Usability News

January 2002, *Vol. 4 Issue 1*

| Volume 4 Issue 1 | Past Issues | A-Z List |

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.
Barbara S. Chaparro, Editor

A Comparison of Popular Online Fonts: Which Size and Type is Best?

By Michael Bernard, Bonnie Lida, Shannon Riley, Telia Hackler, & Karen Janzen

In the last edition of Usability News we discussed our findings in regard to the performance and preference of twelve different fonts at the 12-point size. We are now able to compare these fonts at the 10-, 12-, and 14-point sizes. To do this, we examined some of the most commonly used fonts for differences in reading effectiveness, reading time, perceptions of font legibility, font attractiveness, and general preference. The fonts that were examined are listed below in Table 1.

Table 1. The eight fonts studied (View a sample of each font type)

Serif Fonts	Sans Serif Fonts
Century Schoolbook (Schoolbook) Courier New (Courier) Georgia Times New Roman (Times)	Arial Comic Sans MS (Comic) Tahoma Verdana

Currently, text that is viewed on computer screens consist of an amalgamation of both serif and sans serif fonts that were designed specifically for computer use, as well as those that were originally intended for print (serif fonts cross-strokes that project from the main stroke of a letter, whereas sans serif fonts do not). Fonts designed for print, such as Times, were created for both legibility and economy of print space. Georgia, on the other hand, was designed specifically for computer-display. Georgia is somewhat similar in appearance to Times. However to make Georgia more legible for computer-screen viewing, its uppercase characters were lightened and the letters' x-height (the height of the torso for lowercase letters, such as an 'x') was increased. Research by Boyarski, Neuwirth, Forlizzi, and Regli (1998) examining Times, Georgia, and Verdana fonts on computer screens has found that Georgia was significantly perceived to be easier to read, sharper, and more legible than Times.

Another commonly used serif font is Schoolbook. Schoolbook was designed for maximum legibility, and is still used in elementary school texts. Courier, on the other hand, was originally designed as a typewriter face and is currently the most commonly used mono-spaced font.

The most commonly used sans serif font is reported to be Arial (Ramsden, 2000). However, Tahoma, and Verdana are also very popular. Arial has a rather large x-height and the letters are spaced so they do not touch. Both Tahoma and Verdana were specifically intended for viewing on computer-screens by also having wider letter spacing and a large x-height. In addition, great effort was taken to make the lowercase letters, j, l, and I more distinctive on computer screens. Tahoma and Verdana are fairly similar to each other, except that Tahoma has a greater letter width than Verdana. Another sans serif

font that has become quite popular is Comic. Comic was designed to mimic print found on comic strips, and it is generally preferred among children (Bernard, Mills, Frank, & McKown, 2001).

METHOD

Participants

Sixty participants (16 males and 44 females) volunteered for this study. They ranged in age from 18 to 55, with a mean age of 24 (S.D. = 7.8 years). All participants had 20/40 or better unaided or corrected vision as assessed by a Snellen near acuity test. Thirty-three percent wore prescription glasses. Ninety-three percent of the participants reported to have regularly read documents on computer screens at least a few times per week, and 78 percent of them had at least four years of college.

Task Design

The task design and procedure was the same as discussed in the last issue of Usability News (Bernard, Mills, Peterson, & Storrer, 2001) except that in this study, type size was examined as well. A Pentium II based PC computer, with a 60 Hz, 96dpi 17" monitor with a resolution setting of 1024 x 768 pixels was used in this experiment.

Results and Discussion

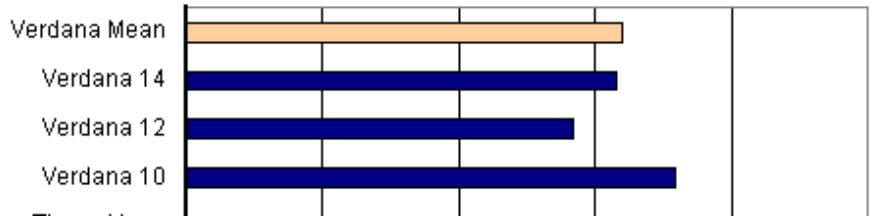
A three-factor mixed ANOVA design was used to analyze objective and subjective differences between the 10-, 12-, and 14-point sizes and fonts. The between-subjects measures were the three type sizes and the within-subject measures were the font types. Ranked font preference was measured by using a Friedman X^2.

