept to compose text was handled in a soft material like wood. After many experiments movable types in metal were introduced using hot metal technology. The original image of a letter had to be engraved on top of a steel punch. This engraving activity in actual size and shape of a letter on a hard steel was a laborious and painstaking, yet artistic achievement. This punch was to be struck into the side of a metal piece (called Matrix). Then hot metal was poured into such matrix moulds, resulting into individual type metal pieces. On the top face of such metallic rectangular pieces the impression of a letter would emerge as a mirror image. When such pieces were composed together in a linear fashion, smeared with ink, pressed and printed on paper, it was called letter press printing technology. From this brief description, one would conclude that it was indeed a long drawn and an individualistic approach to design and to produce a typefont in the early days of printing.

In spite of such pioneering and revolutionary efforts, printing was treated as black magic and learned people did not accept this process of reproducing a text as compared to a handwritten text or Calligraphed text. Yet the art of printing caught on and helped to spread the written words all around. It helped the society in general to get literate faster by reading ready made printed text. Economy and speed of this printed text were two crucial factors. It is now obvious that Guttenberg as well as printers, designers who followed him designed typefaces based on handwritten models, as if the text was handwritten and not printed. “Gothic” styled typefaces were the outcome. Fractur and Swachbacher, German text fonts would reflect the same spirit. When the typefaces were designed on the basis of “Gothic Calligraphy”, in England they were loosely called old English typefaces. The usage of such and similar typefaces still gives us the ambience and aura of the olden times.

B2 - The Indian Scene – PreNiranayasagar, Niranayasagar and Post Niranayasagar

The type design activity on Indian scene was also based on the handwritten styles (Calligraphy) from old manuscripts. Many European Scholars and Missionaries such as Dr. William Carey, Sir Charles Wilkins, Thomas Graham etc. had engaged themselves in creating typefaces and developing composing technology for Indian texts. This era was quite important and relevant for the spread of literacy in the Indian continent. Some attempts of type designing and printing are also observed in the European Countries (i.e. V & J Figgins London 1884 (Devanagari), Tamil type cut in Germany (1716), Schlegel’s Devanagari, Bonnae 1848, Devanagari typecast in Rome (1771)). Printing machine arrived in Goa in the mid 15th Century by accident. Indian font designing and text composing activity started on the Malabar coast, then Madras in early 18th Century, and established its strong identity at Serampore Press near Calcutta in the early 19th Century. Then it shifted to Bombay. Influenced by such activities, Indian printers such as Ganpat Krishnaji in Mumbai and others, followed the trend of type designing and text printing in Indian languages. This era can be described as the Pre Niranayasagar era.

The dedicated all round efforts to design typefaces was truly introduced by Niranayasagar typefont foundry in Bombay in early 19th Century. This all round activity included type designing, content creation in Sanskrit Language, casting typefaces, printing and publishing books in Sanskrit and other Indian Languages; was undertaken by a great pioneer by name Jaojee Dadajee. He established the Niranayasagar type foundry, Niranayasagar printing press and Niranayasagar publishing house. This great institution was a centre of a scholarly linguistic activities guided by Sanskrit Scholars and Shastris. The publications printed in Sanskrit by this
institution are still treated as the most authentic printed editions of the ancient text from India, all over the world. The Punchcutter by name Aaru, was at the helm of type design activity at the institute. The efforts of Jaojee Dadajee and Aaru have created an unparallel instance of a type family which comprises of different weights and variations, in early 19th Century. This Nirnayasagar era is a golden era in Indian Language fontdesigning and text printing using hot metal technology with international standards. Unfortunately very little documented archives of this activity are available apart from the type catalogues and the printed books.

Post Nirnayasagar era marks the emergence of many dedicated printers and publishers equipped with modern technology for type foundry and text printing. This printing and publishing activity spread all over India and contributed towards creating content in various fields of Art, Science and other disciplines. The exposure to western technologies made many of them adopt modern facilities to reproduce Indian Languages and scripts. Linear composition of text in the Latin script was the basis of the development of technologies for type designing and text composing/ printing in the West. This forced Indian printers and publishers to consider changes in Indian scripts, and thus script reform activity took roots in Indian soil. Many Indian engineers, linguists, politicians and enthusiasts have contributed their bit since 1884 till the end of 20th Century. Some of the script reforms were incorporated on mechanical machines in order to get faster reproduction of Indian text.

