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Reading with RSVP on a Small Screen: Does Font Size Matter?

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Devices with Small Screen Interfaces (SSI), such as Personal Digital Assistants (PDAs), are in great demand due to their small size and their many functions. One important drawback, however, is the limited amount of real estate that can be devoted to the presentation of text. When considering this limitation, questions arise as to the best way to present electronic text so that both the quality of the reading experience and user preference is optimized.

One way that might optimize reading performance is to use a Rapid Serial Visual Presentation (RSVP) format for the presentation of text. As the name suggests, RSVP serially presents text one word at a time in the same area of a screen. This type of format has been found to produce generally positive results. For example, a study which compared the RSVP method to a sentence-by-sentence format, as well as a more traditional page-like format found each method to be equally efficient in terms of reading comprehension (Rahman & Muter, 1999).

In addition to text presentation, another factor to be considered is text character size. That is, reading speed tends to improve with an increase in text size, but only up to a critical point (called the maximum reading speed) after which the effect levels off (Legge, Pelli, & Schleske, 1985).

In the Summer 2000 issue of Usability News, we reported from our study of SSIs that the use of RSVP could serve as a viable method of text presentation for small electronic devices such as PDAs, cellular phones, and pagers which display text (Bernard, Chaparro, & Russell, 2000). That study compared RSVP and two other text presentation methods -- ten lines and three lines of automatic text presentation. The current study is a continuation of that research. In particular, we were curious as to how well readers would comprehend RSVP text presented at different speeds with various font sizes. User satisfaction with the presentation formats and general preference for the font sizes were also assessed.

METHODS

Fifteen participants (6 men and 9 women between the ages of 18 and 52) with 20/20 or 20/20 corrected vision participated in this study.

Testing was done on a Pentium II class computer, with all text material displayed on a 1024 x 768 resolution color monitor. The testing software, [Ace Reader Pro](#)TM, was used to present the text in RSVP format and to administer the associated comprehension test questions.

The manipulated variables were: (1) font sizes of 12, 20, and 28 points; and (2) automated presentation rate -- either 250 words per minute (wpm) or 650 wpm. The dependent variables were reading comprehension, satisfaction, and preference. The order of font size, presentation rate, and passage number was randomized to counterbalance across participants, with each participant being presented three passages for each of the six conditions.

The passages ranged from 127 to 269 ($M = 204$) words. The text was presented in black Arial font on a light gray background in an attempt to approximate the background of the average PDA screen. After participants read each passage they answered five comprehension questions related to the passage.

After answering the comprehension questions for the three passages in each condition, participants answered a reading satisfaction questionnaire. The questionnaire asked them to rank their level of satisfaction with the format they had just experienced on a 10-point scale. The question items dealt with such issues as ease of reading, physical and mental fatigue, the ability to concentrate, and desire to read in RSVP format for leisure or work.

Upon completion of all testing, participants completed a post-experiment questionnaire to ascertain the participants' preferences with regard to the various font sizes and speeds presented.

RESULTS AND DISCUSSION

Reading Comprehension

The results of a 2 x 3 (speed by font size) repeated-measures analysis of variance showed a significant main effect for speed [$F(1,14) = 40.57, p < .001$], indicating comprehension was best at 250 wpm. There was no significant main effect of font size nor a speed by font size interaction, indicating that size had no effect on reading comprehension.

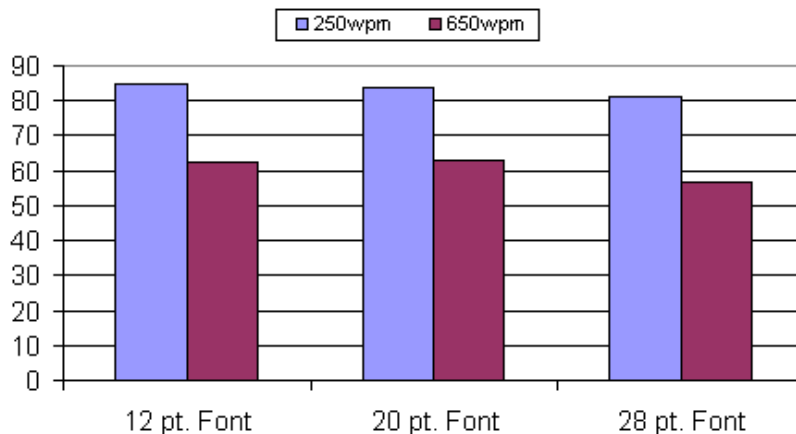


Figure 1. Effects of Presentation rate on Reading Comprehension by Font Size User Satisfaction

Satisfaction

Participants' also reported higher satisfaction with reading the passages at the slower 250 wpm rate. They did, however, report significantly more eyestrain when reading the 12-point size font at either speed.

Font Preferences

One portion of the post-experiment questionnaire asked the participants to rank the three font sizes used during the experiment according to their personal preference. Participants preferred the medium-sized font (20-point) the most, and the smallest font (12-point) the least [$\chi^2(2) = 8.93, p < .05$].

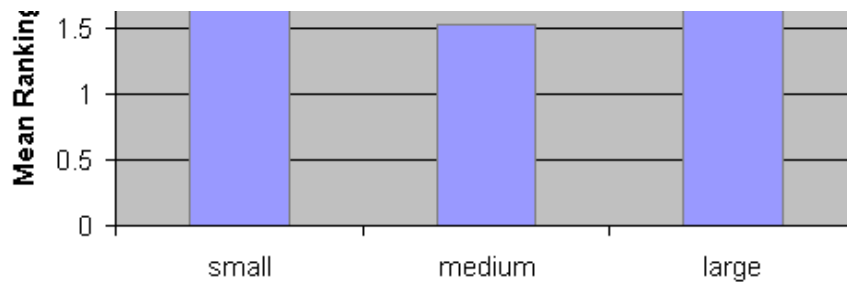


Figure 2. Preference of Font Sizes (the lower the rank, the more the font size was chosen as the most preferred)

In light of the need to find efficient ways of presenting text on increasingly small electronic devices, such as PDA's, cellular phones and digital pagers, the results of this study are encouraging for the use of RSVP. Though no performance differences were found, this study suggests that users prefer fairly large text (20-point) presented at slower speeds (250 wpm).

Previous research has shown RSVP to be comparable to other more traditional text presentation formats as far as reading speed and comprehension, and the results from this study show that RSVP is a resilient format which can accommodate a number of font sizes. This should be encouraging to designers and manufacturers of devices with SSIs, in that text can be presented efficiently despite space restrictions. Of course, more research is needed, most especially the need for testing on actual hand-held devices under various environmental conditions, but, overall, RSVP seems to be a valuable, untapped resource for reading text on SSIs.

Note:

A presentation based on this work was presented at the Human Factors and Ergonomics Society's 45th (2001) Annual Meeting in Minneapolis/St. Paul, MN.

REFERENCES

AceReader Pro Copyright © 1995-2000, StepWare, Inc. All rights reserved. StepWare and AceReader Pro are registered trademarks of StepWare, Inc.
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