An Eye-Tracking Study: How Serif Fonts Affect Reading Online and on Paper

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Introduction

- Fonts are typically divided into serif and sans serif fonts. Serif fonts, such as Times New Roman and Georgia, contain decorative strokes called serifs, which are believed to increase legibility by enhancing the visual difference between letters and calling attention to the ends of a letter's defining strokes (Kim, Park, AHN, Choi, & Yun, 2015).
- Meanwhile, sans serif fonts such as Arial and Calibri lack serifs to reduce visual noise that could interfere with word processing (Zhao, Ding, Ran, & Li, 2018; Moret-Tatay & Perea, 2010).
- Many studies have been conducted on the effects of font type on reading text online and in print, but results have been thoroughly mixed (e.g., Arditi & Cho, 2005; Kim et al., 2015; Zhao et al., 2018).
- This experiment examined whether serif or sans serif fonts make headings and passages easier to read and comprehend, as well as whether the effects of font type differ between reading on a screen or on paper.

Method

- Data was collected from a convenience sample of 48 Wesleyan undergraduates.
- Stimuli: four 200-word titled passages, which used contrasting fonts for the title and body text (e.g., a Lucida Bright title and a Lucida Sans body).
- The font manipulation created two groups of participants. The between-subjects group saw either sans-headed passages online and serif-headed passages on paper, or vice versa. The within-subjects group read both sans-headed and serif-headed passages online and on paper.

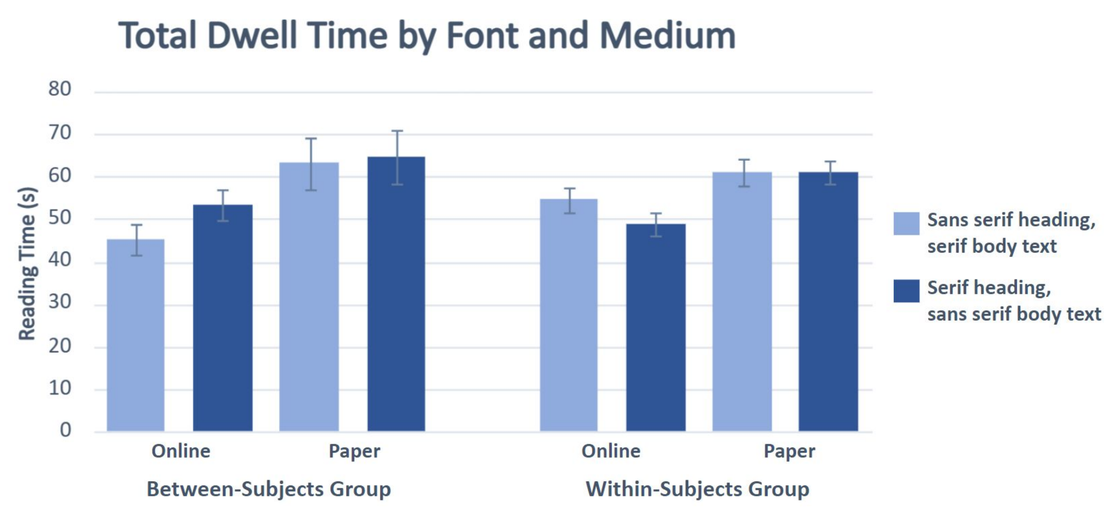
Table 1: *Eye-Tracking Study Participant Demographic Information*

Characteristic	*M* (SD)	Range
Age	18.6 (0.75)	18.0 - 21.0
Biological Sex	54.2% Female	
Year of Study	60.4% First year 33.3% Sophomore 4.2% Junior 2.1% Senior	
Race	54.2% White/European American 2.1% Black/African American 10.4% Asian/Asian American 8.3% Latino/na 18.8% Other 6.3% Unknown	

