Investigation of the most preferred Bilingual Combination of Words: An Experiment with a selected Place Identification Signboard

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Abstract

Bilingualism, a combination of two languages provides two different forms of same meaning for a word. This phenomenon, though a global trend to display information on signboards, has varied forms in different places of India. In such diversity, preferences would vary to a high degree. This variation created interest to investigate the preferences and respective preference criterion of people for bilingual combinations of the word. The objective of the study was to find the most preferred bilingual combination of selected words. Standard typography legibility tests were conducted with five selected English typefaces (based on the British Typographic standard for classification - BS 2961:1967), each arranged separately on the selected size. Similarly, five Hindi typefaces were separately tested out for legibility rating .

The results were further combined together to create maximum number of bilingual combinations in a way that every English typeface combined with every Hindi typeface. This created diversity in combinations. The final stimulus was presented in form of nine bilingual combinations, put together on two selected exterior walls. The pattern of arrangement for the nine combinations was different in both the spaces. All the tests were conducted from 20, 40 and 60 feet viewing distances.

The data collected was then categorized as collection of observations, which were further classified into matrix of results under categories – Letters, Words, Combinations, Qualities and Grid. The results of the study highlight maximum preference for the bilingual combination of DV-Yogesh and Helvetica Bold. . The two important findings were that legibility was affected not only by the design of the individual letterforms, but also by the way they are integrated to each other. The preference test for combinations record that from the maximum distance of 60 feet people concentrated on words more than letters. Another important finding indicated that majority of the people read english words first and then hindi words.

Introduction

Bilingualism (the term with its legitimate roots in linguistics) is a simple representation of two or more languages on a panel. Such bilinguals are mostly used for information signs outside buildings, traffic signs, warning signs, commercial signs. They are placed in places with a legally controlled bilingualism (in bilingual regions or national borders). Bilingualism aims to accommodate equally the discourse of existing populations in a space.

This phenomenon, though a global trend to display information appears on signboards and many other information providing interfaces. It is a matter of dual existence of a language. Hence, the use of typography becomes even more critical as it is the visual form given to a language. India's official language being hindi was approved by Article 343 of our constitution that specifies Hindi in devanagri script as the official language of the Union. There have been research studies in form of issues related to devanagri script in print, invention of new devanagri typefaces for print and electronic use or some studies also explore classification of currently used devanagri typefaces, in order to understand the distinction between different typefaces from Indian point of view[3].

However, there has been no probe so far as to gather issues regarding the typographic configuration of devanagri typefaces used bilingually with english on Indian signboards. One could say that there are issues since people have a general view about not noticing signboards, or panels using texts with readability issue (specially in case of hindi letterforms). But, these hindi letters are combined with english and other local languages in order to overcome language comprehension by people of different cultures in a heterogeneous culture of India.

The curiosity to understand the bilingual dynamics between the two languages on a sign panel arose from the above mentioned arguments.

Method

The statement of inquiry for this experiment was to find the most preferred bilingual combination (of hindi and english together) for a selected information sign. The tests were divided into 2 parts explained below.

Pilot study

Initial pilot study was conducted using an existing identification sign inside IIT-B. A questionaire was developed to conduct the initial pilot test. The study was conducted between (9:00a.m. to 11:00 a.m. duration of the day). The respondent answers were audio recorded. The mini-study gave insights to remove the question(s) leading to non-response. The viewing distance of 60, 40 and 20 feet were pre-decided and finalized for later experiments. The text (STAFF CLUB) of the selected signage was used as a reference text to create sample designs for final tests.

Initial Questionnaire format:

Q.1. Rate the written text at : 60 40 20 (in feet)

- Perfectly Legible
- Legible
- 50-50
- Barely legible
- Illegible

Q.2. What do you see first, english or hindi text ?

Q.3. What languages can you easily read ?

Q.4. What problems do you find with signboards in general ?

Emerging points: Subjects found the variations of sign typography in this signage misleading. There were confusions regarding what was seen first (hindi or english text). The text constantly fluctuates (especially at 60 feet) due to presence of two bilingual hierarchies. Also, the reverse type has its specific legibility and visibility issues. The dark background dissolves the letters by edges that appear as visually constricting letterforms of the text. Taking into account all these points, the design elements to be included for the stimulus for the final tests were crafted.

