

Inter-script Stylistics Comparison among Familiar and Non-Familiar Writers

Type: Research Article
Received: May 29, 2023
Published: June 14, 2023

Citation:
Ankit Singh., et al. "Inter-script Stylistics Comparison among Familiar and Non-Familiar Writers". PriMera Scientific Medicine and Public Health 3.1 (2023): 03-09.

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Abstract

Learning to write by hand begins with copybook models, which gradually evolve into individual features as writers acquire their own traits over time. In this paper, two separate scripts were used, and commonalities between the two scripts were found based on the way the two scripts formed letters that looked similar to one another. Nine distinct lookalike letters were noted and investigated. 200 handwriting samples from 100 people were gathered (50 each from familiar and non-familiar writers). These observations have been compared using a graph. The t-test, a statistical tool, was used to examine the significance of the overall hypothesis. 4.5547 was the t-test value at 5% significance, which is significant at df 16.

Keywords: Inter-script; Comparison; Lookalike alphabets; Stylistics

Introduction

India is a multilingual as well as a multi-script country. There are 22 major languages in India which are written in 13 different scripts with over 720 dialects [6]. In this paper, two different scripts were taken and similarities between these two scripts were observed based on the formation of letters of lookalike letters among these two scripts.

In India, one of the most widely spoken languages is Kannada. All consonants in the Kannada script writing system contain an inherent vowel, making it an alpha-syllabary. In Kannada, there are 34 consonants and 16 vowels. In Kannada, there are roughly 250 basic, modified, and complex character forms. The writing style is from left to right horizontally. Upper-case and lower-case distinctions are not present in Kannada. The study of an Inter-script comparison attempted to explore the issue of their common authorship by taking writing samples of the same writer in three scripts. Careful study and evaluation of the basic elements of written strokes whose execution was found to be similar in all three scripts were carried out, indicating the possibility of 'Script Independent Comparison' [1]. Sim-

ilarly, another study attempted to compare various writing characteristics of the Hindi and Marathi languages [8]. Another study also discussed the examination of handwritten documents of unfamiliar scripts. It examined 10 different Indian scripts for their similarities and differences sample handwriting supplied for comparison in the same script as that of the disputed writings may not be available due to various reasons and the investigating agency still wants some opinion or lead from the expert in the best interest of the case under examination [4]. Another possibility may be that the examiner concerned is not well versed or has sufficient knowledge of either or all the scripts/ language involved in the process of comparison.

Most issues with identical handwriting samples in the same script that cannot be compared fall outside the purview of forensic document assessment. However, this field is not perfect, just like any other human endeavor.

Methodology

100 Handwriting samples (50 each) in English and Kannada were taken from familiar writers. 100 Handwriting samples (50 each) in English and Kannada were taken from non-familiar writers. For this study nine letters were examined which are the formation of English letters 'W', 'O', 'A', 'n', 'h', 'O', 'e', '8', 'a', '2', 'm' and formation of Kannada letters 'ಡ'(da), 'ದ'(da), 'ವ'(va), 'ಉ'(um), 'ಗ'(ga), 'ರಿ'(ri), 'ಲಿ'(li), 'ಳ'(la), 'ಯ'(ya), 'ಖ'(kha), 'ಋ'(rii), 'ಇ'(e), which show clear similarities in handwriting of familiar writers, individual letter formations of all these letters were examined and compared with lookalike letters. The theory was postulated on hypothesis and was proved by statistical analysis i.e. t-test was used.

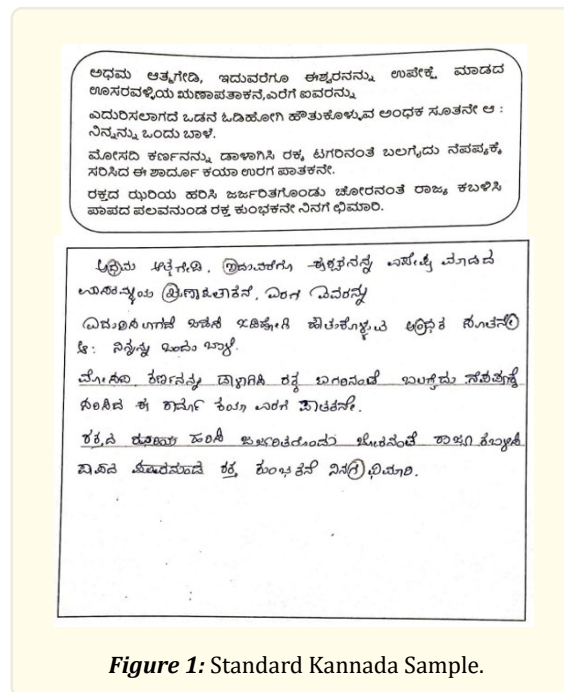
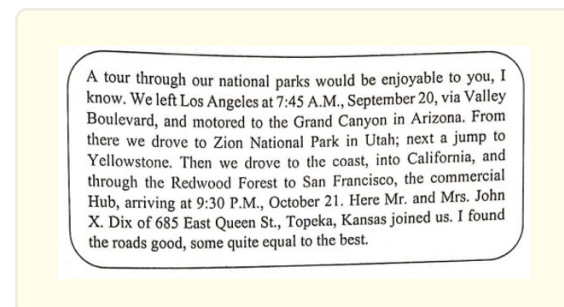


Figure 1: Standard Kannada Sample.



