

Legibility and readability on the World Wide Web

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Reading a text from the World Wide Web has become usual in our culture. We are experiencing a shifting of paradigms: from the printed paper to the computer screen (or from atoms to bits). This transition is modifying how we read and understand a text.

Considering that digital media has a fastest pace for performing actions, as reading for example, we could informally state that most users instead of 'reading', 'scan' the pages: the reading speed is about a 30% slower, the comprehension and understanding of the text goes down to a 50%.

Digital design holds its own problems, and specifically web design, with its different platforms, browsers, hardware makes impossible to control the user's environment.

Typography on the web is a new dilemma, even if rules coming from the printed press could apply, a certain number of particular characteristics from the digital media ask to redefine specific rules. At the moment, most rules are coming from a test/failure system.

This report is the result of an experimental approach to this problem, done with the collaboration of the Typography II Course, Prof. Carlos Venancio, Architecture and Design Faculty, University of Buenos Aires, Argentina.

Goals

To establish which typefaces and under which conditions are presenting better results in terms of legibility and readability on the screen.

Antecedents

Research test done by the Software Usability Research Laboratory, Wichita State University, USA.

Participants

The test was done with 124 students of the Typography II course, Prof. Venancio, Architecture and Design Faculty. With no restriction regarding monitor size, resolution, depth of color, browser or operating system. The average age was of 23 years old, and half of their Graphic Designer's education was completed.

All the participants had the possibility of entering the website to do the tests at their own pace.

Tests

The tests consisted in reading three different texts with similar characteristics, and after finishing the reading, answering some questions which will help later to establish which are the best circumstances of legibility and comprehension. All articles were extracted from the electronic version of the Argentine newspaper La Nación, and were selected from the section «General Information», with a length between 500 and 600 words, and are counterbalanced using a Latin Square design.

We worked in 4 different axis (one test for each): typeface, size/leading, column width and color.

Procedure

The users entered a special website created to perform the tests. The first page had the options of selecting one of the four tests. On entering the specific test page, three options for reading were presented. To counterbalance all the possibilities, we did a distribution of the articles/possibilities so every participant got 3 examples, each of them with a particular option.

At the end of the text there was a link that had two functionalities: it stopped the clock and calculated the time used to read and redirected the user to the second step of the test: the evaluation.

The evaluation process consisted on two aspects: accuracy and preference. The first one contained some questions to answer using a multiple choice, and referred to the article's understanding. All the articles had some words changed in a very subtle way: the subject had to answer how many mistakes were found, as well as a couple of questions related to the news itself.

The second one included 3 subjective questions about the participant's preference. The questionnaire consisted of a 6-point Likert scale with 1 = «Very bad» and 6 = «Excellent» as anchors.

Once the questionnaires where completed, the users could move to the next article or test.

Test 1: Typeface

For this test, the size and leading of the texts was established as 12/15 pixels and 14 pixels for titles; black text on white background.

The typefaces to test are:

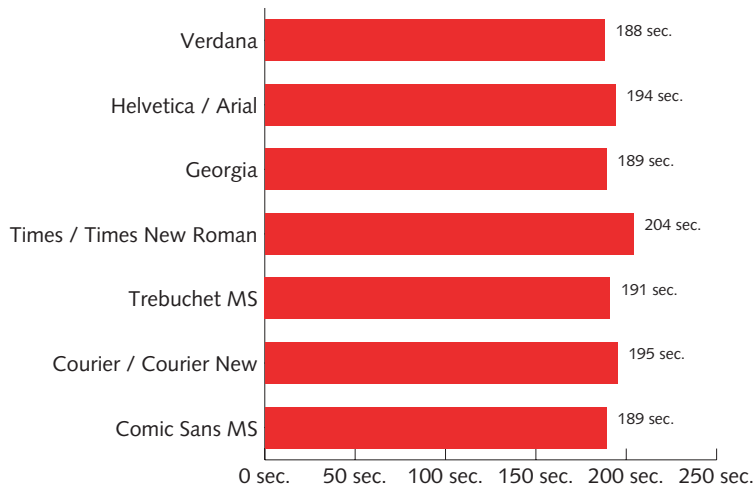
- Verdana
- Helvetica / Arial
- Georgia
- Times / Times New Roman
- Trebuchet MS
- Courier / Courier New
- Comic Sans MS

To counterbalance the examples, we did a distribution of the text / typeface groups so every participant had 3 examples, each of them with a particular typeface.