Hence, further experiment design included following features:

a) Use of black text on white background to achieve maximum contrast.

b) Use of one size for English and Hindi text in the bilingual combinations (along with appropriate matching of english with hindi typeface).

c) To have no restriction on the time given to a respondent to observe and rate the typefaces.

Experiment Structure

The experiment plan was divided into two scenarios: A and B

The interface for sample presentation was a wall of an exterior structure in both scenarios A & B (details mentioned further). The subjects were asked to view the stimuli from fixed distances of 60, 40 and 20 feet for both tests. Experiments were conducted during pre-noon daylight condition. The dimensions for sample design were 42cm X 29 cm. in both scenarios.

SCENARIO A

Test 1. Standard Typography Legibility Tests: They were conducted separately for five english and five hindi typefaces.

Test 2. Preference test: Resulting best rated three English and three hindi typefaces were combined together to create maximum of nine bilingual combinations. Here, the nine combinations were placed in a 3 X 3 grid structure.

Sample size: Total of 20 respondents participated in Test 1. The same no. also participated in test 2.

SCENARIO B

Preference Test (Randomization)

The situation in Scenario B takes the basis of the preference test idea of Scenario A. The same sample bilingual combinations were used in Scenario B. The significant distinctions here were the arrangement of the nine samples, which were arranged in a horizontal row on an exterior wall at a different place. The timings for the conducting the test were kept the same (as in Scenario A). Also, the preferences of 30 different respondents were audio-recorded in this case.

The horizontal arrangement for first 15 respondents was constant. But, the arrangement was flipped horizontally for the remaining 15 of 30 respondents. The idea behind a horizontal arrangement and variation within it was to see whether the changes would affect the choice of the most preferred bilingual combination and the related criterion or not? Would the resulting chosen combination be the

same as was in preference test of Scenario A ? Therefore, randomization in the arrangement of sample designs became crucial.

Participants

Scenario A

20 respondents who volunteered for the study included 9 males and 11 females, in the age-groups ranging from 20-58 years. The details like their names, age, occupation, height, vision factor, languages easily read were recorded.

Scenario B

30 respondents who participated in the test included 19 males and 11 females, in the age groups ranging from 12-78 years, with maximum people coming between the age groups of 30's to 40's. The details like their name, age, occupation, vision etc. were hand written by the researcher on separate hard-printed questionnaire developed for the study.

The design format for the same is given below:

Experiment Design

Scenario A

A total of nine bilingual combinations were explored (with each English typeface occurring with each Hindi typeface). The samples were presented to the subjects in one-by-one sequential order. For each stimulus, subjects were asked to rate it on a five-point standard legibility scale from distance 60, then 40 and lastly 20 feet (starting from the farthest distance to the shortest one).

Test 1 *The five-rate legibility scale used:*

Perfectly Legible	Legible	50-50 / Neutral	Barely Legible	Illegible

Test 1 *Sample designs*

1.Stimulus for English text (Se):

i). The basis for selecting following five English typefaces was to use classic typefaces with majority of them that have been used in signage designs : Helvetica – Bold, DIN Bold, Frutiger 55 Roman, Whitney Medium and Franklin Gothic Medium. Also, the choice was based on the British Standards Classification of Typefaces (BS 2961:1967), which includes: Grotesque, Neo-grotesque, Geometric and Humanist classifications.

ii). Here, a Grotesque (Helvetica Bold) and a Neo-grotesque (Franklin Gothic Medium) was accompanied by the Humanist characters (Frutiger 55 Roman & Whitney Medium) along with DIN typeface (Deutsche Industrie-Norm=German Industrial Standard), a Geometric typeface.

2.Stimulus for Hindi text (Sh):

The basis for selecting following Hindi typefaces was to use a combination of uniform with non-uniform stroke width options : DV-Prakash Bold, DV-NIDMahendraBold, DV – Yogesh Bold, DV – Surekh Bold, DV – TT Natraj Bold. The criteria were a deliberate choice to understand what are the likable character preference(s) for indian sign panel, whether the uniform stroke hindi typeface or the non-uniform stroke hindi typeface

The basis for the selection of devanagari typeface doesn't follow a standard, since no standard for selection exists.

This issue needs to be resolved by the type designers in Indian context. Extensive research is going on in creating devnagari typefaces for print, electronic legibility. Added to these attempts, devanagri issues vis'-a-vis' Indian signs and their semantic requirements need a research based investigation.

