



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student : Subhajit Chandra

Roll Number : 136105001

Programme of Study : Ph.D.

Thesis Title: Legibility of Bengali Typeface: The role of letterform anatomy in type Design

Name of Thesis Supervisor(s) : Dr. D. Udaya Kumar

Thesis Submitted to the Department/ Center : Department of Design

Date of completion of Thesis Viva-Voce Exam : 24/07/2019

Key words for description of Thesis Work : Anatomy, Bengali, Legibility, Typeface

SHORT ABSTRACT

India is a multilingual country with various scripts. Bengali is one of them. The anatomy of Indic scripts including Bengali has rarely been discussed and are not adequately defined. There is a lacuna of substantial work in typeface anatomy of Bengali script. Similarly, there is hardly any literature on legibility of Bengali typeface. One of the major issues with reading is legibility. Legibility is the perception of letter (of a typeface) with adequate distinctiveness in letterform. Letters are crucial for reading since it constructs the meaning of any given word. To achieve the research objective, we set to determine the anatomy of Bengali typeface and important anatomical features that are essential for letter recognition. The aim of the study is to find the role of anatomical features in typeface legibility. The methodology adopted for the study is ‘Design Research Method or DRM’ proposed by Blessing and Chakrabarti in 2009.

The typeface anatomy of Bengali was prepared based on Semiotics that comprised two stages of analysis: Syntactic and Semantic. The structural formation of a typeface was investigated in the Syntactic analysis. To create logical parts out of that structure, a normalised approach has been introduced that broke down all the complex features to a single unit. The data from syntactic analysis were considered in the semantic study for meaning-making. The semantic study was carried out in two phases, Syntagmatic and Paradigmatic analysis. The syntagmatic analysis was used to determine the letter-parts with nomenclature. By repeated measures, similar letter units were grouped accordingly and were coded with identity. The study proposes seventeen distinct anatomy of Bengali letters after analysing vowels and consonants. The paradigmatic analysis is a comparative study that carried out here to validate the anatomy

with four typefaces. The proposed anatomy can be further used in OCR systems for identification of letters. A categorization of letters was also prepared based on common character and common structure of letters.

Legibility is the measure of reading performance in correlation with visual variables. For successful reading, a letter should have the quality of being perceived, recognised and be identified correctly by any means. An eye-tracking study was conducted to establish the role of anatomical features in letter identification. Ten blocks of three to four different letters (letter height 4cm) were presented in low contrast condition. They appeared one by one at mid position from left to right at equal distance with a time gap of five seconds. Participants were asked to read aloud quickly and accurately as they appeared on the screen. The data from participants revealed that a specific feature or combination of features is repeatedly detected in most of the cases. A letter was identified by explicit anatomical feature or in combination of more than one feature.

The second experiment was conducted to determine the anatomical features that are essential for the letter identification. To reveal the anatomical features, a 'short exposure' test was carried out using 'Bubble' as mask on letters to reveal the features. A total number of one thousand four hundred and ten masked letters were exposed in front of participants for a short span of time. The analysis of data revealed fifty-nine important features that were essential for Bengali letter recognition. Among them, thirty-four features were significant in recognition process.

A critical analysis of individual letters was conducted considering eye-tracking and short exposure data. The analysis extrapolates the role of anatomical features in letter identification. The combination of anatomical features was explicit and made letter unique by design. The combination of features triggered the recognition process that led to successful identification of letters. Based on the data, a list of essential letter features was prepared for design. The study proposes a design guideline for type designers considering the role of anatomical features in letter identification process.