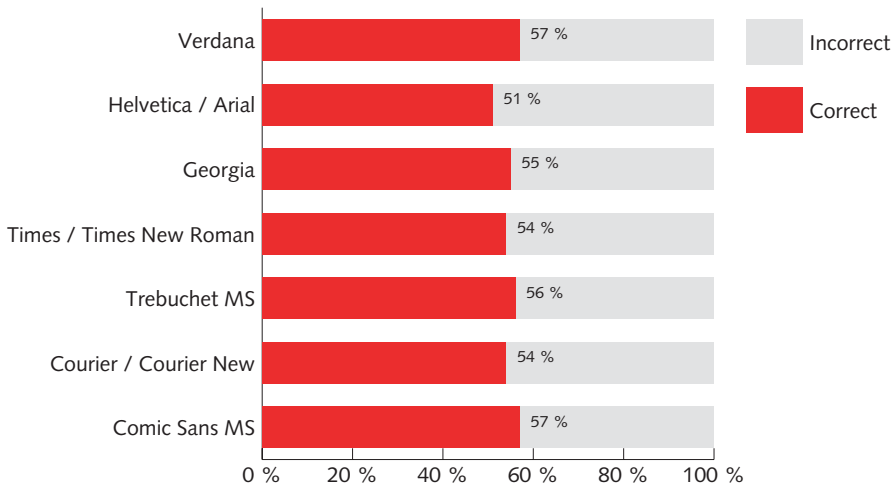
The participants were asked their opinion on «Legibility», «Personality» and «Elegance» of the typeface they have just read.

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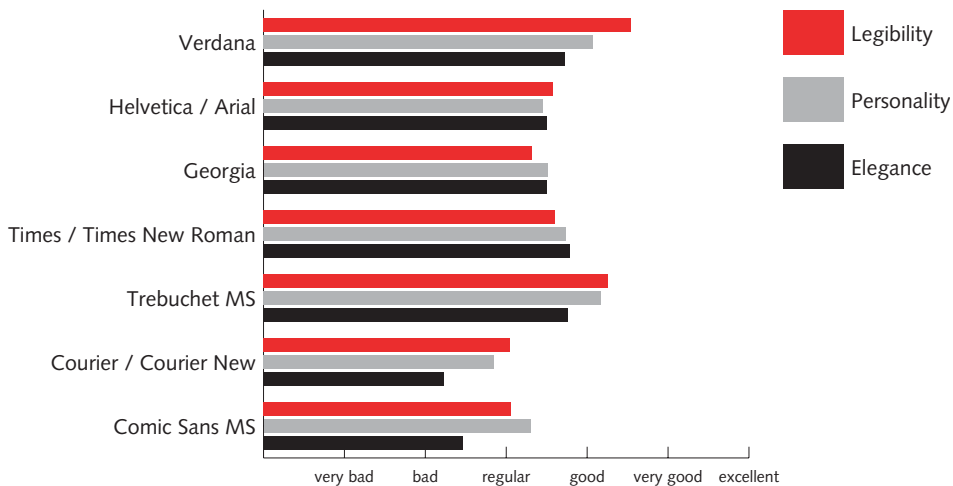
Typeface: Average reading time in seconds



Typeface: text comprehension



Typeface: subjective testing



Test 2: Font size and leading

The size and leading are two basic elements to determine the legibility of a given text. The proposal of this test is to verify which is the optimal relation between them for the screen.

The different options to test are (size in pixels):

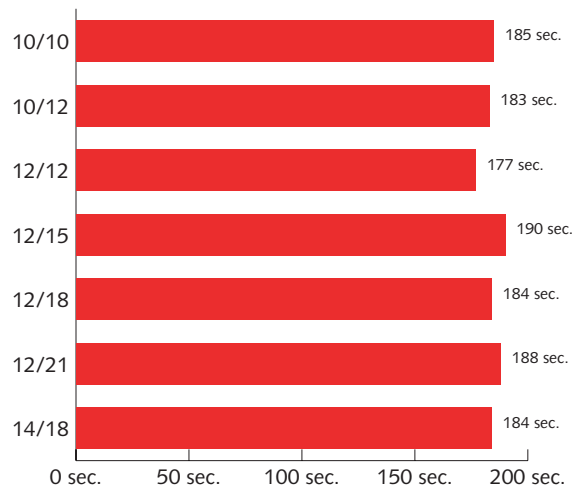
- size 10 leading 10
- size 10 leading 12
- size 12 leading 12
- size 12 leading 15
- size 12 leading 18
- size 12 leading 21
- size 14 leading 18

In every case the typeface used was Verdana; black on white.