3. Typographic considerations:

a. Simple optical scaling method to match the cap height of all typefaces (english and hindi separately) has been used in the sample designs. Keeping the the x-height by increments, arriving at almost 85% of the uppercase height for devanagari (Hindi) typeface, to create a visual balance in terms of word shapes that are distinctive but uniform.

The stimuli were presented separately following a sequence of Se1 to Se5 (for English) and Sh1 to Sh5 (for Hindi)

Example of Stimulus (Se4), Helvetica Bold matched with Prakash Bold

Optical scaling
100% Cap height (English text) - 85% of Cap height (Hindi text)

b. The visual harmony of letters is established between letterforms by adjusting the three following type elements adjacently: range in the cap height / kerning / word spacing (in %). In creating individual characters, the objective became emphasizing the distinctive quality of each letter whilst maximizing the adjacent white space – to facilitate clarity at distance and minimize the effects of tight kerning. The prime objective was always clarity, the aesthetic judgment criterion is secondary.

Test 1 RESULTS
Data was collected in excel sheets for both Se1 to Se5 (english text) and Sh1 to Sh2 (hindi text) to calculate the mean and standard deviations for each of the 10 fonts at the specified distances.

1. At 60 feet, there are maximum deviations for Frutiger 55 (Se3) and DIN Bold (Se2). The deviation value for Whitney medium (Se4) is the least, and hence is the most legible of all others.
At 40 feet, DIN Bold (Se2) and Frutiger 55 Roman (Se3) have almost same legibility rate. The best ratings have been obtained for Helvetica Bold (Se1).
At 20 feet, the legibility goes good from Helvetica Bold (Se1) to Frutiger 55 Roman (Se3) and Whitney Medium (Se4).

2. At 60 feet, there are maximum deviations in DV –Yogesh (Se3), DV –NIDMahendraBold (Se2) and DV-Prakash (Se3).
At 40 and 20 feet, the most legible values indicate towards DV – Yogesh Bold and DV – Prakash Bold.

3.Final combinations for test 2:
Se1, Se4 and Se3 (on the basis of least deviations at 20 and 40 feet)
Se1, Se3 and Se2 (on the basis of least deviations at 20 and 40 feet)
Inferences:
a.LEGIBILITY RELATION
Lesser the deviation from the mean value for a typeface, better its value rate of legibility.
b.VISION AND VISIBILITY
The values in 60 feet are fluctuating responses from subjects, analyzing it qualitatively one can speculate the reasons for the same. The 20 subjects for this test were a combination of normal, far-sighted and shortsighted vision of different age groups. Visibility from distance gets influenced by the vision quality of a person.

Test 2
Bilingual combinations of the best three English and Hindi typefaces, as results of test 1, were developed with each Hindi typeface conjoined with every English typeface. A maximum of 9 such bilingual combinations could be created, with Hindi text placed above the English text.

