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Usability News is a free web newsletter that is produced by the Software Usability Research Laboratory (SURL) at Wichita State University. The SURL team specializes in software/website user interface design, usability testing, and research in human-computer interaction.
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Reading Online Text with a Poor Layout: Is Performance Worse?

by [Barbara S. Chaparro](#), [A. Dawn Shaikh](#), & [J. Ryan Baker](#)

Summary: This study examined the effects of enhanced layout (headers, indentation, and figure placement) on reading performance, comprehension, and satisfaction. Participants read text passages with and without enhanced layout. Results showed that reading speed and comprehension were not affected by layout, however, participants were more satisfied with the enhanced layout and reported it to be less fatiguing to read.

INTRODUCTION

The readability of online text has been shown to be influenced by a number of typographical variables including text size and type, line length, density, margins, and white space (see Dyson 2004 for a review). In the last issue of *Usability News*, we reported on the effects of white space, manipulated through margins and leading (Chaparro et al., 2004). Results from this study showed that participants read the text with optimal white space slower, but comprehended more than the text with poor use of white space. In another study, Chaparro & Bernard (2001) found that moderate amounts of white space distributed throughout a webpage resulted in higher user preference but no performance differences when compared to low and high amounts of white space for a series of search tasks.

An important source of white space on a textual page occurs around headers, embedded figures, and paragraphs. This white space influences the overall layout of a page and is recommended for optimal reading (National Cancer Institute, 2003). This study examined the effects of such white space on reading performance and comprehension. Participants read online text passages with and without an "enhanced" page layout. Enhanced page layout included optimal use of white space with headers, indentation, and figure placement.

METHOD

Participants

Twenty college students (10 male, 10 female) with normal or corrected vision participated in the study. Seventy percent of the participants reported visiting web sites daily, 15% reported visiting web sites a few times a week, and 15% reported visiting web sites a few times a month. Primary

activities reported were email, browsing, searching for information, online games, online music, and instant messaging. Thirty-five percent of the users reported reading online 7 — 24 hours per week, 15% reported reading 2 — 6 hours per week, and 50% reported reading 0 — 1 hours per week.

Materials

Text passages chosen from SAT and ACT practice examinations of approximately 800 words ($M = 830.17$, $SD = 33.55$) were used in the study. The passages were created in a graphical format by expert typographers to incorporate enhanced page layout including optimal use of headers, indentation, and figure placement. An example of the two conditions is shown in Figure 1. Text passages were randomly presented using a Visual Basic 6.0 program which captured reading time. Passages were presented on a Dell Inspiron 5100 Laptop with a 15" display running 1400 x 1050 screen resolution. Passages were set up on two pages; users clicked on an arrow at the bottom of each page to advance to a subsequent page or return to a previous page. No scrolling was required. Users read the passages at a distance of approximately 50 cm.

