


# Legibility: Sinhala typeface features for Directional Informative Sign Boards

## ABSTRACT

*Typefaces designed for the purpose of directional informative sign boards (DISB) communicate legible information related to drivers and passengers to navigate within road systems to: maintain road discipline and assist drivers to make instant decisions within a short period while operating a vehicle. The legibility of these typefaces works as a fundamental requirement. The reader's preference test (RPT) highlights that a typeface is unique due to its visual features—the anatomy of a typeface and it influences legibility performance, comprehension, memorability, priming, persuasion, perceptual fluency, and practical usage. This visual perception and the neurotic process of connecting human vision and brain is the intellectual cognition between; reader and information that acutely affects the reader to process information. When considering the amount of research work towards the advancement of DISB and typefaces designed for this purpose is at large within the western context, and more evident in Latin script but lacks in scripts such as Sinhala and Tamil within the Eastern regions. To fill this knowledge gap, the research contributes to Sinhala script discussed within the domain of typography research and proposes a draft typeface for Sri Lankan DISB. Considering legibility to be a required key factor in typefaces designed for the purpose of DISB the research methodology was structured into three stages. The **first stage** reviews legibility test methods, its measurements, testable factors usability and identifies the most relevant test to analyse typeface features. This section concludes by identifying RPT as the most relevant test with two variables: typeface personality traits and anatomy. **Second stage** adopts the two variables and tests six Sinhala typefaces that contain personality traits required for DISBs. It concludes with the identification of three typefaces that contain the required personality traits for DISB. The **third stage** analyses the anatomy of the three typefaces and proposes a draft Sinhala typeface for DISB. This stage redefines the two variables specific to Sinhala script and typography research. The stage concludes with a summary of the anatomical features of the proposed draft typeface and confirms a list of anatomical features required for Sri Lankan DISBs. The research also contributes to developing a methodology to analyse Sinhala typefaces, and draft new typefaces for specified communicative purposes. As for further research, the research the draft typeface to be developed and tested to font and to adapt to similar scripts and advanced typography research.*

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## Typefaces: communicative purpose and road informative signboards

Typefaces play a significant role in our everyday life. They are created as a contribution to express information. Typefaces and its related technical tactics are supported to improve the communication purpose in whichever format they are placed or displayed. Typefaces as individual typography systems or in context work to deliver meaning to messages with a tone of voice and feelings while influencing communication ideas and purposes.

Typefaces do not always remain static as designers constantly refine and revisit the governing system as it evolves. Creating type is a lengthy process involving numerous revisions to individual characters until it fulfils the purpose. The fonts *Georgia*, *Verdana* are designed to optimise reading on screens (Franken, Podlesek & Možina, 2014) while *Times* and *Arial* are designed for digital output and hard copy (Coronel-Beltrán & Álvarez-Borrego, 2010). Among thousands of Latin typefaces, *Helvetica* is identified as a font used for general purposes. Meanwhile, fonts that contain a visual character of script-style are usually used for the purpose of wedding invitations. It can be stated that specific visual characteristics convey strong messages and are well used for specific purposes such as *Stencil* for building or structures, *Black letter* for logos of technology-related companies, *Collegiate* for advertisements related to academic purposes, *Scotch Roman*, *Garamond*, *Antique* for body text and *Bodoni*, *Old Style*, *Caslon* and *Cheltenham* for design purposes (Webster & Tinker, 1943) etc. Moreover, some typefaces are designed and tested for specific purposes such *Highway Gothic* and *Clearview* for the purpose of directional informative sign boards (DISB). Either way, typefaces or fonts used to communicate ideas and purposes have a personality that is conveyed it's the visual features. The most successful typefaces are a fine balance of the aspirations and constrictions of their concepts with the compromises, idiosyncrasies, and practicalities of application and legibility (Willen & Strals, 2009).

Among many unique typefaces, typefaces used in DISB play an important role in a sustainable manner to maintain road safety. Latin typefaces such as *Highway Gothic*, *Clearview*, *DIN 1451*, *Gill-sans* are some of the used for directional information sign boards. They are applied in many countries: *Highway Gothic*; United States, Turkey, Malaysia, Brazil, Canada, Mexico, Australia, New Zealand, Italy, and Spain (Silva, 2014). *Clearview*; United States, Canada, Indonesia, and Sri Lanka. *DIN 1451* later replaced with *Gill-sans*, Germany. However, these typefaces designed for the purpose of DISB do not work in isolation as it is a composition of many elements; numerals, arrowheads, icon graphics and in some cases (other

script/s) typefaces etc. and the DISB itself has its own communicative purpose. The distance through numerals and direction through arrowheads and icon graphics are used to communicate road safety and effective information. These graphical elements together with the typeface/s communicate legible information related to drivers and passengers to navigate within road systems to: maintain road discipline, assist drivers to make instant decisions within a short period while operating a vehicle. Road signs are placed at access points to ensure the best viewing height for drivers and pedestrians (Ministry of highways and road development and road development authority, 2007), they are placed as attractive way findings signs to drivers within cluttered backgrounds. Usually, the placement is located on the opposite side of the driver's line of sight from the road (Calori & Vanden-Eynden, 2015). According to the environmental graphic design system, unique shape, form, and structure support identifying road signs. Further, factors such as brightness, resolution during daylight and night vision and weather conditions are also considered when designing DISB as it impacts legibility. Thus, legibility of these graphical elements, placement of road signs and typefaces work as a fundamental requirement. Yet, the scope of this research is forced to legibility and typefaces.

