Is legibility of typefaces designed for screen use the same for all languages?

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Abstract:

Screen reading is without a doubt one of the most common ways of communication. A wide range of information (documents, advertisements, emails, news etc) is brought to us with the help of the screen (mobile phones, computers, television etc). Therefore, the clearance and visibility of typefaces at different viewing conditions is an important aspect when information should impact on people. The quality of screens differs; however, on average, its technology is advanced and there are fewer problems than there were in the past. Nevertheless, the trivia of the area has a strong impact on how the user will read and comprehend certain information [1]. The use of appropriate typefaces is in consequence undoubtedly important, while the design of typefaces differs for print and screen use [2]. It is common that we put little attention to the typefaces used for screen information presentation. Therefore, tests on the typeface performance when broadcasted on screen need to be performed [3].

The presented typefaces (i.e. Verdana, Tahoma, Georgia) were designed specifically for screen use [4–6]. Nevertheless, there are some differences among these typefaces. First of all, the typeface Georgia differs from Verdana and Tahoma in serifs. Secondly, the thickness of strokes differs among all three typefaces. The typeface Georgia has a difference between thick and thin strokes. Thirdly, counter shape is different at all three typefaces. At the Verdana typeface, the counter shape is the biggest. One feature, which is approximately the same at all three typefaces, is the x-height. These factors are important when considering typeface legibility and screen use [7, 8]. We must emphasize that despite one of the three typefaces (i.e. Georgia) being a serif typeface with a difference in stroke width, it was prepared and designed to be used on the screen.

The aim of our study was to examine the influence of typefaces on the legibility among students. Three typefaces designed specifically for screen use were shown on a screen in text, the length of which was as recommended [9] 11 lines and included 200 words. Each test person performed two tests, one in a native language (Croatian or Slovenian) and one in the English language. Moreover, the time limitation was included in tests [10]. Each text was presented on screen for three minutes and disappeared after that time.

Two groups of participants, each constituting of 25 people (students), took part in the study, which means that overall, 50 persons were involved in the experiment. The Croatian language is a native language of a half and the Slovenian language is a native language for the other half of the tested group. The average age of participants was 22.40 (22.52 Croatians and 22.28 Slovenians).

Each participant's task was to perform the testing twice, first in their native and then in a foreign language or vice versa. In this case, the sequence was randomly mixed; consequently, the typeface customization can be excluded from the results, this sequence leading to objective results.

The coverage area for each typeface was the same. The distance from the screen to the reader was the same for all testees (i.e. 65 cm) and the view angle remained unchanged [11]. The extent of the visible area was hence almost the same and can be excluded as a variable which can affect results. The content of text referred to everyday science, mainly covering nature and is considered as popular science material.

The time and fixation measuring presented a part of the observation. The eye tracking device Tobii 120 was used to measure the reading time and to count the number of fixations for each reader. The fixations are important to control that the focus of viewers is evenly distributed on the area where the text is presented. More important while observing the reading is time [12]. The shapes of letters, size of the x-height and counter shape are the factors which largely affect the time spent for reading and comprehension [13].

After each reading of the presented text, the person had to answer the question connected to the text content [14, 15]. The correctness of answers was very high (merely one or two mistakes in the whole pool of answers), especially for the native languages (i.e. Croatian and Slovenian), while there were more mistakes when reading the text in a foreign (i.e. English) language.

Comparisons that are a part of our study can be divided into four groups as follows:

a) English : English
b) Croatian : Slovenian
c) English : Croatian
d) English : Slovenian

The data useful for our research results from a comparison of the results for the English texts. oth nations are a part of the Slavic language group with few differences in their native language (Croatian and Slovenian). ence, we wanted to perform a comparison between the Croatian and Slovenian language. A comparison between the English and Croatian or Slovenian language, respectively, is probably the least interesting while the language differentiation is enormous and it is difficult to draw conclusions, much more effort being needed to compare two different language groups.

Nevertheless, the focus of our research is based on typeface comparisons among the same language tests (English) and the same language group tests (Croatian, Slovenian).

The comparison of English tests shows that on average, the shortest reading and comprehension time was required for the typeface Verdana (77.12 s). The typeface Georgia turns out as the least successful typeface since the average reading time was the longest (84.30 s). The reason for this can probably be found in the fact that the typeface Georgia has a difference in stroke width and consists of serifs, which are helpful when reading books, but less when reading text from the screen. A detailed overlook of results shows that on average, the Slovenian readers needed the less time to read the typeface Verdana (73.99 s), while for the Croatian readers, the shortest time is noticed at the typeface Tahoma (76.76 s). oth groups of participants needed th e most time to read the typeface Georgia (87.99 s Croatians and 80.61 s Slovenians).

The differences among the typefaces are small. Upper case characters are lightened, the x-height is increased and the ascenders rise above the cap height. Tahoma is mainly ideal for the use in user interfaces and other situations requiring a presentation of information on the screen. Verdana was designed to be readable at small sizes on the (computer) screen. The lack of serifs, large x-height, wide proportions, loose letter spacing, large counter shape and emphasized distinction between similarly shaped characters are chosen to increase legibility. The biggest problem when considering the designs of typefaces to be well seen on the screen are the characters *j*, *l* and *I*. The distinctiveness of these shapes is considered important and affects good visibility and legibility.

Some studies [16] of typeface legibility by means of reading efficiency resulted in no significant typeface effect. The typefaces Verdana and Georgia were perceived as more legible than Tahoma [16]. Other studies [17, 18] show that (when Verdana, Georgia and Tahoma were compared) Verdana and Tahoma are better accepted than Georgia. The latter turned out similarly at the results of our research.

A comparison of different language groups (Croatian and Slovenian) shows that again the typeface Verdana is the best accepted while the average reading time for both groups was 59.75 s and the typeface Georgia is the least acceptable with the average reading time of 63.95 s. It is true that the time required for reading is by about 15 seconds shorter when observing native languages but the data point to a constant priority of the typeface Verdana compared to Georgia (Verdana Tahoma Georgia).

An overall comparison (English with Croatian and Slovenian) is as mentioned before questionable. The differences among the language groups are too big and for this reason, objectiveness of data can be incorrect. Nevertheless, a rough comparison shows the same trend of typeface appropriateness.

The details which at first sight appear unimportant prove to be intrinsic. The counter shape of the typeface Verdana is in comparison with the typeface Tahoma and Georgia bigger. This difference plays an important role when comparing the visibility and comprehension of presented texts. The width at Verdana letters is when compared to Tahoma letters greater, which results in better text visibility on the screen and consequently better comprehension (correctness of answers).

It is of the essence to choose letters appropriately in order to give clear information, especially since we are on a daily basis exposed to an enormous amount of information brought to us by different media. A correct comprehension of the read text undoubtedly affects our opinion and in consequence, the objective understanding of daily served information.

Keywords: eye tracking, language, legibility, time, typeface and screen.

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