Reading Efficiency

Examining reading efficiency (reading time/accuracy) resulted in no significant font size or type effects. That is, fonts that were read faster were generally read less accurately, and thus had comparable reading efficiency scores. This was also found in previous studies (i.e., Bernard & Mills, 2000; Boyarski, et al.,1998), which suggest that differences between the examined fonts at these sizes are not great enough to substantially affect reading efficiency. On average, however, larger text sizes are considered more readable than smaller sizes (Mills & Weldon, 1987; Rudnicky & Kolers, 1984). Yet these readability differences are often not significantly apparent until the size difference becomes quite large (Tinker, 1963). To a large extent, this may be true for online reading.

Reading Time

Examining the mean reading time for each font type irrespective of their accuracy, revealed significant font type [$F(7, 399) = 2.79$, $p < .01$] and size [$F(2, 57) = 4.10$, $p < .05$] differences. Post hoc analysis indicated that both Times and Arial were read significantly faster than Courier, Schoolbook, and Georgia. Fonts at the 10-point size were read significantly more slowly than fonts at the 12-point size (see Figure 1). The average difference between the fastest and slowest read font was 99.4 seconds. For a two-page online document, this difference is not that great. And since the majority of online text is shorter than this, the difference in reading time between fonts should typically be quite small.



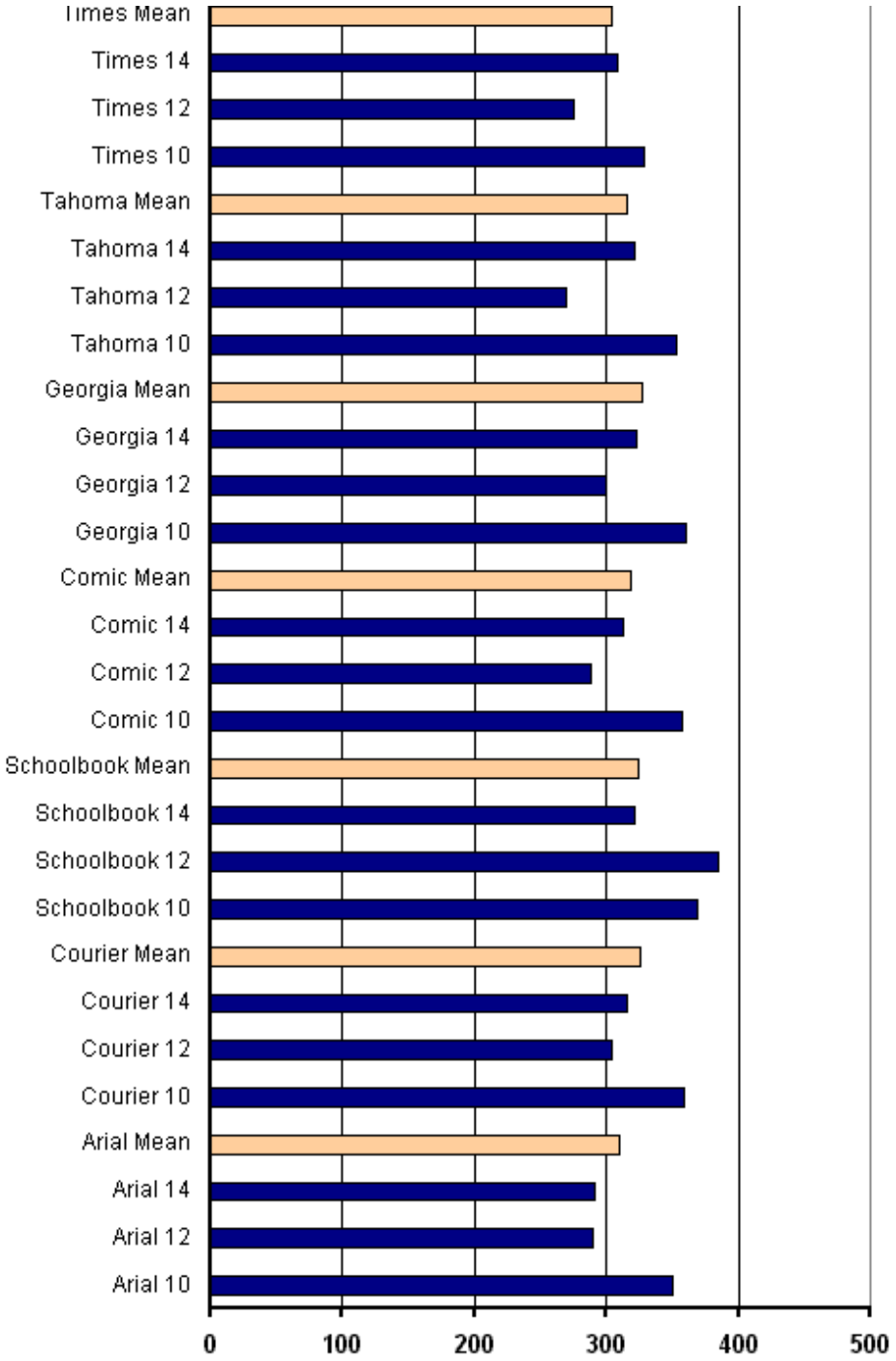


Figure 1. Reading time in seconds (longer bars indicated longer reading times)

Perceived Legibility

Assessing the perception of font legibility revealed a significant font type x size interaction [$F(14, 399) = 2.21$, $p < .01$]. Post hoc analysis revealed that 10-point Tahoma was perceived as more legible than 12-point schoolbook. In addition, 12-point Verdana and Courier were significantly perceived as being more legible than 10-point Comic, Schoolbook and Verdana. Also, 12-point Courier was perceived as more legible than 12-point Schoolbook and Tahoma, as well as 14-point Comic. Interestingly, 10-point Georgia had a significantly higher perception of legibility than 12-point Tahoma and Schoolbook. Fourteen-point Arial was perceived as being more legible than14-point Comic, and 10-point Arial was perceived as more legible than 12-point Tahoma. Moreover at the 14-point size, only Arial was significantly perceived as being more legible than fonts at other sizes (10-point Schoolbook and Comic).

It is thus possible that, in general, increasing text size does not add to the perceived legibility of fonts (at least at these sizes). Overall, Arial and Courier were considered the most legible fonts, whereas Comic was perceived as the most illegible font (see Figure 2).