In the case of DISB typefaces, letter height, type or style of typeface, upper case, lower case and sentence case, line spacing and background colour etc. influence legibility on DISB (Calori & Vanden-Eynden, 2015). Within DISB, multiple-scripts are applied in bi-lingual and/or multilingual countries. At such instances the different typefaces representing different scripts, and its visual variation play a vital role. Countries such as Slovakia, Austria, Germany, Greece, Ireland discuss the complexity of a typeface, text size, text line-height and height ratio, and inner lines, script, and display layout (Eglin, Bres & Emptoz, 1998) when designing new typefaces for DISBs. Yet, this type of practice of designing a specific typeface for DISB is not very evident within non-Latin scripts. For example, Sri Lanka; a multilingual country, that uses three typefaces (Latin, Tamil, and Sinhala) in their DISBs only represents the use of *Highway Gothic* and *Clearview* for the Latin, while the other two typefaces that represent other two scripts are selections from a pool of existing typefaces designed for other purposes.

Context of Latin script: Latin typefaces and typeface series commonly used for DISB are: *Akzidenz Grotesk*, *Motorway*, *Transport heavy*, *Transport medium*, *DIN*, *Highway Gothic of the FHWA series*, *Clearview*, *Gill Sans*, *TERN series*, *Astrs Frutiger*, *S.N.V.*, *Old Soviet Standard GOST 10807-78*, *Caratères*, *Drogowskaz*, *Tratex* etc. In practice, the use of two typefaces is used in DISB of bi-lingual or multilingual countries. Significance of this application is that two or more Latin typefaces in a single DISB containing different typefaces in response to the readers and the communicative purpose. The use of the

Typefaces *Akzidenz Grotesk* and *DIN* used in countries such as Germany, The Czech Republic and Latvia is an example of it. Another aspect is that typefaces designed for the DISB are constantly being developed or modified with time. For example, the typeface *Transport* found in Portugal, Ireland, Iceland, Cyprus and Greece is modified as *Motorway* (Lund, 2003; Silva, 2014). Such applications and modifications are constantly being reviewed by researchers and type designers. These subtle visual variations entrapped in the anatomy of a typeface makes the typeface unique and subjective to the reader. The interlink between a typeface's visual features and its personality connote linguistic meaning conveyed by words in a reader's cognitive space. The emotional weight carried by the personality traits of a typeface improves the reader's experience of the text, this influences legibility.

Anatomical features explained in Figure 1 demonstrates *Akzidenz Grotesk* typeface used in Germany to have open and semi-enclosed counters and diagonally cut terminals of letters a, c, e and s. The lowercase 'i' and 'j' contain square dots (Lund, 2003). Similarly, the typeface *New Motorway* contains open, semi-enclosed counters with diagonally cut terminals in letters 'a', and obliquely cut terminals in letters 't' and 'y', yet the lowercase 'i' and 'j' are constructed as round dots. What's significant about the *New Motorway* typeface is its unique spacing system, which eliminates confusion between letters to increase legibility. On the other hand, the typeface *DIN* elaborates its anatomical features to have a narrow-rectangle form with vertical and horizontal terminals. Its uppercase letters have semi-enclosed counters cut at inconsistent angles. The counters are open, semi-enclosed and terminals of lower case letters a, c, e and s are obliquely cut. Its lowercase 'i' and 'j' contain square dots (Lund, 2003; Silva, 2014). The typeface *Transport* too is like typefaces *Akzidenz Grotesk* and *DIN*.

Within the practice of Latin script, it is evident that there are many discussions and literature on the significance of having a unique typeface for a specific purpose. Therefore, the conscious decisions taken during the typography research and the type-design process fulfils its communicative purpose.