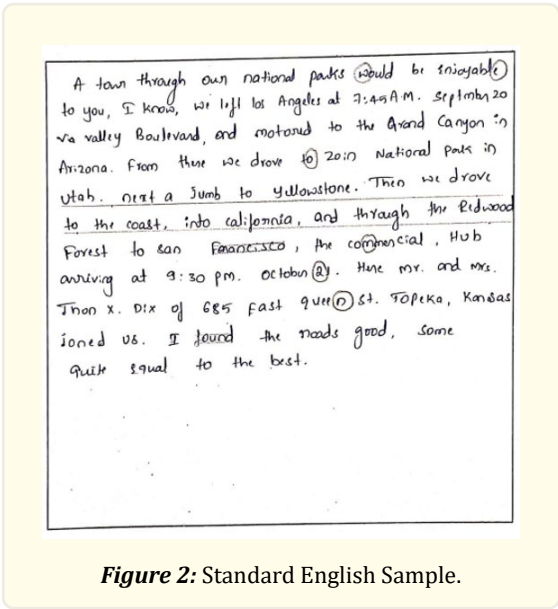


Figure 2: Standard English Sample.

Result

This study was carried out to observe the similarity between English and Kannada scripts by comparing the individual formation of lookalike letters found in both scripts.

Similar characters observed among familiar writers:

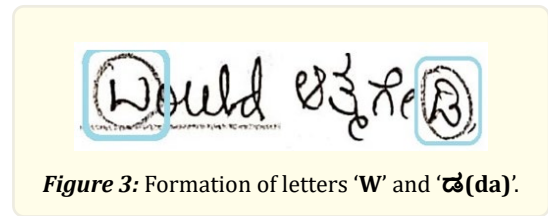


Figure 3: Formation of letters 'W' and 'ದ(da)'.

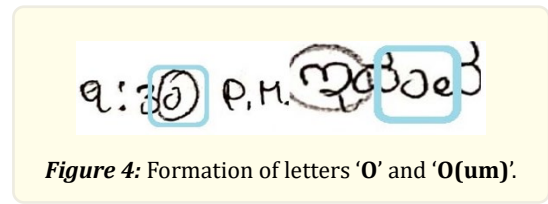


Figure 4: Formation of letters 'O' and 'O(um)'.

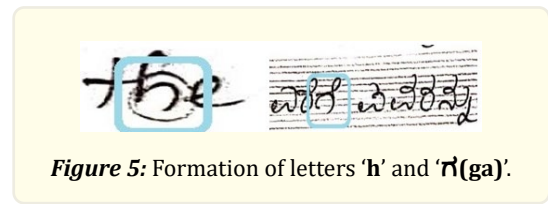


Figure 5: Formation of letters 'h' and 'ಗ(ga)'.



Figure 6: Formation of letter 'e' and 'ಲಲಿ(lii)'.



Figure 7: Formation of the letter 'm' and 'ಇ(e)'.



Figure 8: Formation of letters 'a' and 'ಯ(ya)'.



Figure 9: Formation of numeral '8' and letter 'ಳ(la)'.



Figure 10: Formation of numeral '2' and letter 'ಖ (kha)', 'ಋ (rii)'.

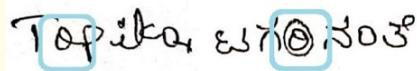


Figure 11: Formation of letters 'O' and 'ರಿ (ri)'.

Observation among non-familiar writers:

The formation of letters of the Kannada alphabet made by non-familiar writers is full of tremors. The copybook model of writing is followed without any changes from its actual shape. The way of formation of letters that are starting and ending strokes was blunt. The shapes of the same letter change at different positions. Enough spacing can be seen between letters of the alphabet.

Comparison among familiar and non-familiar writers:

S. No.	Characters		Similarities	
	English	Kannada	familiar writers	non-familiar writers
C1	W	ಡ(da), ದ(da), ವ(va)	44	6
C2	O	ೠ(um)	36	13
C3	A n, h	ಗ(ga)	25	2
C4	0	ರಿ(ri)	14	1
C5	e	ಲಿಲಿ(lii)	33	10
C6	8	ಲಿ(la)	21	1
C7	a	ಯ(ya)	10	1
C8	2	ಖ(kha), ರಿ(rii)	23	1
C9	m	ಇ(e)	8	1

Table 1: Comparison of the similarity of characters among familiar and non-familiar writers.

T-test value for these observations

Mean value for Familiar writers = 23.78.

Mean value for non-familiar writers = 4.