B3 - Type faces for mechanical composing - Typewriter, Monotype, Linotype

Typefaces for Indian Languages on manual typewriters were very limited in quantity and quality. Since the functioning of the qwerty keyboard was adopted for Indian scripts, input in linear composition had to be followed. Therefore, only 96 glyphs could be put on Indian manual typewriters. However, this quantity of glyphs was not adequate to create the exhaustive range of Indian syllables. The three tier structure of Indian script orthography also suffered in the process. In short, the output of manual typewriter was not satisfactory.

In the case of Linotype, a full line was composed at a time using pre-fabricated metal matrices. The composing speed of this mechanical typesetting machine was suitable for composing mass text for newspapers. Linotype mechanics was developed for linear single tier structure of Latin script. Therefore, the Indian language syllables with three tier structure had to be split vertically into two or three parts to compose a single syllable. The typefaces for Linotype were based on the styles of hot metal technology fonts and were mostly designed by western type designers such as Dr. Fiona Ross, (Bengali) et al. The technology used in Monotype demanded the set of glyphs in a matrix of 16 x 16 and facilitated the composing of individual letters at a faster speed than manual typewriters. In the case of Indian languages, this technology provided a good feature of kerning through overhanging. Therefore, the output of Monotype looked similar to the output from manual text composing. Monotype operated in two stages (input device machine of punched tapes and type casting machine) and was popular in the book publishing industry of the Indian Languages. Thus mechanical composing devices such as type writer, Monotype and Linotype catered to the needs of composing text in Indian Languages in an office environment, the newspaper industry and in book publishing respectively. The role of Indian type designers in these technologies was minimal and of collaborative nature.

B4 - Photocomposing (Predigital era) early digital era

Photocomposing was at an advanced stage of text composing in Latin script in the early 20th Century. In this technology photographic materials - such as negatives, sensitive papers; as well as photographic techniques of projecting and developing images in enlarged or reduced sizes; were used very effectively in the place of hard/hot metal technology. This development took place in the western world for a definite reason - economics. The investment of time, money and manpower was far too much to create a
typeface in hot metal technology, and the type industry was not sure whether newly introduced typefaces would be successful in the market or not. To avoid such heavy investment, a trial run of a font design created through a cheaper and more convenient way was needed. This was the reason for developing the photocomposing technology. Many font designs were easily introduced through this technology and in the process it was found that these techniques could also be effectively used for composing text. One by one, four generations of photo composing (Photo imaging, photooptics, photoscan, digital scan) came out in the western market, and were adopted for Indian Language text composing too. Photographically operated transformations from a master type design, was an attractive proposition of this technology. On the Indian scene this technology facilitated crisper images of types, creation of type families and most importantly, the positioning of vowel marks using the kerning (+/- offset) feature.

In the third and fourth generation of phototypesetting technology, scanning of images, and storing information of images was introduced as an initial ‘digital’ approach to letterforms and their compositions. Therefore this technology can be identified as a predigital era. Many western manufactured phototypesetting machines such as Photon/Lumitype, Compugraphics, Mono-Foto, Linotron etc. were adopted for Indian Language photocomposing. These proprietary technologies demanded following their own closed unit systems for designing types in Indian scripts.

(Appendix: Images: B4-1.TIF)

**B5 Different glyph sets designed under different technologies for Devanagari.**

**Hot Metal Technology**

1. Nirnayasagar Type (Akhand System) Including 115 Conjuncts With vedic sign combinations For Vedic Sanskrit 609 1000+
2. Sanskrit font set by V & J Figgins London 811
3. Degree System to compose text in 3 tiers, separately 155
4. Devanagari Manual Type Writer 44 to 46 keys 92
5. M onotype with Diacase of 17 x 15 255
6. Linotype Main keyboard: 90 +Side keyboard: 34 +H and sort tray: 10 + 134

**Photo Typesetting Technology**

1. M onotype Negative case 17 x 15 255
2. Linofilm With fount grid 18 font x 6pt sizes x 90 characters =7720 possibilities of letterforms 90
3. Photon (the lumitype) With matrix disc-8” dia 16 fonts x 12 lenses x 90 =17280 possibilities of letterforms 90