Context of Sinhala script; There is no literature on Sinhala typefaces related to DISB within the context of Sinhala script or Sinhala typography. Thus, this research

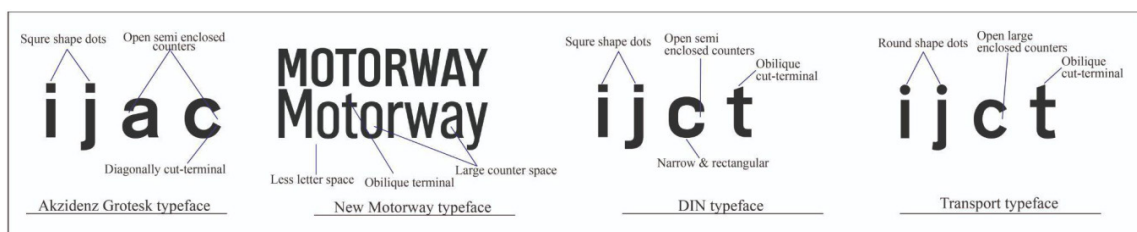
works as a pioneer. The construction of the Sinhala script is different in comparison to Latin script. Sinhala script has 60 letters (18 vowels and 42 consonants), the vowels are represented as individual letter forms and as vowel signs placed adjacent to consonants, the script included special characters, non-alphabetical signs and combined-consonants. According to the National Education Institute in Sri Lanka, 60 letters take 46 letter variations, 12 letters contain 46 basic letter forms without diacritics or consonants. Visually it is considered as a circular/ rounded script with minimum straight lines. Its anatomical features are placed within five reference lines, its base character height is specified with the letter 'pa' ප, terminology used to define the anatomical properties/features are biased to each letter shape. 46 letters are constructed from a total of 89 sub-features, distinct to each letter and are summarised into 19 visual features (Samarawickrama, 2016).

Sri Lanka adopted the current use of DISBs with the development of expressways around 2011. According to the Road Development Authority (RDA), the applied Sinhala typeface is *DL-Araliya* and Tamil is *Paranthan*. The adaptation of these two typefaces were based on a committee decision, selected from the then available Sinhala and Tamil fonts (Sudath, 2018). *DL-Araliya* was designed by A.M.D Lenarolle and observations on it claim that it was designed for the purpose of print media. On the other hand, typefaces *Highway Gothic* and *Clearview* that are used to represent English, were adopted considering their recognition as international standard typefaces developed for the purpose of DISBs.

When considering the amount of research work towards the advancement of DISB and typefaces designed for this purpose is at large within the Western context, and more evident in Latin script but lacks in scripts such as Sinhala and Tamil. To fill this knowledge gap, the research contributes to Sinhala script discussed within the domain of typography research. Considering legibility to be a required key factor in typefaces designed for the purpose of DISB the research methodology was structured into three stages.

### Stage 01

*Review of Reader Preference test method (RPT) among legibility test methods*



» **Figure 1:** Visual differences and similarities of three different Latin typefaces designed for DISB

Legibility is the scientific approach to recognise displayed objects within a very short time (Tinker & Paterson, 1929). It is about the ease of reading fast by recognising individual letterforms, structures and visual shapes (Beier, 2009). It acts as a function of type design and is measured through scientific methods of reading speed in normal reading context and different environmental conditions (Weingerl, Nedeljković & Pušnik, 2022, Chandra, Bokil & Kumar, 2017; Beier, 2009; Beier, 2012; Haley, 2009; Waller, 2011; Tracy, 1986, as cited by Chandler, 2001; Wijnholds, 1996, as cited by York, 2008; Weisenmiller, 1999). To proceed with the research; legibility and different methods used to test it are discussed here to learn on the most appropriate method to test *DL-Araliya*.

## Legibility test methods

Most typefaces vary in appearance and character; it has different levels of legibility (Brumburger, 2003; Mackiewicz, 2005; Shaikh, Chaparro & Fox, 2006). Therefore, the clarity of a single character within an aesthetically attractive typeface is a fundamental contributor to legibility. And, to measure legibility, factors related to the human eye and typography parameters related to reading documents are considered in Tinker and Patterson's four legibility test methods: The continuing reading method, The search task, The visual accuracy threshold, and The reader's preference test. These four methods introduced in the early 1900s by Tinker and Patterson—pioneer researchers on legibility are the most frequently used legibility test methods in current day research. These test methods and others; Daniel Starch test, Ovink test, Tachistoscope test etc. (Arditi & Cho, 2007; Beier, 2009) were reviewed here. These test methods constantly debate between the idea of legibility and readability. Most tests on readability are developed to test comprehension and measure reading ability, accuracy of eye vision and quality of typefaces. Similarly, legibility test methods are developed to test comprehension but measure the ability to recognise single letters within test material. Therefore, by reviewing each method, its measurements, methodology and the testable factors/usability, the research learns the most relevant methods to analyse a typeface's legibility.

Since this paper is a compilation of a completed master's research, only a summary of Tinker and Patterson legibility test methods are reviewed here: (1) The Continuous reading test method; measures reading speed and comprehension while noting the number of errors by measuring reading time. It tests knowledge based on comprehension. (2) The search task test examines spelling errors in words or specific words on typography materials. This method is related to the scanning process rather than the actual reading. The method is not considered for real-life reading situations. (3) The visual accuracy threshold measures letters or word identification rate in a context. The test is based on a vision test, usually

conducted in laboratories to identify the ability to recognise words. This test method includes Colour tests, Short exposure and distance study. (4) The reader's preference test is based on attitude toward a unique typeface. It measures the aesthetic knowledge of a typeface; its personality. It is based on readers' preference on a typeface and observes unique visual features; the anatomy of the typeface (Pušnik et al., 2019; Schriver, 2013; Beier, 2009; Beier, 2012; Carter, Day & Meggs, 2007; Ardit & Cho, 2007; Reynold, 2007 as cited by Beier, 2009; Sheedy et al., 2005; Legge et al., 1989; Levitt, 1971 as cited by Ardit & Cho, 2007). Learnings on the objective of each of these test methods, measurements etc. it is evident that only the latter test method was focused on typefaces and demonstrated possible adaptation to DISBs.