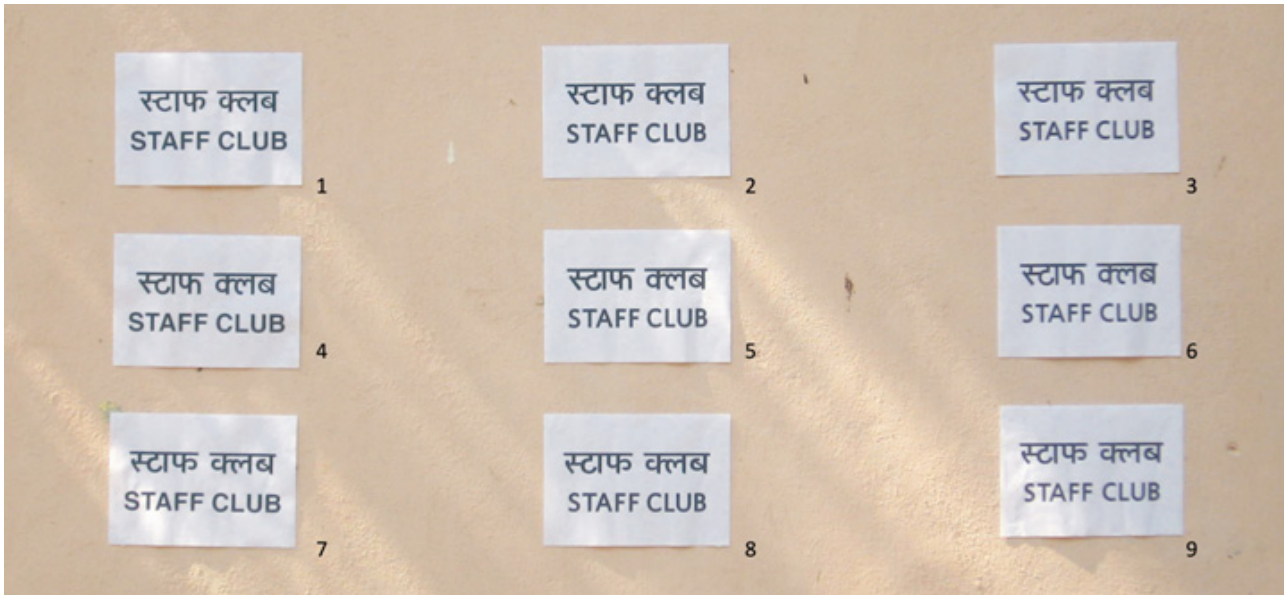

Diagram representing number of preferences for all nine bilingual combinations at 60, 40 and 20 feet:

The subjects were asked to choose the most preferred bilingual combination from the fixed distances, starting from 60 feet to 40 feet and finally from 20 feet. The second part of the questionnaire was to gather the reasons behind their choice of the bilingual chosen.

Test 2 RESULTS

Diagram representing number of preferences for all nine bilingual combinations at 60, 40 and 20 feet:

	60f	40f	20f
Sb1	16	14	17
Sb2	4	1	3
Sb3	3	0	2
Sb4	3	4	0
Sb5	0	0	0
Sb6	0	0	0
Sb7	0	2	2
Sb8	0	0	0
Sb9	0	0	0

The most preferred combination was Sb1 (DV – Yogesh Bold and Helvetica Bold)

At 60 feet

Clarity was observed by 18 people column-wise. Most of them liked first column and chose the first combination (Sb1) as the most preferred combination. At 60 feet, 14 people expressed that they could see "words" in English-Hindi together as a combination at first sight. The bold look of words STAFF CLUB in the first column for English Typeface (Helvetica Bold) was the criterion for combination preference for all 18 people. Also, a few of them liked the use of white space between English letters in Helvetica Bold.

The rest 2 subjects being communication designers keenly observed the counterspaces and the character design of the typeface options. Some critical observations made by one of them being :

1. Best typographic combination was Sb4 (DV- Prakash Bold with Helvetica Bold) from 60 and 40 feet, due to generous counter-spaces in Hindi – letters matching with negative spaces of Helvetica letters.
2. Second most preferable combinations were Sb5 and Sb6 (where, DV – Prakash has been combined with Whitney Sans and Franklin Gothic); due to better font matching between Hindi and English typeface.
3. DV – Yogesh has wide-spread negative spaces which do not match perfectly when seen from longer distances (60 and 40 feet). But, from 20 feet, the eye is able to adjust to the ratio of negative spaces in a better way. Yogesh letters with Helvetica letters provide convincing proportion as a combination both vertically and horizontally. The kerning is visible from 20 feet. The open letters of DV – Yogesh in comparison to DV – Prakash provides much better combination with kerned letters of Helvetica at 20 feet.

At 40 feet

1 Majority of the subjects found all combinations designed with same typefaces. Here, observations and choices emerged more by comparing typeface combinations in individual rows.

2. Contrast from letter to letter between English and Hindi typefaces amongst the nine combinations could be viewed comfortably from this distance by 15 subjects.

3 Here, these subjects concentrated on letters and expressed views accordingly [e.g.] (ta) of Se1 very clear, clear counters here, but in last row hindi letters have disturbing cuts especially letter [(ba)] - [Se7 ka "phh" kaafi alag hai, better than in Se4 and Se1].

4. Here, DV – NIDMahendraBold typeface in Sb7, 8 and 9 combinations was unanimously selected as the most "complicated but good-looking" typeface. Among the three, Sb7 emerged the most preferable combination because of clear and bold English letterforms.

At 20 feet

At the distance of 20 feet, 15 subjects found all the combinations bold and clear in comparison to the same combinations when viewed from 60 and 40 feet. Hindi

letterforms in comparison to English letterforms, were analyzed with enhanced interest shown by the subjects.