**Digital Technology**

7 bit overlay on ASCII characters 127
8 bit formats (PS and others) 255

**Unicode standard Opentype fonts**

SaralH indi 650
SaralM arathi 660
SaralSanskrit 921
SaralTamil 193
SaralTelugu 351
SaralKannada 555
SaralOriya 463
SaralBengali 621
SaralAssamese 621
SaralGurmukhi 313
SaralGujarati 739
SaralKannada 555
RaghuVaidika (with Vedic signs) 1172
Structure Part C (Digital Font Designing and Digital Font Technology)

C1 - Difference between digital and analog types - scope and challenges

The basic difference in digital types and analog types, is in their physical, internal structure. Analog typefaces would be either objects (in case of hot metal technology) or images (in case of phototypesetting technology). Digital fonts would primarily consist of information about the shape and the structure of a letterform. With such information, a typeface object and or a typeface image could be created as and when required and in different formats to suit a digital operating system, to compose text. Therefore the scope and challenges involved in creating, manipulating, storing and transferring of digital type fonts are manifold. A typographic design created by using analog types would always remain static, whereas a typographic design created by digital types would always be dynamic, everchanging, interactive and immersive.

C2 - Varying glyph sets for various formats/purpose

Visual glyphs are linguistic marks orthographed in a certain fashion. Such glyphs put together fabricate a structure of linguistic words. Linguistic words put together in a systematic way would create a meaningful sentence. A bunch of sentences planned in a proper sequence/order would create sensible text. For writing sensible text in a given script associated with a given language, one would need a set of glyphs which would be a basic repertoire of linguistic marks. Text for a highly specialized area or an ancient text, would need an adequate range of glyphs. The quantitative and qualitative requirement of a glyph set would defer as per the task to be achieved in a given language. For example - In an initial letter font, (Category 9B) number of glyphs to be designed will depend upon the frequency of syllables, at the start of words in a given language. In digital technology, the profile of a glyph set would vary as per the formats used for various textual tasks. For example: the glyph set identified to represent character codes in the Unicode standard for Devanagari script, would be less than the glyph set in a typefont designed in Devanagari. The Unicode chart shows 108 characters (Refer to Image: C4-2.TIF) whereas the Saral Hindi font (IndiX project) contains 650 glyphs (Refer to Image: C4-2.TIF). The linguistic glyphset required to compose text in Hindi language using extended Devanagari script is shown in Image: C2-1.TIF.

(C)oding standardization - regional, national, global and their effect on type designing and technology.

In hot metal technology the storage of text was a physical activity in terms of compositions of metal typefaces. In early photo typesetting era, the analog images of composed text were stored. In the digital era storage the information of typefont and composed text is of vital importance. This stored data can be revised, updated, modified, transmitted using various soft tools. In order to have authentic, in exchange of such data of a text document, the standardization of codes assigned to each element of the text is of paramount importance.

In the days of DTP, many private vendors developed and sold proprietary applications for text composing in Indian scripts. They had their own coding scheme and standards. Therefore various types of coding standards did exist, which made the exchange of data of text extremely difficult. At the National level, ISCII standard (parallel to ASCII standard) was introduced as The Indian Script Codes for Information Interchange in 1983, 1988,1991; as the Indian standard for storing information data. On the global scale, The Unicode introduced unique identity codes for writing systems/scripts from all over the world. This facilitated unambiguous information exchange globally, especially for network operations. Many Indian scripts have been allotted Unicodes as per version 3.0 and version 4.0. Indic text composition and storage of data in Unicode standards has created a new dimension in Indian script, font designing and font technology.

C4 - Planning and process of designing a digital font using different font formats and font generation technologies.

Planning a digital font in a Indian script is the first basic step. For this code standardization, format and the objective of the design is important. The look and feel of letters inbuilt unique stylistic elements,
appropriate features to enhance visual/aesthetic qualities are some of the primary considerations. The required quantity of glyphs are to be designed in their appropriate outlines, proportions and an appropriate lettering style in a digital font is to be created. The designed outlined shape is broken into pixels. The digital data is used for display on screen, transmission or print on paper. The following five steps were followed in designing the Saral series at C-DAC, Mumbai under the type font design directorship of Prof. R. K. Joshi.

Step 1 - Planning the lettering style of the typefont. Identifying and designing outlines of the glyphs as per the character codes of Unicode.

(Appendix: Image: C4-1.TIF)

Step 2 - Identifying and designing outlines of the total glyph set as per the linguistic and typographic requirement of a language/script.