**The readers preference test (RPT):** highlights that a typeface becomes unique due to its visual features—the anatomy of a typeface. And it is the anatomy that influences legibility performance, comprehension, memorability, priming, persuasion, perceptual fluency, and practical usage (Jordan et al., 2017). Further, RPT considers this influence with visual perception; neurotic process of connecting human vision and brain. The intellectual cognition between; writer, reader, and information acutely affect the reader to identify the most suitable typeface for the specific communicative purpose. This is because a typeface carries the emotional weight of a text and creates the tone of a message while improving the reader's experience of the text (Saltz, 2009). The emotional weight or the semantic qualities are portrayed through typeface personality traits: strength, elegance, friendliness, romance and humour, potency (strong/weak), evaluation (clean/dirty), elegance, novelty and antiquity, evaluation, mood and activity (Brumburger, 2003b) cheapness, dignity, economy, luxury, strength, refinement and precision (Spencer, 1969 as cited by Brumburger, 2003b; Wendth, 1968 as cited by Brumburger, 2003b), confident, elegant, casual, bold, romantic, friendly nostalgic, modern, delicate, sassy (Susan & Wright, 1989 as cited by Jordan et al., 2017) etc.

Information is communicated through the linguistic-meaning of words and different tones of voice. The same information can be communicated more effectively through different tones of typefaces captured in a typeface's personality. This typeface application connotes the meaning over and above the primary meaning, and type personality connotes meaning over and above the primary meaning of words (Lewis et al., 1989 as cited by Shaikh, Chaparro & Fox, 2006). Therefore, the interlink between anatomy and the semantic quality of a typeface determines the reader's preference when perceiving information. The different tones and connoted meaning of typefaces are analysed by type-designers, researchers via observations of a typeface's micro aesthetic details (Kunz, 2000 as cited by Mackiewicz, 2005). These details are considered as letter parts that

make up a character which contains a unique quality that expresses opinions, valuations, and judgments (Mackiewicz, 2005). It distinguishes one typeface from another creating contrast between letters which influence legibility of typefaces (Carter, Day & Meggs, 2007).

RPTs conduct experiments to identify the interrelationship of typeface personality and typeface features of different typefaces as the reader's preference is a subjective measurement and it is based on the objective of nature. In practice, information on readers' preferences of a typeface is collected through questionnaire surveys (Weisenmiller, 1999). These personal preferences are denoted with two adjectives on either side of a Likert scale. Sample groups are expected to score their preference by observing stimuli containing sample text or specifics. By calculating the results confirms the personality traits of a typeface or a font. These findings of a typeface's personality traits leads researchers to identify appropriate typeface for appropriate communicative purpose. The use of RPT is applied to learn the preference on point size of typeface (Shaikh, Chaparro & Fox, 2003), styles of typeface, printing quality, paper quality, paper surface, leading, type size, line width, lowercase versus italics, simultaneous variation of line width and typeface size, space and lines between columns, regularity of alignment versus indentation of alternate lines at left and right end and simultaneous variation of type size (Tinker & Paterson, 1942). RPT is also tested to learn the preference on leading between displayed typefaces and body text used in billboards, advertisements, business letters, instruction manuals, newspapers, greeting cards, websites, and computer manuals (Mackiewicz, 2005) etc.

RPT as a legibility test method highlights the significance of a typeface. Its variables are typeface and their personality traits. The test is used to identify a reader's preference of a typeface used for a specific purpose. The preference is tested on the required personality traits a typeface has for the specified purpose. In this case, the purpose is a legible typeface for the purpose of DISBs. A typeface's personality traits are entrapped in its anatomical features, and it is what impacts the type personality which enhances the legibility performance. This section concludes with this understanding and applies RPT for Sinhala typefaces in the next.

## **Stage 02**

### *Reader preference test: Personality traits for DISB and Sinhala typefaces*

To identify Sinhala typeface personality traits for DISB, the section starts by listing out the personality traits required for DISB via literature. This knowledge is then tested on Sinhala typefaces. The selected Sinhala typefaces are based on the existing pool of typefaces available in Sri Lanka and the visual features of *DL-Araliya*:

*ya*: the typeface used in current DISB's of Sri Lanka. The objective of this section is: to learn if *DL-Araliya* has the personality required for DISB. To achieve this (a) Discusses personality traits required for DISB and builds the pairs of adjectives for the stimuli. (b) Explains the selection of the sample typefaces, composition of the stimuli and testing. (c) Analyses the responses and concludes the learnings of this stage.