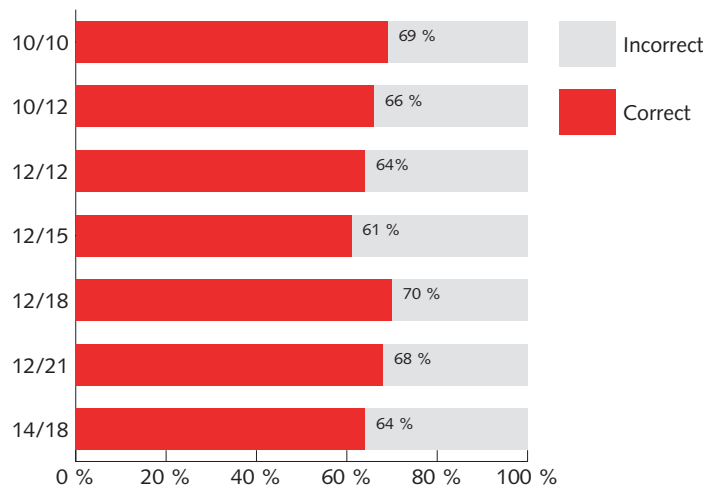
The participants were asked their opinion on «Legibility», «Comfort» and «Typographic colour».

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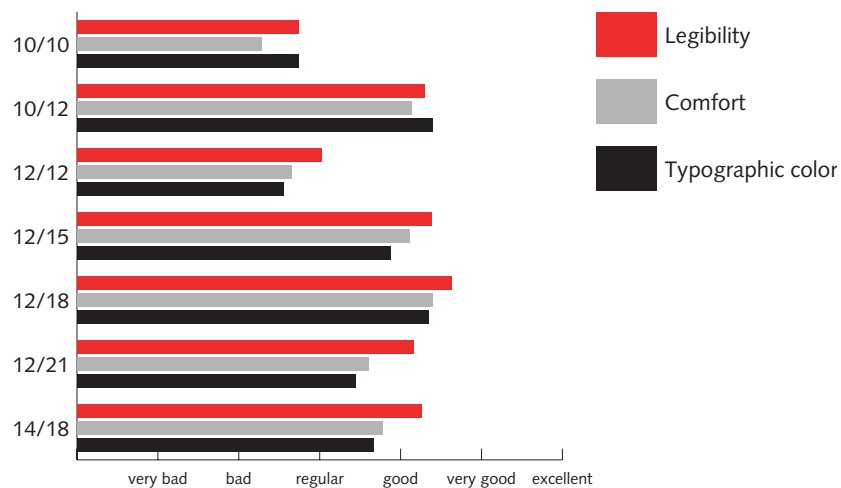
Size & leading: average reading time in seconds



Size & leading: text comprehension



Size & leading: subjective testing



Test 3: Column width

The right equilibrium between the font size and leading determines an optimal column width. For the printed media 60 characters per line is considered as the optimum value. We also know that if one raises this number of characters it is advisable to increase the leading in order to improve the legibility. But, will this concept apply to screen reading?

The variables to test are:

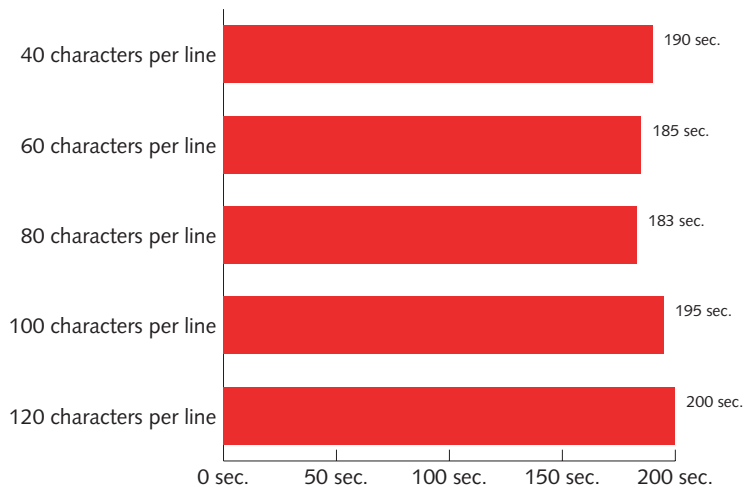
- 40 characters per line
- 60 characters per line
- 80 characters per line
- 100 characters per line
- 120 characters per line

In every case the size and leading of the texts was established as 12/15 pixels and 14 pixels for titles, and the fixed typeface was Verdana; black on white.