(Appendix: Image: C4-2.TIF)

Step 3 - Writing adequate number of composition rules and tables to support the correct construction of syllables and text.

(Appendix: Image: C4-3.TIF)

Step 4 - Integrating the tables and the font into the operating system/application.

(Appendix: Image: C4-4.TIF)

Step 5 - Testing of the glyphs and linguistic syllables using the font, tables, input and output devices and O/S. Release of the font.

PROJECT INDEX 2
Glyphs set - Font documentation
8 levels Testing of an Indian Language Font in context to glyph set.

L1 - A glyphs set containing the requisite number of glyphs of vowels, vowel matras, vowel modifiers, consonants, consonant modifiers, numerals, punctuation marks and other required symbols/signs as per requirement of a given script/language.

(Appendix: Image: C4-5.TIF)

L2 - The glyphs set as in L1, but presented and arranged in the requisite code standard/s i.e. Unicode, ISCLI, ISFOC, INSF0C, VIVIDHA, Private and/or proprietary. (Refer to C4-1.TIF).

L3 - Typical vowels, vowel matras, vowel modifiers, typical consonants and their syllabic combination in a “Barakhadi” pattern of the consonants arranged as per phonetic classification in a given script for given language i.e.

Ka Khaa Gi Ghii Ngłu क ख ग घ न द L4 - Typical vowels, vowel matras, vowel modifiers, typical consonants and their syllabic combinations including syllables of frequently used conjuncts i.e. In Devanagari Script. (Refer to C5-1.TIF to C5-11.TIF for mono consonant syllables).

L5 - Typical vowels, extended vowels, vowel modifiers, extended vowel modifiers, consonants, extended consonants, consonant modifiers, extended consonant modifiers and their syllabic combinations including syllables of all possible conjuncts i.e. Extended Devanagari.

L6 - The glyphs set as in L7 + with all tonal marks as provided in, for the text in Vedic Sanskrit language.

(Appendix: Image: C4-6.TIF)

L7 - A set of most frequently used syllables from a given script for a given language and arranged in a linear way without any letter space in between syllables i.e. AHO length developed by Prof. R.K. Joshi in Devanagari Script for Hindi and Marathi languages.

(Appendix: Image: C4-7.TIF)

L8 - A typical standard test text in a given script for a given language. This test text for Indian languages will include samples of representative and frequently used syllables forming words and meaningful sentences. I.e. The brown fox jumped over a lazy dog - A standard test text used in Latin Script for English language. The “Aadhyatimika” test text designed and developed by Prof. R.K. Joshi in Devanagari Script for Hindi and Marathi languages.

(Appendix: Image: C4-8.TIF)

Eight level glyph sets for Indian Languages (AashTaStariya Bhashik ChinhaSanch)

C5 - Glyph set - parameters and testing of a digital font.

(Appendix: Image: C5-1.TIF to C5-11.TIF).
**Modules Plan: 12 Indian Languages**

Eka Vyanjan AksharMala

Monoconsonant syllables

Modules M1, M2, M3, M4, M5, M6, M7, M8, M9, M10, M11, M12, M13, M14, M15, M16.

**Module1 (M1):**

(34 consonants + 10 vowels)

The Module0 (M1) is applied to the following 11 languages:

HIN (Hindi), MAR (Marathi), SAN (Sanskrit), ASM (Assamese), BEN (Bengali), GUJ (Gujarati), PAN (Punjabi), ORI (Oriya), KAN (Kannada), MAL (Malayalam), TEL (Telugu).

**Consonants 34 (Vyanjan Vama):**

<table>
<thead>
<tr>
<th>Consonants</th>
<th>Vowel</th>
</tr>
</thead>
<tbody>
<tr>
<td>ka, kha, ga, gha, nga, ca, cha, jha, jha</td>
<td>a, i, u</td>
</tr>
<tr>
<td>t, tha, dha, r, da, ta, tha, dia, tha</td>
<td>a, i, u</td>
</tr>
</tbody>
</table>