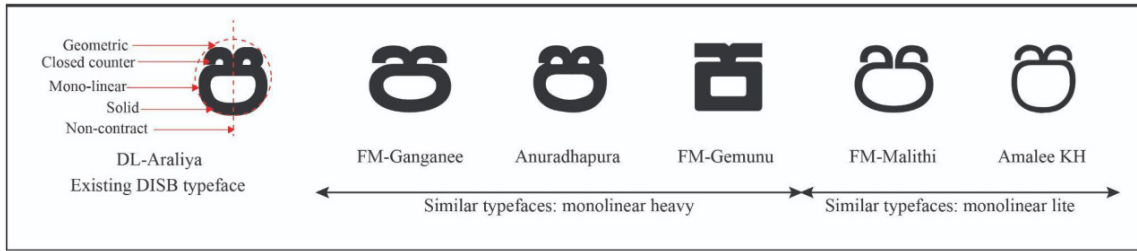
### **(a) Identifying Sinhala typeface personality traits for DISB and testing**

Typeface personality traits for directional informative sign boards discussed in literature are traditional, professional, practical and a classic (Hyndman, 2016), short, fat/solid, simple and fast readable (Smiley, 1978) unique, individual personality, taste, traditional, relevant, fashionable and heavy (Lund, 2003) etc. to build the adjective pairs for the test each of these pairs were reviewed and eight pairs of adjectives were listed for the test: Slow readable-fast readable, common-unique, grouped-individual, short-tall, light-bold, unfashionable-fashionable, classic-modern, fragile-solid. These pairs are placed in the stimuli demonstrated in Figure 3.

The first pair was decided to learn on how fast a typeface can be read as reading influences the driver while manoeuvring a vehicle. Second pair; highlights the importance of portraying the typeface to be unique for the purpose of DISB, as it cannot be mis-read with an advert or other communication media. Third pair; interprets the requirement of the need of more space between letters rather than it being visualised as a group of text which influences legibility, similarly fourth pair discusses the large counter space entrapped in taller letters (larger Pa-height) in comparison to short letters. Fifth pair; focuses on the stroke width to be heavy. Sixth pair; elaborates on the elegance of the stroke to be fashionable. Seventh pair; speaks of the requirement of a modern typeface rather than a typical classic typeface and eighth pair discusses the solidness of the stroke. In summary based on literature eight pairs of personality traits were identified for the test and to compose the stimulus.

### **(b) Selection of Sinhala sample typefaces, composition of the stimuli and testing**

The selection of the sample Sinhala typefaces was based on the anatomical features of *DL-Araliya*: the typeface used in current DISB's of Sri Lanka. As illustrated in Figure 2, it is a monolinear, heavy stroked, non-contrast typeface with a very high grey value. Considering these basic anatomical features: tool, hand, flesh and grey value of Sinhala typefaces were selected. Due to the limited number of Sinhala typefaces available in Sri Lanka, three typefaces; *FM-Ganganee*, *Anuradhapura*, *FM-Gemunu* were included in the test, and due to the limit of heavy Sinhala typefaces, *FM-Malithi* and *Amalee*



» **Figure 2:** Selected sample typefaces for RPT

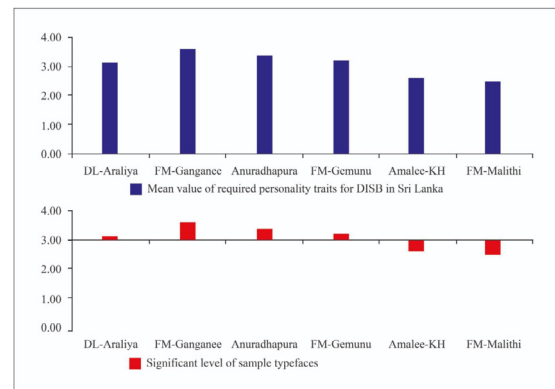
were included based on the mono-linearity. In summary five Sinhala typefaces mentioned above and *DL-Araliya* conclude the selection of six typefaces for the testing.

**Stimuli:** Having selected the sample typefaces the stimuli were composed as seen in Figure 3. The composition included a name of an (unfamiliar) city in white on black at the top, Likert scale at the centre and the adjective pairs representing the required personality traits on either side. This was then shared in a classroom setting, with a sample group of 60 design graduates who are familiar with Sinhala typeface features and the research objective. With the necessary instruction on the task, their preference was marked. The adequacy of respondents was confirmed using the SPSS software (Statistical Package for Social Sciences, version 20) and the non-probability judgmental sample was considered 'approximately acceptable'. Using Microsoft Excel, the mean value was analysed; if the mean value was greater or equal to 3 ( $\geq 3$ ), it was considered as the typeface with the 'most' personality traits for DISB, and if less than 3 ( $< 3$ ), it was considered as the 'least'.