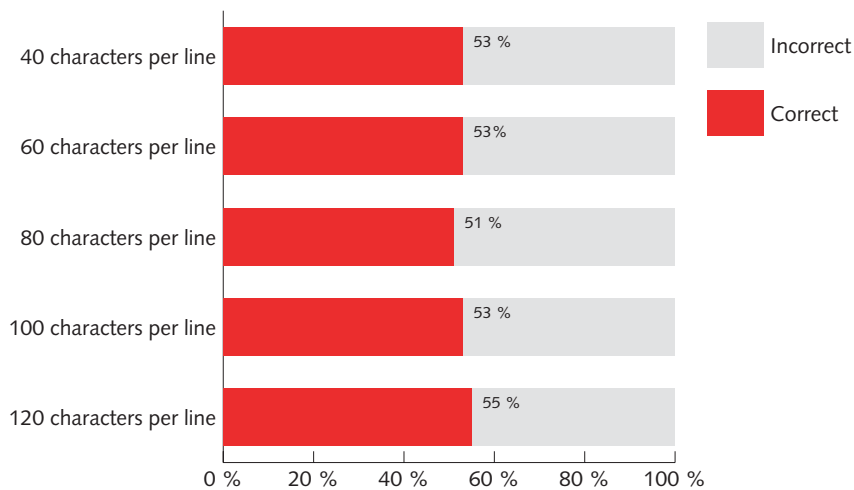
The preference opinion asked this time was concerning «Legibility», «Comfort» and «Balance».

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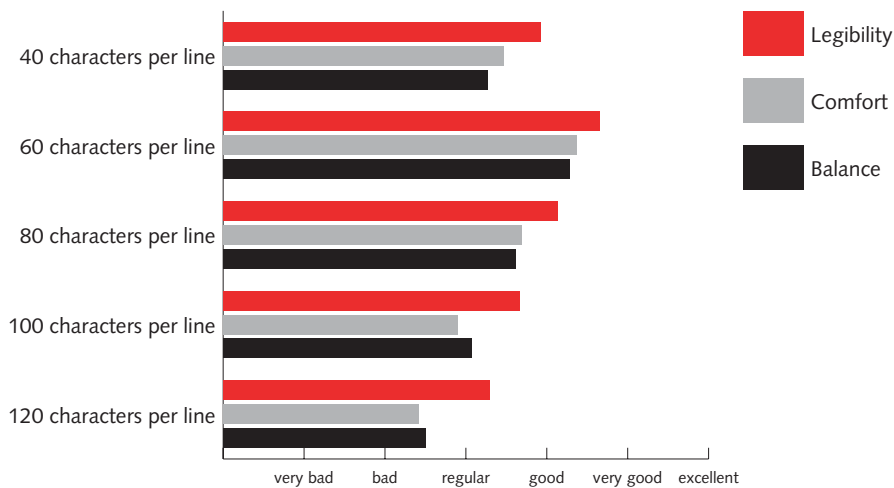
Column width: Average reading time in seconds



Column width: text comprehension



Column width: subjective testing



Test 4: Colour

The colour is one of the main factors affecting legibility on any kind of media. Specially for the screen where the colour is generated by the emission of light rather than subtraction, like it is in printed media.

There are gentle colours, aggressive, calm, exiting. All of them could be used with the goal of changing the user's mood. But, how seriously they affect the legibility of a text?

The variables to test are:

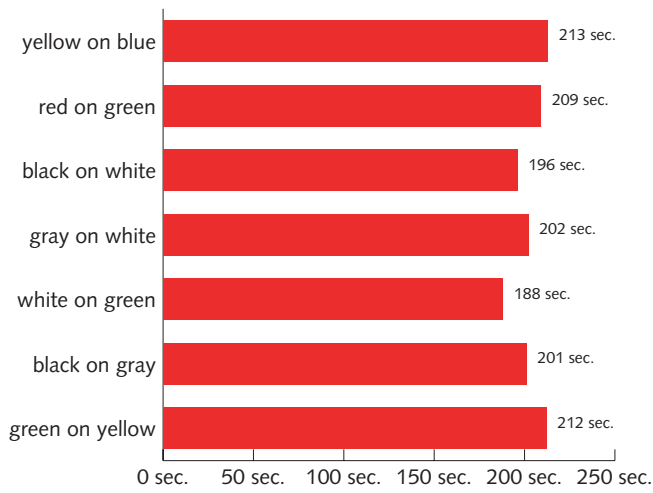
- yellow on blue
- red on green
- black on white
- gray on white
- white on green
- black on gray
- green on yellow

In every case the size and leading of the texts was established as 12/15 pixels and 14 size for titles, and the fixed typeface was Verdana.

