Usability News

The Effects of Line Length on Reading Online News

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Summary: This study examined the effects of line length on reading speed, comprehension, and user satisfaction of online news articles. Twenty college-age students read news articles displayed in 35, 55, 75, or 95 characters per line (cpl) from a computer monitor. Results showed that passages formatted with 95 cpl resulted in faster reading speed. No effects of line length were found for comprehension or satisfaction, however, users indicated a strong preference for either the short or long line lengths.

INTRODUCTION

The amount of text-based information available online is steadily increasing. Universities are offering more online classes; publishers are releasing more online books and journals; and consumers are gathering online news, weather, and product information daily. Therefore, the examination of the factors that influence the readability of online text is very important. In a recent survey, Shaikh and Chaparro (2004) evaluated the reading habits of Internet users across five document types (journal articles, news, newsletters, literature, and product information) and found that users preferred to read journal articles in printed form, but other documents such as online news, newsletters, and product reviews in online formats.

Research has shown that many aspects of physical layout of online text impact reading performance and satisfaction; Dyson (2004) gives an excellent review. One such factor that has been studied is line length, or the number of characters presented per line of text. Research investigating line length for online text has been inconclusive. Several studies found that longer line lengths (80 – 100 cpl) were read faster than short line lengths (Duchnicky and Kolers, 1983; Dyson and Kipping, 1998). Contrary to these findings, other research suggests the use of shorter line lengths. Dyson and Haselgrove (2001) found that 55 characters per line were read faster than either 100 cpl or 25 cpl conditions. Similarly, a line length of 45-60 characters was recommended by Grabinger and Osman-Jouchoux (1996) based on user preferences. Bernard, Fernandez, Hull, and Chaparro (2003) found that adults preferred medium line length (76 cpl) and children preferred shorter line lengths (45 cpl) when compared to 132 characters per line.

Purpose

Shaikh and Chaparro (2004) found that 62% of respondents preferred to read news onscreen rather than on paper. The goal of this study was to investigate the effects of line length on reading

performance of online news articles. This study investigated the effects of four line lengths (35, 55, 75, and 95 cpl) on reading speed, comprehension, and satisfaction.

METHOD

Participants

Twenty college students from a Midwestern university volunteered to participate in the experiment and were compensated with $25. All participants had 20/40 or better unaided or corrected vision. Participants reported visiting websites daily, had experience reading online, and were regular users of the Internet.

Materials

News articles with approximately 375 words (M = 367.9) were selected from MSN®; and Yahoo®; news. Average reading level for each passage was at the 12.0 grade level. The news articles covered a variety of topics ranging from computer viruses to innovative automobiles. The passages used Arial 10-point font with 12-point interlinear spacing between lines. Each paragraph was separated with an additional line break as is typically done on web pages. Hyphenation was not used in the text.

A total of 19 comprehension questions were written for each article including one title, main idea, and structure question and three factual and incidental questions, and 10 recognition questions (see Dyson & Haselgrove, 2001). A background questionnaire was used to collect demographic information as well as computer and Internet usage patterns. A Reading Satisfaction Evaluation consisting of 11 questions on a 7-point Likert Scale collected user reactions to the passage layout, perceived eyestrain, and fatigue. A Post-Experiment Questionnaire was used to determine layout preference.

Procedure

Following the completion of the consent form and the background questionnaire, participants were seated approximately 52 cm from the screen. The pages of text were displayed using Internet Explorer 6.0 in full screen mode to reduce distractions of tool bars, scroll bars, and menu items; paging (with no scrolling) was used to navigate the passages. The HTML pages contained "Next" and "Previous" buttons that users clicked with the mouse to navigate. All HTML pages were accessed from the computer hard drive to minimize download time.

Participants read a total of eight short news articles presented in counterbalanced order for line length. Two news articles were presented in each line length. Participants completed the set of comprehension questions after reading each passage. The Reading Satisfaction Questionnaire was given after each set of short passages. Following the last passage, the Post-Experiment Questionnaire was administered.