**(c) Analyses the responses**

Six stimuli representing the six typefaces were distributed among each member of the sample group for testing. The data was collected and statistically analysed as demonstrated in Figure 4. The results showed that; *FM-Ganganee*, *Anuradhapura*, and *FM-Gemunu* had the most significant personality traits for DISB. However, *DL-Araliya* was ranked fourth (with a mean value of 3.13), and *FM-Ganganee* scored 3.62. The results

confirmed three Sinhala typefaces have the required personality traits for DISB and the currently used typeface for DISB in Sri Lanka *DL-Araliya* does not.



» **Figure 4:** Mean value and significant level of sample typefaces

To identify Sinhala typeface personality traits for DISB this section questioned if the typeface *DL-Araliya* has the personality required for DISB and it was tested using the RPT. The results proved that *DL-Araliya* does not have the required personality for DISB as it scored a lower mean value. Yet, the overall result of this stage proved that another three typefaces have the personality required for DISB as they scored a higher mean value. The three typefaces are *FM-Ganganee*, *Anuradhapura*, and *FM-Gemunu*. Therefore, to explore the requirement for Sri Lankan DISBs the three typefaces need to be visually analysed.

» **Figure 3:** Sample Stimuli for RPT

**Stage 03**

*Visual analysis and proposed anatomical features for a Sinhala typeface for DISB*

To identify the Sinhala anatomical features for DISB, this section applies the knowledge gained from the previous stage and proposes the required. To achieve this (a) Re-defines the variables for analysis as the anatomical features of Latin differs from Sinhala. (b) Visual analysis and drafting of a Sinhala typeface for DISB. The drafting process reconfirms the objective of this section by applying the gained knowledge: to learn the Sinhala anatomical features for DISB. (b) is conducted in three steps to achieve the objective outcomes.

**(a) Re-defining the variables for analysis**

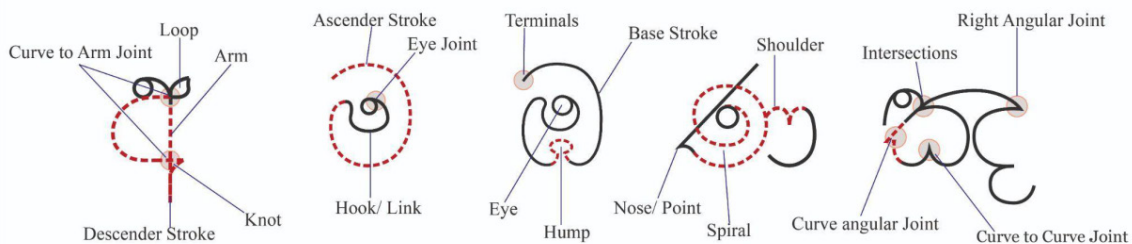
The anatomy of a typeface is built on the reference lines, the base character height (x-height for Latin and pa-height for Sinhala) and the anatomical features. In comparison to Latin the Sinhala script is visually complex. The anatomy of the Sinhala script contains 19 visual features that includes 89 sub features (Samarawickrama, 2016) and the Sinhala alphabet has 60 letters. To identify anatomical features, this section explains the variables: sample number of letters (table 01) that captures the anatomical features and the three selected typefaces.

**Table 1**

Selected sample letters for visual analysis

Typeface	Sample 26 letters; represent 89 visual features of Sinhala script
FM-Ganganee	ප ම ධ ණ ව ය ළ න ක ධ ර ඉ අ pa ma nda na bu ya gha na ka ta ra la a
	ද ජ ච ඹ උ ග ශ ල ව ඩ ඒ ක ස da ja cha bha u ga sha la va d pha ha sa

**Independent variable: anatomical features of Sinhala typeface**, the 19 visual features demonstrated in Figure 5, contains 89 sub features. These sub-features are categorised under 46 Sinhala letters (Annex 01). Yet the research observes only 26 letters as a single letter demonstrates multiple features. Therefore, a sample number of 26 Sinhala letters that captures 89 sub features were selected.



» **Figure 5:** 19 visual features in Sinhala script

**Dependent variable: sample Sinhala typeface**, the result in stage 02, identified three Sinhala typefaces that had the highest mean value proving the required personality traits for DISB. Therefore, the research selected FM-Ganganee, Anuradhapura, and FM-Gemunu as the sample Sinhala typefaces.

**(b) Visual analysis and drafting a typeface for DISB**

The visual analysis and the application of knowledge towards drafting a typeface was conducted simultaneously within three steps:

**Step 01- Observation of the tool, hand, flesh, and grey value**

This step observes the tool, hand flesh and the grey value of the typeface and concludes with an overall understanding of all the three typefaces and proposes the basic visual qualities when drafting Figure 6.