St Deviation for Familiar writers = 12.18.

St Deviation for non-familiar writers = 4.60.

n = 9.

df (degree of freedom) = 16.

T-test value = 4.5547.

The critical t-test value for df = 16 at a 5% level of significance is 2.12. As the t-test value for this test is 4.5547 which is greater than the critical t-test value of 2.12, so this indicates that there is a significant difference between the two writers thus the value is statistically significant.

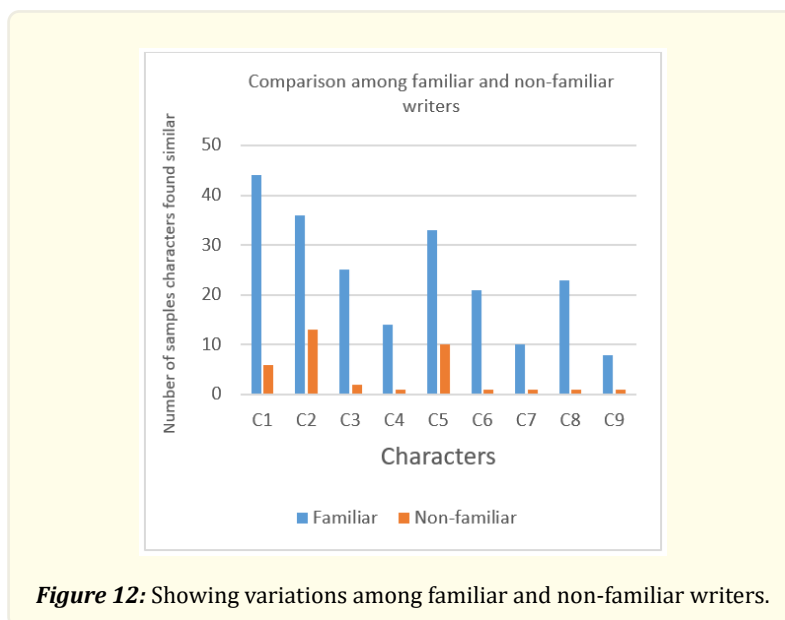


Figure 12: Showing variations among familiar and non-familiar writers.

Discussion

As shown in Fig 12 the similarities among English and Kannada script for the look alike alphabets in handwriting for familiar and non-familiar writers and it was observed that 88% showed similarities in case of familiar writer whereas 12% in non-familiar writer in case of letter 'W', likewise for the letter 'O', 72% showed similarities in case of familiar writer whereas 26% in non-familiar writer, likewise for the letter 'A', 'n', 'h', 50% showed similarities in case of familiar writer whereas 4% in non-familiar writer, likewise for the letter cursive 'O', 28% showed similarities in case of familiar writer whereas 2% in non-familiar writer, likewise for the letter 'e', 66% showed similarities in case of familiar writer whereas 20% in non-familiar writer, likewise for the numeral '8', 42% showed similarities in case of familiar writer whereas 2% in non-familiar writer, likewise for the letter 'a', 20% showed similarities in case of familiar writer whereas 2% in non-familiar writer, likewise for the numeral '2', 46% showed similarities in case of familiar writer whereas 2% in non-familiar writer, likewise for the letter 'M', 16% showed similarities in case of familiar writer whereas 2% in non-familiar writer.

The variation was statistically computed using paired t-test and the calculated value was 4.5547 at a 5% level of significance with 16 df which is statistically significant accepting the null hypothesis H_0 for familiar writers that there are no significant differences in English and Kannada scripts among the familiar writers and likewise the alternate hypothesis H_1 was accepted for the case of non-familiar writers suggesting that there is a significant difference among English and Kannada scripts of non-familiar writers concluding that there are significant differences among familiar and non-familiar writers and familiar writers have much more probability of having similarities among the look-alike alphabets.

Hence, after studying the individual characteristics of respondents, it was found that populations can be distinguished by comparing the handwriting of familiar and non-familiar writer populations. The examination was also done by statistical calculations for their significant nature.

Conclusion

This study presents the variations of writing amongst writers based on different parameters. 200 handwriting samples were procured and were successfully examined and tested using a T-test.

There are some characteristics like the formation of the English letter 'W', 'O', 'A', 'n', 'h', 'O', 'e', '8', 'a', '2', 'm' and formation of Kannada letters 'ಡ'(da), 'ದ'(da), 'ವ'(va), 'ಉ'(um), 'ಗ'(ga), 'ರಿ'(ri), 'ಲಿ'(lii), 'ಲಿ'(li), 'ಯ'(ya), 'ಖ'(kha), 'ಋ'(rii), 'ಇ'(e), which shows clear similarities in handwriting of familiar writers. The handwriting of non-familiar writers showed not many similarities.

On application of statistical calculation i.e. T-test value for the examined data was 4.5547 and it was concluded that the identified features i.e. lookalike letters mentioned above show significant behavior at 5% ($p < 0.05$) significance with df 16.

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