Other noteworthy responses:

1. The most favourable bilingual combination from this distance (20 feet) was Sb1 (DV – Yogesh Bold with Helvetica Bold). In general, clarity and bold look of English letters was considered best compatible with Hindi letters in the first two rows (including combinations Sb1 to Sb6). Both Sb1 and Sb7 were likeable combinations because of the bold character of English typeface (Helvetica Bold). Sb1 combination was considered simple and most clear of all (due to simple Hindi letters complimenting the letters of English). On the contrary, Sb7 was the second most likeable combination (because it provided "stylish curvaceous" Hindi letters, DV – NIDMahendraBold created a unique combination with English letters of Helvetica Bold).

2. Hindi typeface in second row was considered simple (especially in cases of Sb4 and Sb6). The Hindi typeface "Prakash – Bold" has uniform stroke width, which makes it least complicated in terms of shape. An interesting response by one of the subjects was that Prakash Bold has letters which could be generally seen in children's books, with letters having simple, straight forms with almost no extra curves. (the observation was particularly targeted to letters like "ta" and "phh".

B1 (Arrangement 1)

Combinations	S.no.	60f	40f	20f
DV- NID Mahendra Bold Franklin Gothic Medium	Sb1	3	1	1
DV – Prakash Bold Whitney Sans Medium	Sb2	0	0	0
DV – Yogesh Helvetica Bold	Sb3	9	12	14
DV – Prakash Bold Franklin Gothic Medium	Sb4	3	0	0
DV – NID Mahendra Bold Helvetica Bold	Sb5	0	0	0
DV – NID Mahendra Bold Whitney Sans Medium	Sb6	0	0	0
DV – Prakash Bold Helvetica Bold	Sb7	3	2	1
DV – Yogesh Whitney Sans Medium	Sb8	0	2	1
DV – Yogesh Franklin Gothic Medium	Sb9	0	1	1

B2 (Arrangement 2)

Combinations	S.no.	60f	40f	20f
DV – Yogesh Franklin GothicMedium	Sb1	0	0	0
DV – Yogesh Whitney Sans Medium	Sb2	2	4	2
DV – Prakash Bold Helvetica Bold	Sb3	6	3	6
DV – NID Mahendra Bold Whitney Sans Medium	Sb4	3	1	0
DV – NID Mahendra Bold Helvetica Bold	Sb5	3	1	2
DV – Prakash Bold Franklin Gothic Medium	Sb6	0	1	2
DV – Yogesh Helvetica Bold	Sb7	8	10	13
DV – Prakash Bold Whitney Sans Medium	Sb8	1	3	0
DV- NID Mahendra Bold Franklin Gothic Medium	Sb9	1	1	1

RESULTS

Results below consider preference opinions of 18 subjects. Two subjects out of total twenty had no. of variations in opinions. One of the subjects had one-sided visual impairment (his left eye had correct vision at long distance and the right eye had correct vision at short distance). The observations made by this subject has been specifically decribed below.

60 feet

B1

1. For all 18 subjects, clarity in word "Staff" became the major preference criterion from the distance of 60 feet.

2. 12 subjects expressed the view of considering English words first and then concentrating on Hindi words. Here again, the combination of Sb3 (DV – Yogesh Bold with Helvetica Bold) was the most preferred combination of all. (see table).

3. In three responses from 60 feet, Sb1 was considered equivalent to Sb4 as best English – Hindi combinations. This is interesting, since the Hindi typeface used in both are very different. The reason though given by the respondents was better clarity of English letters than Hindi letters in both combinations.

B2

1. The maximum no. of preferable responses for Sb7 have six responses, where Sb3 was considered equally preferable combination as Sb7. The major criterion being clear English words and different kind of hindi typeface (different than the much bolder hand-painted letters seen generally on signboards in India).

2. Sb4 and Sb5 could be considered second best preferred combinations at 60 feet. In this case, both were rated equally preferable by three respondents. The criteria being,

40 feet

B1

1. Here, Hindi letters were considered first by the respondents. Then the shapes of English letters were viewed in comparison to Hindi letters. The major criteria for selection of combination Sb3 here was shapes of letters (phh, ta, la); shapes of letters (S, F and C) in comparison to English letterforms in other combinations.

E.g. of one of the opinions "Letters S, F and C of helevtica bold in combination 3 are better looking, provide better contrast with Hindi letters; in comparison to S, F and C English letters used in combination 8" . In combination 8, Whitney Sans was combined with the same Hindi typeface DV – Yogesh used in combination Sb1 with Helvetica Bold. Since, from 40 feet, letter shapes became clearer, it was easier for the subject to observe the use of same Hindi typeface in the two combinations, with actual difference of forms in the English letters.