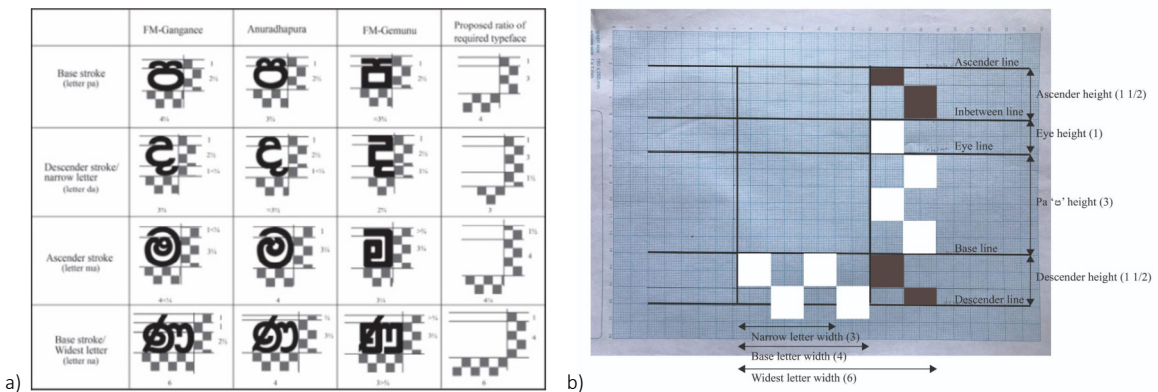
**Tool:** the tool is what speaks the loudest in a typeface as it determines the stroke thickness, weight, and the terminals. In the case of the three typefaces, the tool can be defined as a mono-liner pen as the strokes are constructed with the same weight. This also determines the proposing draft to be a non-contrast typeface.

**Hand:** the hand is determined by the tool and its movement. It was observed that *FM-Ganganee*, *Anuradhapura*, and *FM-Gemunu* have a combination of a rationalist and a geometric hand. The first two typefaces take a more circular nature, while the latter takes a square shape. Therefore, the proposed hand for the draft typeface should contain a composition of both.

**Flesh and grey value:** the flesh of a typeface is identified by the boundaries of the stroke. In this case the flesh of all three typefaces has a solid flesh: resulting a high grey value. Therefore, this is proposed for the draft. In summary the proposing draft typeface should be a non-contrast typeface with a combination of a geometric and a rationalist hand. It should have a high grey value with a solid flesh.

Visual properties	19 Anatomic features				
<b>FM-Ganganee</b> Rationalist Open counter Mono-linear Solid Non-contract					
<b>Anuradhapura</b> Rationalist Closed counter Mono-linear Solid Non-contract					
<b>FM-Gemunu</b> Geometric Open counter Mono-linear Solid Non-contract					

» **Figure 6:** 19 visual features of FM-Ganganee, Anuradhapura and FM-Gemunu



» **Figure 7:** a) Measurement of selected 3 typefaces with the proposed proportions b) reference lines

### Step 02- Determining the proportions

This step analyses the proportions of the typefaces which is determined by the reference lines, the base character height and the width of the widest and the narrowest.

Proportions: to determine the proportions, four letters illustrated in Figure 7 were selected to represent the: base character, ascender, descender, widest and the narrowest letters among the sample 26 Sinhala letters. The analysis was conducted by placing the sample typefaces on the 5 (existing) reference lines to calculate the proportions with a common measurement 'x'. The common measurement (x) is the size of the eye of the letter pa, it is found between the eyeline and the in-between line. The analysis was conducted by calculating the three sample typefaces and arriving at a mean-proportion.

Therefore, the proportions for the proposing draft typeface should have: the base character letter to be equal in height and width 4x by 4x, the ascender height to be 1.5x above the in-between line and the descender

to be 1.5x below the baseline. The proposed mean for the widest is 6x and narrowest to be 3x. Using the eye height (x) as the common measurement, the width of the stroke thickness should be ¾. be ¼x less.

### Step 03- Analysing and applying anatomical features

This stage analyses the three typefaces across the sample 26 letters. Figure 6 demonstrates the 19 visual features (that captures the 89 sub features) of the sample typefaces. During this analysis process it was evident that the visual variation among each typeface was very high. Therefore, the research observed the ideal letter features explained with three visual features: hook, spiral terminal in the first column of Figure 8, followed by the sample typefaces. To achieve the full potential each letter was drafted to capture the mean visual qualities and drafted. The visual drafting process observed the ideal letter features, the application of it in the sample typefaces and proposed the anatomical features and a letter (Figure 8). The drafting process was done by manually tracing sample letters, placing it on a graph sheet



and manually drafting multiple times revising steps O1 and O2. It was after a rigorous development process; a draft was confirmed (found in Figure 8 last column). Using this process 26 Sinhala letters that capture all 89 sub visual properties of Sinhala were drafted.