**Consonant Phonemes 34 (Vyanjan Vama):**

<table>
<thead>
<tr>
<th>Consonant Phonemes</th>
<th>Vowel</th>
</tr>
</thead>
<tbody>
<tr>
<td>k, ǩ</td>
<td>a, i, u</td>
</tr>
<tr>
<td>ǩ + i = ǩ</td>
<td>a + ǩ</td>
</tr>
<tr>
<td>ǩ + i = ǩ</td>
<td>i + ǩ</td>
</tr>
<tr>
<td>ǩ + u = ǩ</td>
<td>u + ǩ</td>
</tr>
<tr>
<td>ǩ + u = ǩ</td>
<td>u + ǩ</td>
</tr>
</tbody>
</table>

**Vowels 10 (swaras):**

<table>
<thead>
<tr>
<th>Vowels</th>
</tr>
</thead>
<tbody>
<tr>
<td>a, i, u, e, ao, ai, au, eo, eo, ou</td>
</tr>
</tbody>
</table>

**Akharmala of consonants**

For example:

<table>
<thead>
<tr>
<th>Consonant Phonemes</th>
</tr>
</thead>
<tbody>
<tr>
<td>k, ǩ</td>
</tr>
<tr>
<td>ǩ + i = ǩ</td>
</tr>
<tr>
<td>ǩ + u = ǩ</td>
</tr>
</tbody>
</table>

Indian Language : Font Design
Multiconsonant syllables

Modules:

- Module 17.1 to M17.16
- Module 18.1 to M18.16
- Module 19.1 to M19.16
- Module 20.1 to M20.16
- Module 21.1 to M21.16

Multilingual conjunct syllable (i.e, K + Ka)

The Module 17.1 (M 17.1) to Module 17.16 (M 17.16) is applied to the following 12 languages:

HIN (Hindi), MAR (Marathi), SAN (Sanskrit), ASM (Assamese), BEN (Bengali), GUJ (Gujarati), PAN (Punjabi), ORI (Oriya), KAN (Kannada), MAL (Malayalam), TAM (Tamil), TEL (Telugu).

Multilingual conjunct syllable (i.e, K + Ra)

The Module 18.1 (M 18.1) to Module 18.16 (M 18.16) is applied to the following 12 languages:

HIN (Hindi), MAR (Marathi), SAN (Sanskrit), ASM (Assamese), BEN (Bengali), GUJ (Gujarati), PAN (Punjabi), ORI (Oriya), KAN (Kannada), MAL (Malayalam), TAM (Tamil), TEL (Telugu).

Multilingual conjunct syllable (i.e, R + Ka) Reph

The Module 19.1 (M 19.1) to Module 19.16 (M 19.16) is applied to the following 8 languages:

HIN (Hindi), MAR (Marathi), SAN (Sanskrit), ASM (Assamese), BEN (Bengali), GUJ (Gujarati), ORI (Oriya), KAN (Kannada).

Multilingual conjunct syllable (i.e, EyelashR + Ka)
Module 20.1 (M 20.1) to Module 20.16 (M 20.16) is applied to the following 2 languages:
- MAR (Marathi), SAN (Sanskrit).

Module 21.1 (M 21.1) to Module 21.16 (M 21.16)
Multilingual conjunct syllable (i.e., KSsa and/or JNya)
Module 21 (M 21) to Module 21.16 (M 21.16) is applied to the following 11 languages:
- HIN (Hindi), MAR (Marathi), SAN (Sanskrit), ASM (Assamese), BEN (Bengali), GUJ (Gujarati), ORI (Oriya), KAN (Kannada), MAL (Malayalam), TAM (Tamil), TEL (Telugu).

C6 - Digital fonts and the challenges of multilingual, multimodal and multilayered digital compugraphy as a part of knowledge and information exchange.

Visualization of Texta – the text “beyond”

Digital technology through efficient competing techniques has helped in creating and processing multilingual, multilevel textual and visual information as part of globalization activity. Yet, the text generation / creative writing activity is limited to writing text on visualized events / objects / experiences, the visualization activity is yet to be explored in the context of text itself either 2D, 3D or virtual. For this purpose there is a need to think about the linguistic signs as a potential vehicle beyond mere linguistic expressions. The computer vision activity could play a vital role in taking text beyond text.

The following 5 explorations are intended to be presented at the conference at the conceptual level.

1. **Texta 1: Kaala Paath**
The text on the selected themes related to dynamics, will be programmed for its structure to get changed every time in time. This will create the concept of ever changing text (visually) to be seen and experienced by the reader.

2. **Texta 2: Trimiti Paath**
Reading a non-linear text as a journey, with 3D letter objects as landmarks is expected to create a new type of semiotic experience.