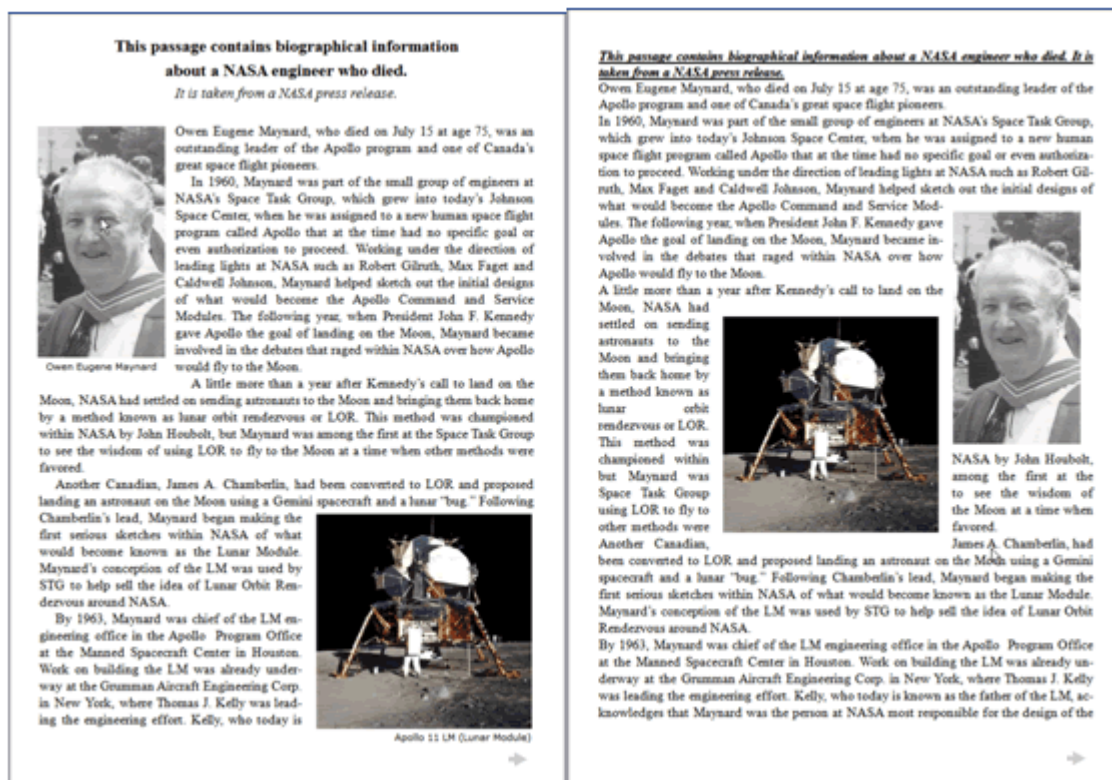


Figure 1. Examples of the Page Layout conditions — Enhanced Page Layout (left), Poor Page Layout (right).

Procedure

Participants were randomly assigned to first read passages from either the Enhanced Page Layout or the Poor Page Layout reading condition. In each condition, they spent approximately 30 minutes reading 3 documents. They were asked to read each document at their own pace. After reading each passage, the participant was given eight comprehension questions about the passage. Participants were permitted to go back to the passage to look up the answers to the questions, but were advised that they only had 5 minutes to do so. After reading all 3 documents, the participants completed a questionnaire regarding their reading satisfaction. Participants then took a short break

and then repeated the procedure with the 3 passages for the other condition. After both conditions were completed, participants were shown a sample page with images of the 2 conditions and asked to state their preference as to which layout they liked best. The order of the conditions and passages was counterbalanced across participants.

RESULTS

Reading performance. Reading time was averaged across passages for each condition and converted to words per minute. Comprehension scores were computed as a sum score out of a total eight possible. Paired-samples t-test revealed no significant differences across conditions for reading speed ($t(19) = .41, p > .05$) or comprehension ($t(19) = .96, p > .05$) (Table 1).

Table 1. Mean (SD) Reading Performance Across Conditions

	ENHANCED PAGE LAYOUT	POOR PAGE LAYOUT
READING SPEED (WPM)	185.60 (47.22)	183.38 (51.36)
COMPREHENSION	5.32 (.99)	5.08 (1.31)

Satisfaction

Paired-samples t-test revealed significant differences across conditions for the satisfaction questions related to layout ($t(19) = 4.11, p < .01$) and mental exhaustion after reading ($t(19) = 2.49, p < .05$) (Table 2). Scores reflect a 7-point Likert scale score; the higher the score, the more satisfied the participant reported being.

Table 2. Mean (SD) Satisfaction Scores Across Conditions (Scale 1 — 7; high score indicates higher satisfaction)

SATISFACTION	ENHANCED PAGE LAYOUT	POOR PAGE LAYOUT
Easy to read	5.20 (1.15)	4.75 (1.37)
Ability to concentrate	5.30 (.98)	5.20 (1.40)
Satisfied with text size	5.25 (1.29)	5.05 (1.50)
Satisfied with layout *	5.50 (1.79)	3.25 (1.71)
Crispness of text	4.97 (1.25)	4.75 (1.09)
Physical level after reading	4.15 (1.08)	4.20 (.95)
Mental level after reading *	5.50 (1.35)	4.70 (1.03)
Confidence in comprehension	5.25 (1.12)	4.75 (.97)
Level of eyestrain	4.90 (1.33)	4.40 (1.53)
Like to read textbook material with this text	4.05 (1.54)	3.25 (1.71)
Like to read leisure material with this text	4.15 (1.75)	3.55 (1.88)
Like to read news material with this text	4.35 (1.63)	4.00 (1.92)

Confidence in comprehension	5.25 (1.12)	4.75 (.97)
Level of eye strain	4.90 (1.33)	4.40 (1.53)
Like to read textbook material with this text	4.05 (1.54)	3.25 (1.71)
Like to read leisure material with this text	4.15 (1.75)	3.55 (1.88)
Like to read news material with this text	4.35 (1.63)	4.00 (1.92)

* $p < .05$

Preference

Results from a Wilcoxon Z test showed a significant preference for the Enhanced Page Layout layout, $Z(N=20) = -3.58$, $p < .05$. Overall, 90% of the participants preferred the Enhanced Page Layout format while 10% preferred the Poor Page Layout format.

DISCUSSION

Results from this study showed that, interestingly, reading performance or comprehension was not influenced by the quality of the page layout, despite the fact that participants often had to sometimes read *around* a photograph in the poor layout passages. Participants reported higher satisfaction and less mental fatigue with the enhanced layout passages than the poor layout passages. Not surprisingly, preference was also in favor of the enhanced layout. This study demonstrates how resilient readers are to poorly formatted online text. Poor use of white space does not impact reading performance. Higher satisfaction and preference of the better layout, should not be discounted, however, since such variables influence whether a user continues interacting with a website or simply moves on to one with better visual appeal.

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