- application of the visual feature 'omitted eye'
- open counters and semi-open counters
- extended length of the curve-to-curve joint

## Discussion and Conclusion

In conclusion, the Sinhala anatomical features required for DISB can be listed as below, and the summary is illustrated in Figure 9:

### step O1:

- monoline, non-contrast typeface,
- combination of a rationalist and a geometric hand,
- solid flesh with a high grey value

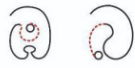














### step O2:

- the base character to be equal in height and width.
- large base height with equal ascender and descender height
- six reference lines (5 already existing and 1 additional to accommodate ascender strokes)

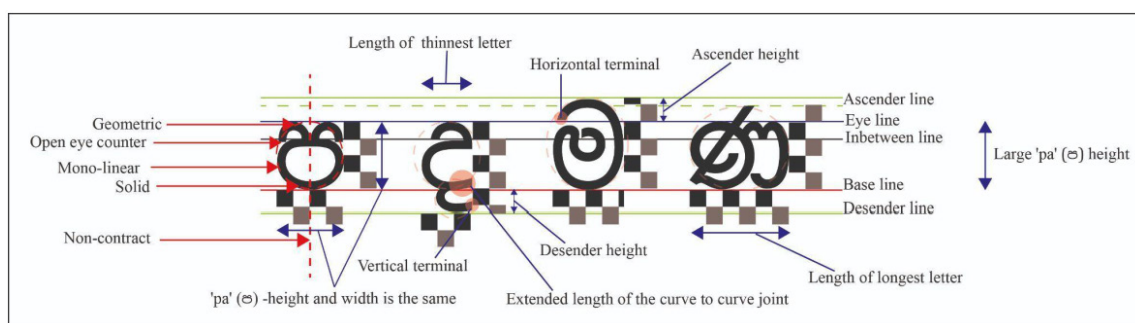
### step O3:

- Terminals to be either horizontal or vertical with no diagonal or rounds.

The research discussed the significance of the role of typefaces in general and specified to DISB. It highlighted legibility as a fundamental requirement and discussed the large amount of research and development within the context of Latin typefaces but lacks in scripts such as Sinhala and Tamil used in (multilingual) Sri Lanka. To fill this knowledge gap, the research contributes to Sinhala script discussed within the domain of typography research. The research justified and applied RPT by defining its variables: the personality traits and anatomical features for Sinhala. To arrive at the overall aim of describing: what typography knowledge you required to design a legible Sinhala typeface for DISB, the research looked to two objectives: to learn if DL-Araliya (existing DISB typeface) has the personality required for DISB and to learn the Sinhala anatomical features for DISB. The findings on the first objective concluded that DL-Araliya does not have the required personality traits for DISB,

Distinct visual feature in ideal letter	FM-Ganganece	Anuradhapura	FM-Gemunu	Proposed visual features of required typeface
 <p>Hook</p>	 <p>Hook links with omitted iris eye    Hook links with iris eye</p>	 <p>Hook links with omitted iris eye    Hook links with iris eye</p>	 <p>Hook links with omitted iris eye</p>	 <p>Hook links with omitted iris eye    Hook links with iris eye</p>
 <p>Spiral</p>	 <p>Spiral stroke connected to omitted iris eye</p>	 <p>Spiral stroke connected to omitted iris eye</p>	 <p>Spiral stroke connected to omitted iris eye</p>	 <p>Spiral stroke connected to omitted iris eye</p>
 <p>Terminal</p>				

» **Figure 8:** Visual analysis selected distinct visual features: Hook, Spiral and Terminal



» **Figure 9:** Basic letterform structure with visual properties of the required typeface for DISB in Sri Lanka



» **Figure 10:** Existing DISB (with existing Tamil and Latin typefaces) with a proposed Sinhala typeface

but three other Sinhala typefaces did. Therefore, to achieve the second objective the research visually analyses the typefaces and applies the gained knowledge in inquiring the anatomical features required for DISB. In conclusion the overall research presents a list of anatomical features required for Sri Lankan DISBs and the methodology to analyse typefaces, and draft new typefaces for specified communicative purposes. The research also proposes the possibility of adapting the methodology to similar scripts and advanced typography research. or further research, the research proposes the draft typeface to be developed and tested to a font.

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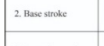

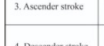


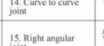



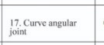





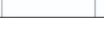
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**Annex 01 - Division of 89 sub-features within 19 visual features demonstrated with 46 Sinhala letters**

Distinct visual properties of the Sinhala script	Number of variables of distinct visual properties with sample letters	Distinct visual properties of the Sinhala script	Number of variables of distinct visual properties with sample letters
1. Eye		11. Shoulder	
2. Base stroke		12. Loop	
3. Ascender stroke		13. Eye joint	
4. Descender stroke		14. Curve to curve joint	
5. Knot		15. Right angular joint	
6. Hook		16. Curve to arm joint	
7. Nodul point		17. Curve angular joint	
8. Hump		18. Intersection	
9. Arm		19. Terminal	
10. Spiral	