3. **Texta 3: Paraa Paath**
There would be virtual Texta structure in which one enters and while having a digital walk, various layered information is exposed which can be interactive mode as events.

4. **Texta 4: Apaath**
The text and de-text has to be composed and decomposed programmatically as a phenomena observed in the nature. The event will involve creating a structure of words related to construction and deconstruction activity achieved through the assemblage of pixels into a text and then the text turning into a heap of pixels.

5. **Texta 5: Naad Paath**
The non-linear multi-layered and multi-dimensional text will be read by robo machine converting the same into appropriate sound tracks. The phonetic based linguistic sound can be entered with a graphic mark-up language. This graphic mark-up language will specify the higher level text capable of conversion from graphic mode to speech mode.

Letterforms need not exist as the lowest element of a chain in human communication, but could serve as an ‘organic’ element in the text, which changes its physical appearance in ‘time’.

On one hand it should be liberated from this age-old functional demand and be treated as mere objects of a new type which can be made- unmade, constructed - deconstructed as a part of public place environment.

And on the other hand one could be able to enter into such alphastructures and gain synaesthetic experience from such an inward journey.

Letterform designers and new technologists together should demand of each other such a new role and work towards fulfilling the new task ahead.
Not just generating and processing texts of a given length but go beyond.

as Texta 1 (with letters having their own dynamics)
as Texta 2 (letters changing form in time)
as Texta 3 (letters as objects)
as Texta 4 (letters as experience)

for this, the third eye, addressing the sixth sense and singing the 8th note; must be opened up.

References / Acknowledgements

4. The Unicode Standard
8. R. K. Joshi, position statement mode at the annual conference of Association Typographique Internationale (ATYP1), Reading University, UK (1997)

I gratefully acknowledge Jui Mhatre and Gracy Abreo of C-DAC Mumbai, for their help to put this article together.

Courtesy / Source:
Prof. R.K. Joshi
Visiting Design Specialist
C-DAC Mumbai (formerly NCST)
Typography Of Devanagari

A
Mātrā
Degree →  clearfix
letter →  kī One em
Three ems

B
Mātrā
Degree →  kū One em
Two ems
Three ems

C
Full body →  kī Four ems

D
Full body →  kū Four ems

Fig. 96: Degree and Akhand Type

Ukdr. Aumdr. on Letter with high space karnag
तर हो जो उत्कृष्ट का महाद्वीपवासी होणा-मा
श्रेय धरण सहायता कलाकृतिक गृहवनायः
उद्धार आज्ञा हृदरस्ते कर्मयाये आज्ञा मान्य के अर्थे
त्वावधादन मो आज्ञा अत्यंत अभारे आरे
सदर सुरक्षा निमये उद्धार सोमवार दिनांक अ मार्च १९८० रोजी
सकाते १०-०० वास्ता का संशयानाथालयाचा सर के.वे. अर्थे शरीर में
कुछ बात जाने आरे

शास्त्रीमती रायाचे

प्रथम पत्तीतील काव्य साहित्य निर्माण एवं वाक्यवृत्त आयाना
पंक्ती निर्देशनानि प्रायोजन रूपांतरण
अनुवादित कलाकृतिक गृहवनायः
उद्धार आज्ञा हृदरस्ते कर्मयाये आज्ञा मान्य के अर्थे
त्वावधादन मो आज्ञा अत्यंत अभारे आरे
सदर सुरक्षा निमये उद्धार सोमवार दिनांक अ मार्च १९८० रोजी
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कुछ बात जाने आरे

शास्त्रीमती रायाचे

प्रथम पत्तीतील काव्य साहित्य निर्माण एवं वाक्यवृत्त आयाना
Lumitype Matrix Disc

Image: B4-1.TIF
Numerals:
0 1 2 3 4 5 6 7 8 9
Zero One Two Three Four Five Six Seven Eight Nine

Vowels:
а आ इ ई उ ऊ र (Vocalic) ल
a aa i ii u uu r(Vocalic) l(Vocalic)
э (Candra) э(Short) а ai o(Candra) o(Short) o au

Vowel signs:
аа ii uu r(Vocalic) l(Vocalic)
е (Candra) э(Short) а ai o(Candra) o(Short) o au