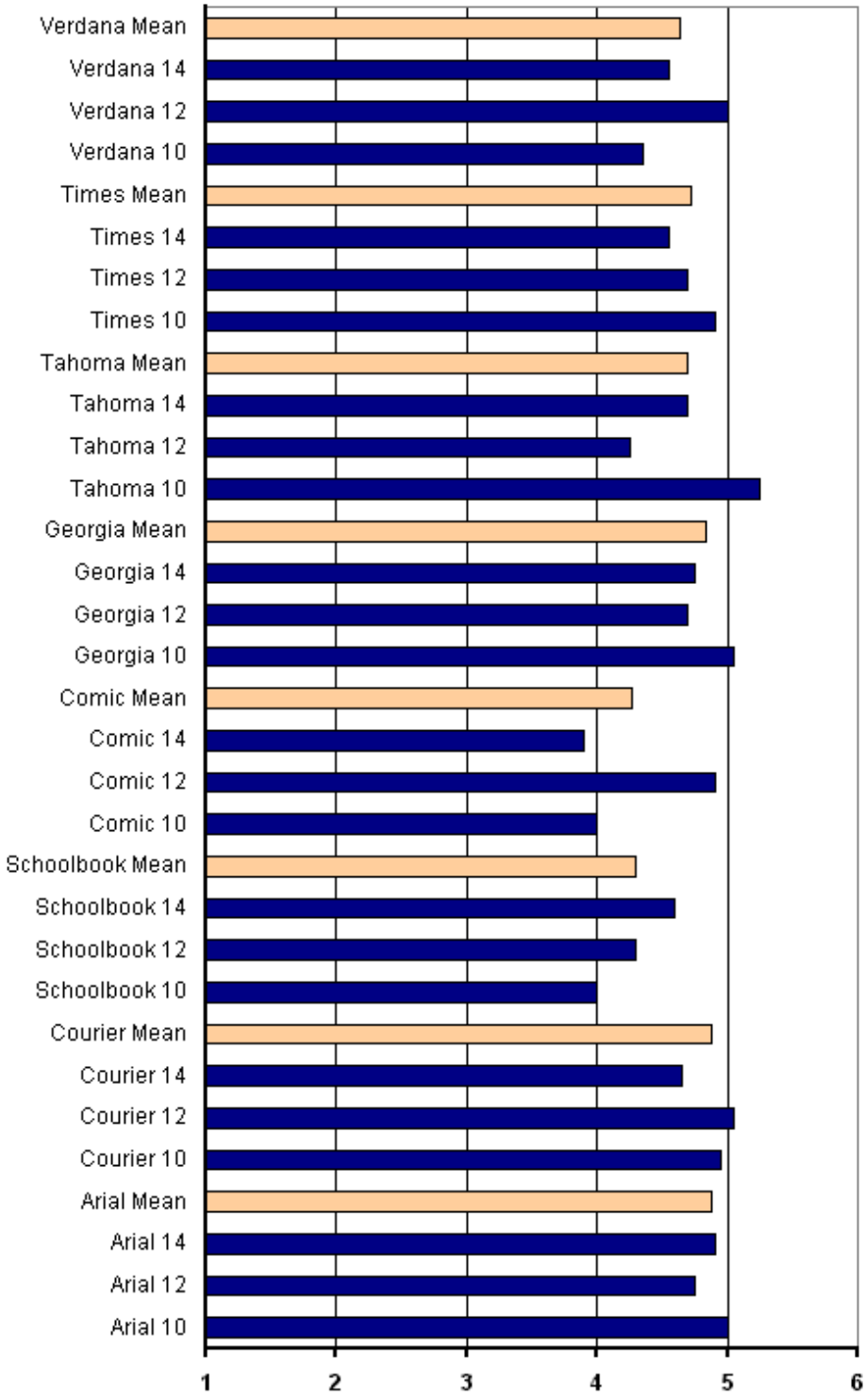