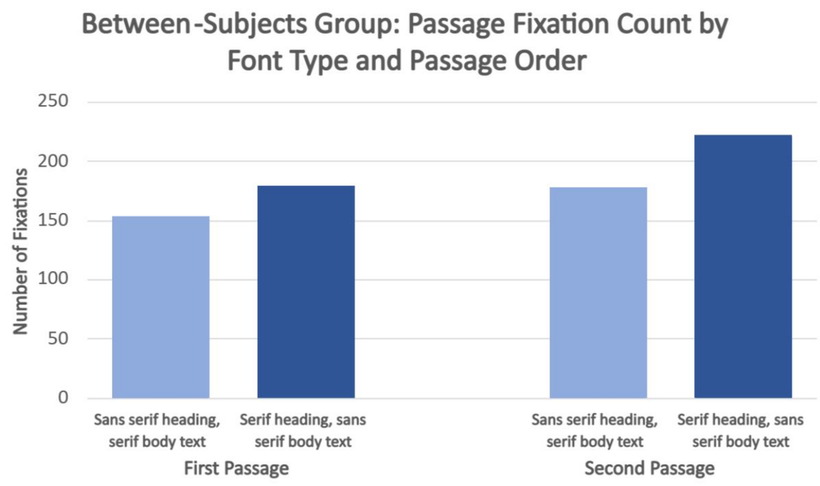
- An EyeLink 1000 eye tracker recorded the participants' eye movement as they read two passages on the computer screen. Then, they read two passages on paper while timed. For each passage, participants answered comprehension questions about its content.

Results

- ANOVA results showed that people read significantly faster online than on paper in both groups (between-subjects: $F(1, 22) = 21.71$, $p < .001$; within-subjects: $F(1, 23) = 12.80$, $p = .002$).
- However, they performed worse on the comprehension questions after reading the passages online, especially for the first online passage (between-subjects: $F(1,22) = 5.16$, $p = .03$; within-subjects: $F(1,23) = 6.13$, $p = .02$).



- In the between-subjects group, participants made more fixations on average on passages shown in sans serif than serif fonts ($F(1, 22) = 4.75$, $p = .04$). They also spent more time reading both the title and body text of the second passage compared to the first passage's (title dwell time: $F(1, 22) = 4.83$, $p = .04$; passage dwell time: $F(1, 22) = 12.11$, $p = .002$).
- This finding is consistent with how participants made significantly more fixations on the title and body paragraph of the second passage compared to those of the first passage (title fixation count: $F(1, 22) = 4.60$, $p = .04$; passage fixation count: $F(1, 22) = 17.01$, $p < .001$). This increased attention may explain why participants performed significantly better on the second online passage's comprehension questions ($F(1, 22) = 8.69$, $MSe = 117.04$, $p = .007$).



Discussion

- Participants read significantly faster online than on paper regardless of whether they read two sans-headed passages, two serif-headed passages, or one of each passage type. This indicates that some elements of reading on a screen made people read more quickly. The cause may be positive, such as accelerated processing and improved legibility, or negative like discomfort hindering deeper processing.
- The participants in both groups performed worse on the comprehension questions when they read the passages online, indicating that the increase in reading speed was at the expense of comprehension. Our findings align with past literature which found that elementary and undergraduate students read faster, but performed worse on comprehension tasks when they read on a computer (e.g., Kim et al., 2015; Støle, Mangen, & Schwippert, 2020).
- Participants were found to fixate significantly more on sans serif passages, although there was no discernible font effect on readability or comprehension. This difference in eye movement may imply that readers paid more attention, or had to refocus their attention more frequently, while reading sans-bodied online passages compared to serif-bodied ones. Thus, more research is needed to assess whether sans serif fonts significantly decrease reading speed for longer texts.
- Given the cost to comprehension as shown in this study, it may be worthwhile to read important text like study materials on paper rather than online.

Conclusion

- This study offers insight into how font type and the screen affect reading speed and comprehension. People read significantly faster online at the cost of comprehension. They also made more fixations on paragraphs presented in sans serif fonts, suggesting that the absence of serifs encourages readers to pay more attention to the text.
- As online reading becomes more common in schools, the findings of this study may inform the use of technology and typography design choices to make reading materials more legible for all students.

References and Acknowledgements

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