RESULTS

Reading Speed. Reading time was converted to words per minute. Results from a one-way within subjects ANOVA showed that there was a significant main effect of line length on reading speed, $F_{(3, 57)} = 3.45$, $p = .02$, $\eta^2 = .15$. The 95 cpl (M = 178.82, SD = 41.83) articles were read significantly faster than any of the other line lengths (35 cpl M = 167.21, SD = 33.66; 55 cpl M = 167.38, SD = 33.96 ; 75 cpl M = 169.44, SD = 33.48) (Figure 1).
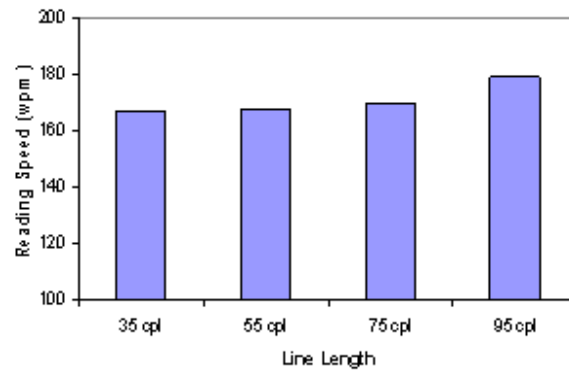
Figure 1. The effect of line length on reading speed.

Reading Efficiency. Reading efficiency was computed by multiplying the reading speed by the percent correct on the comprehension questions. Results of a one-way within subjects ANOVA showed a marginally significant effect of line length, $F(3, 57) = 2.68$, $p = .06$, $\eta^2 = .12$. Significant differences were found between 35 cpl and 95 cpl with the 95 cpl being more efficient.

Overall Comprehension. To compute an overall comprehension score, raw scores were adjusted per question type to yield a total comprehension score of 6 (based on the six types of questions). In doing this adjustment, each type of question was worth a total of one point. Results from a one-way within subjects ANOVA showed no effect of line length on overall comprehension.

Comprehension by Question Type. Results from a one-way within subjects ANOVA revealed a significant main effect of question type on comprehension, adjusted $F(3.98, 75.69) = 10.193$, $p = .001$, $\eta^2 = .35$. Participants scored significantly lower on the structure questions than title, main idea, and factual questions across all line lengths (Figure 2).
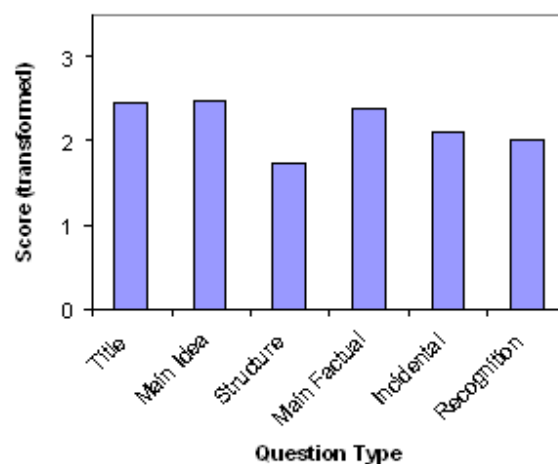

Figure 2. The effect of question type on comprehension.

Satisfaction & Preference. There was no main effect of line length on overall satisfaction. There were also no significant differences in preference. However, 60% of participants chose either 35 cpl (30%) or 95 cpl (30%) as the most preferred line length. On the other hand, 100% of participants chose either 35 cpl (45%) or 95 cpl (55%) as the least preferred line length.

DISCUSSION

This study examined the effects of line length on reading performance. Reading rates were found to be fastest at 95 cpl. Readers reported either liking or disliking the extreme line lengths (35 cpl, 95 cpl). Those that liked the 35 cpl indicated that the short line length facilitated "faster" reading and was easier because it required less eye movement. Those that liked the 95 cpl stated that they liked having more information on a page at one time. Although some participants reported that they felt like they were reading faster at 35 cpl, this condition actually resulted in the slowest reading speed.

Circulation of newspapers at 814 of America's largest daily newspapers declined 1.9% from September 2004 to March 2005 (Shin, 2005). This decline is part of a 20-year trend in newspaper circulation and is due, in part, to the increased use of the Internet and other forms of media (cable, satellite, etc). As users continue to choose online news sources, it is imperative to understand factors that contribute to improving the overall online reading experience for news. Participants were able to read news articles significantly faster while maintaining high reading efficiency using 95 cpl. Despite the fact that there were no differences in satisfaction scores, a line length that supports faster reading could impact the overall experience for users of online news sources.

Note: For additional information on this study, please see the proceedings of the Human Factors and Ergonomics Society's 49th (2004) Annual Meeting, Orlando, FL.

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