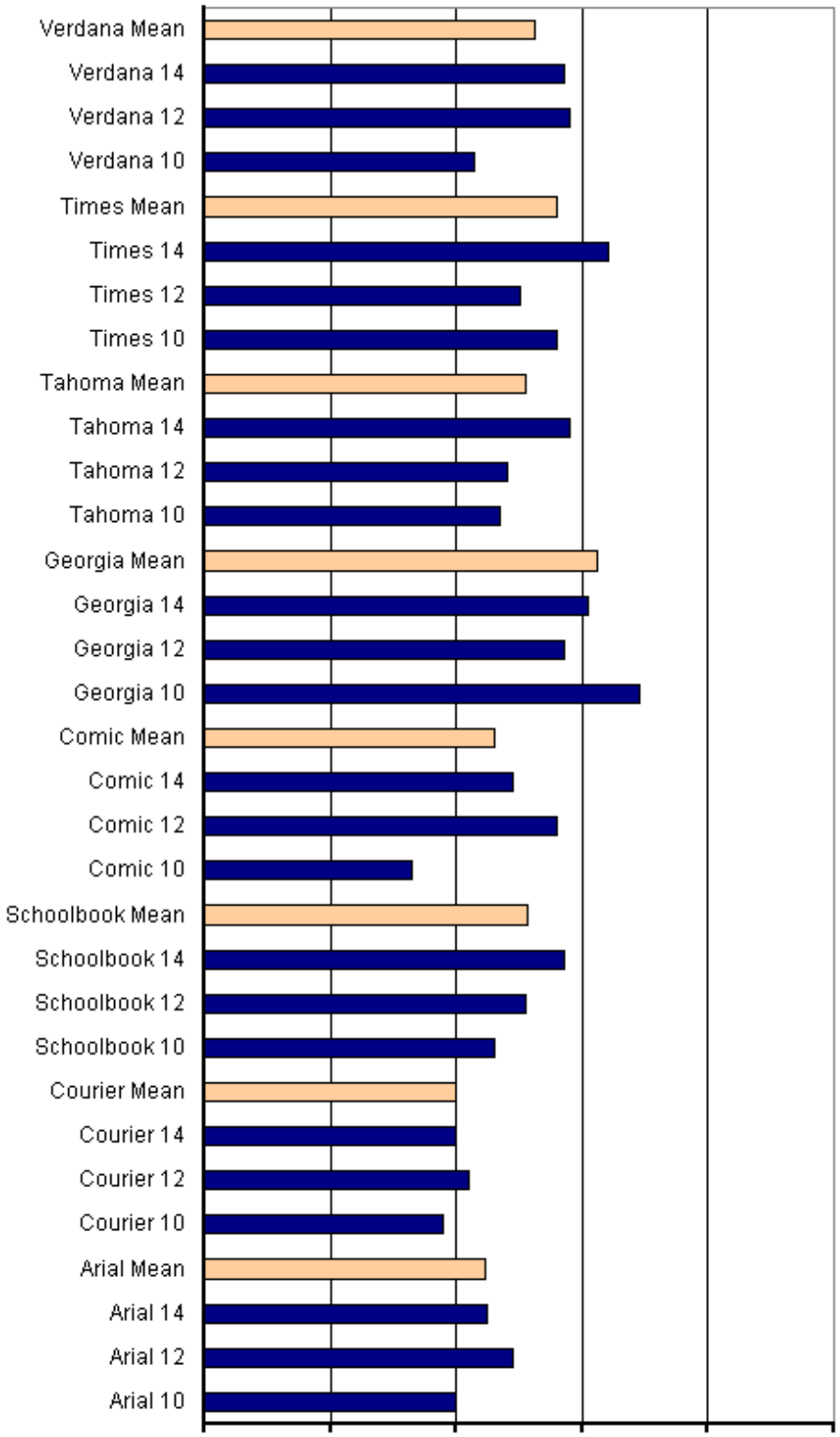