2. Similarly, Sb3 was compared with others in three more such responses. (in one, compared to Sb8 again and in the rest two, compared to Sb7 – DV – Prakash Bold with Helvetica Bold).

B2

1. Letter shapes and contrast between Hindi and English letters were observed for the first time from 40 feet.

2. Among 10 favoured answers for Sb7, 3 responses considered Sb7 and Sb3 equally preferable bilingual combinations for a signboard. The preference criterion being bold and clear English letters, big letter shapes in DV – Yogesh for Sb7 and simple, better shapes of Hindi letters in Sb3.

20 feet

B1

Sb7 (DV – Yogesh with Helvetica Bold), was chosen unanimously as the most favoured combination of all

The criteria from 20 feet being best proportion of English to Hindi letters, best contrast between English to Hindi letters and the bold appearance of English letters.

B2

1. Sb7 again has maximum no. of preferences as a combination. But, here Sb7 was considered equivalent in terms of English to Hindi letter compatibility with Sb3 in 4 responses. The reason being likeability of English letters (Helvetica Bold) used in both combinations. All the four respondents observed the use of same English typeface for both the combinations.
2. Two respondents with corrective vision compared Hindi letters "ta" and "ba" in both Sb7 and Sb3 to reach a conclusion as to which combination is the most preferable one for a name identification signboard.
3. Not only individual letter shapes, but also the space between letters were taken into consideration while selecting the final combination by all 18 respondents.

CONCLUSION

Most preferred Bilingual Combination

1. The most preferred combination was DV – Yogesh Bold (Hindi) with Helvetica Bold (English). The preference criterion for the selection, though varied in both Scenarios, but in a nutshell, Helvetica Bold was considered with "Bold", "Big" and "clear" words and letters.
2. In Scenario B, idea of randomization in the arrangement of combinations was applied. One could see that when the arrangement was changed (as could be seen in the results of B2), the overall preference was the same combination (as in Scenario A), but the preference is shared with other combination using the same English typeface.
3. From above points, one could conclude that in a bilingual combination of English with Hindi typeface (under a controlled design element of using black text against white background), the kind of English typeface used becomes one of the most important selection criterion, followed by compatibility of Hindi typeface to English typeface.

Words, then letters

Integrated letters (or words) become important on a sign panel when viewed from a long distance. At shorter distances, "letters" and their details become more important, probably because the details of positive negative spaces, details in the integrated letters could be seen in clearly from short distances.

1. Also, at the distance of 60 feet, "words" in English were compared to other English typefaces. The distinction between typefaces could not be observed by the respondents at first sight of all nine combinations. They took more time to convey their preferences.
2. At distances of 40 and 20 feet, the viewer's started commenting on "letter shapes". Observations, comparisons between English and Hindi typefaces centered around the qualities of letters.
3. Also, at the distance of 60 feet, "words" in English were compared to other English typefaces. The distinction between typefaces could not be observed by the respondents at first sight of all nine combinations. They took more time to convey their preferences.
4. At distances of 40 and 20 feet, the viewer's started commenting on "letter shapes". Observations, comparisons between English and Hindi typefaces centered around the qualities of letters.

About devanagri letters

Responses in relation to Hindi typefaces have considered "individual letterforms" rather than "integration of letters" as words. (viewed from the distance of 40 and 20 feet sequentially). For 60 feet, there has been negligible argument about letterforms or the visual look of hindi

Though, there have been responses of likability of hindi letters (in typeface like DV-NIDMahendra bold of having "stylish", "unique", "unusual letterforms"), the final preference criterion were again clear, uniform letter shapes (with least or no variation), letters with generous white spaces around them, letters with least complicated curves. All these could be best viewed in the devanagri typeface "DV – Yogesh Bold".

Hence, emerging findings in relation to this case study indicate following future scope of research intervention in the area of bilingual typography:

1. Review the visual issues related to character design of devanagri letterforms used on signboards in India.
2. An inquiry into the hindi letterforms would combine the analysis and understanding of English typography and standards currently used. Whether there arises a need to create a new display typeface or create essential standards (which are currently not existing for signboards), could not be investigated in isolation. The bilingual function of the Hindi along with English words on Indian signboards becomes an objective research inquiry.

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