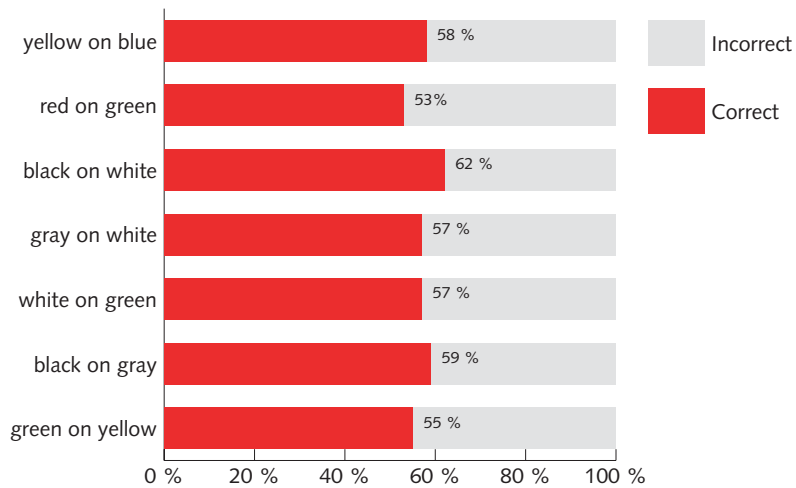
The opinion asked this time was concerning «Legibility», «Comfort» and «Contrast».

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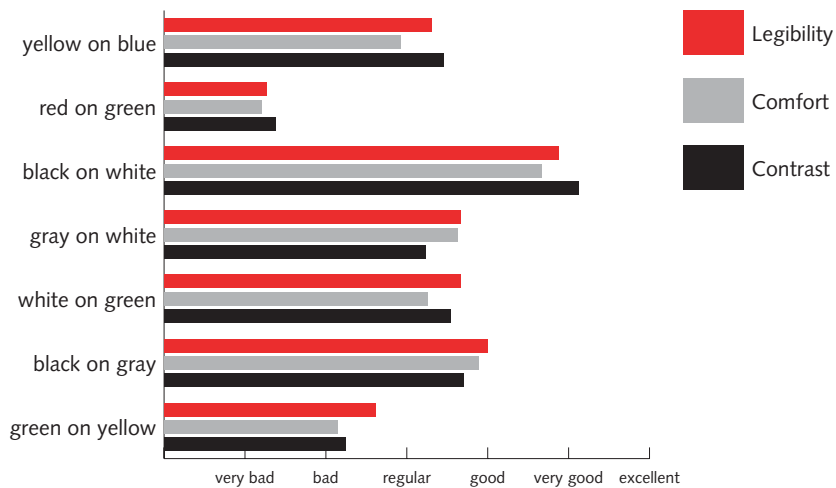
Average reading time in seconds



Colour: text comprehension



Colour: subjective testing



A closing review

With these tests, we were evaluating the readability and legibility of a text under three aspects: time, accuracy and preference.

Regarding the time, the difference in reading that we observe in the various tests are very subtle to establish a useful and transferrable conclusion. Nevertheless, it's interesting to note that within all the tests, we have an average of 192.88 seconds of general reading time. A curious remark —understanding that a 72.96% of the tests were done using Verdana, 12/15 and black on white—, are the results of these particular tests: Verdana, 188 seconds; 12/15, 190 seconds; black on white, 196 seconds; which are validating and confirming our average result.

Considering the accuracy of the users responses, the four tests gave a similar result close to a 60% of correct answers. As we said at the beginning, the comprehension and understanding for screen reading is reduced to a 50%. On the other side, the similarity of the percentages of accuracy for the four tests lead us to think that the procedure for evaluating the comprehension of the texts should be modified to obtain a more valuable result.

The most successful and realistic conclusion seems to appear on the subjective aspects of the tests. Here we could say that the results are valuable. It seems to be that wider differences are on the mind of the readers rather than on the effectivity of a given example itself. Beauty is on the eyes of the beholder, but functionality not always is.

Since the experiment was not performed in a controlled environment, somehow the tests were done in a totally normal situation: every user could choose under which conditions do it, they did it at home with the computer they use everyday, the connection speed they have, which differs from one participant to the other. This fact gives the benefit of reality but adds, as well, more variables that could have lead to some weird results.

Annotated Bibliography

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Credits

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