Consonants:
क ख ग घ ङ
Ka Kha Ga Gha Nga
च छ
Chh Cha Chh
ट ठ
Tta Ttha Dha Dha
त थ द ध न
Ta Tha Da Dha Na
प फ भ म
Pha Pha Ba Bha Ma
य र ल ठ
Ya Ra La Lha Va
श ष
Sha Shha Shh

Some Conjunctions:
क श ज
Ka Sa Jja
क श ज ब
Ka Sa Ja Bha
क श ज द
Ka Sa Ja Da
क श ज न
Ka Sa Ja Na
क श ज
Ka Sa Ja

Image: C2-1.TIF
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<td>ढ</td>
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Some examples of Shaping

Matra Shaping

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<th>Shaped Glyph Cluster(s)</th>
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<tbody>
<tr>
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<tr>
<td>ओ</td>
<td>र</td>
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</tbody>
</table>

Vattu Shaping

<table>
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<th>Character Typed</th>
<th>Shaped Glyph Cluster(s)</th>
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</thead>
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<tr>
<td>क</td>
<td>क</td>
</tr>
<tr>
<td>ठ</td>
<td>क</td>
</tr>
</tbody>
</table>

Input: KA + Halant + KA + Uu + Anudatta

Rules worked out
क + ः + ख = क्र
ह + ि + ज + ः + द + फ = हिंदी
Aadyatmik text

SaralKannada

SaralMalayalam

SaralMarathi

Standard Sentences:
To test out the range and major syllabic combinations in Devanagari and other Indian Scripts, a standard line of text is designed. (parallel concept to the sentence - 'the quick brown fox jumped over the lazy dog' in English language.)

Image: C4 Font Stage-4.TIF
Level A : Ordinary Reading

त्यमू पु वाजिंयें देवजूतं सहोवांतं तर्कतां रस्थानाम॥
अर्िश्नेनि पूतनाजमाशु ज्वस्तये तािक्येमिहा हुक्मेम॥
RV. 10. 178.
- तािक्येमिहाम

Level B : Reading with High Stress and Low Stress

त्यमू पु वाजिंयें देवजूतं सहोवांतं तर्कतां रस्थानाम॥
अर्िश्नेनि पूतनाजमाशु ज्वस्तये तािक्येमिहा हुक्मेम॥
RV. 10. 178.
- तािक्येमिहाम

Level C : Speaking (Chanting) with full tonal variations

A part from "Naradiya Siqaa"
Bhandarkar Oriental Research Institute,
Poonia 411 004, INDIA

Image : C4-6.TIF
Aadhyatmik text

Hindi

आध्यात्मिक दृष्टि से पूर्वतः भारत आज धीमी प्रगति की विशा में आगे बढ़ रहा है। धीमीका आधारविधार, समाजविक, सामाजिक, सांस्कृतिक, शैक्षिक तथा आर्थिक विकास का पूर्वगान पूर्वतः भारत की प्रगति का दृष्टि किया जाता है। इसके बाद भी,

Standard Sentence:
To test out the range and major syllable combinations in Devanagari, a standard line of text is designed.

Image: C4-7.TIF

Image: C4-8.TIF
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<th>Vowel Sounds (Swara)</th>
<th>Consonants (Vyanjan)</th>
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<td>क, च, म, य, र, ल, भ</td>
</tr>
<tr>
<td>औ</td>
<td>क, च, म, य, र, ल, भ</td>
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**Aksharitamas of consonants**

<table>
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<tr>
<th>Consonants (Swara)</th>
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</tr>
<tr>
<td>औ</td>
<td>क, च, म, य, र, ल, भ</td>
</tr>
</tbody>
</table>

**Module 1 (M1):**

- (34 consonants + 10 vowels)

**Module 2 (M2):**

- (Consonants = 10 vowels + Anusvara & Candrabindu)

---

**Fig. C 5-1 Tiff.**

**Fig. C 5-2 Tiff.**
Fig. C 5-3 Tiff.

Fig. C 5-4 Tiff.
Indian Language: Font Design

Module 10 (M10)
(consonants = 14 vowels + Anusvara + Candrabindu + Visarga)

vowels 14 (swara)

Aksaras 94 (Vyanjan)

Aksharavali of consonants

Fig. C 5-7 Tiff.

Fig. C 5-8 Tiff.
Fig. C 5-9 Tiff.

Fig. C 5-10 Tiff.

Fig. C 5-11 Tiff.