Figure 2. Perceived font legibility (1 = "Not at all" and 6 = "Completely")

Perceived Attractiveness

Examining participants' impressions regarding a particular font as being attractive revealed significant font type differences [$F(7, 399) = 5.64$, $p < .001$]. Post hoc analysis indicated that Georgia was

significantly perceived as being more attractive (regardless of font size) than Arial, Courier, and Comic, while Times was significantly perceived as more attractive than Courier (see Figure 3). It is possible that Georgia and Times were considered attractive because of their widespread use in both print and on computer screens (Times also serves as the primary default for Microsoft Office™ software suites) and, thus, participants were more familiar with this type of font. In fact, the majority of the participants had Times as their default font (32%). Arial came in second with 10% having it as their default font. It is, of course, also possible that the more ornate style of the serf fonts, Times and Georgia, made them appear more attractive than the sans serif fonts (for a more detailed discussion of the subjective reactions associated with the examined fonts at the 12-point size, see Bernard, Mills, Perterson, & Storrer, 2001).



1 2 3 4 5 6

Figure 3. Perceived font attractiveness (1 = "Not at all" and 6 = "Completely")

Font Preference

10-point

Analysis of the participants' font preference at the 10-point size revealed significant differences in ranking [c^2 (7, N = 20) = 59.38, p < .001]. Post hoc analysis indicated that Arial, Courier, Comic, Georgia, and Verdana were significantly preferred to Times. Verdana was significantly preferred to Schoolbook. Verdana was the most preferred and Times was the least preferred font at this size, which is not that surprising since Verdana was designed specifically for the computer screen whereas Times was not.

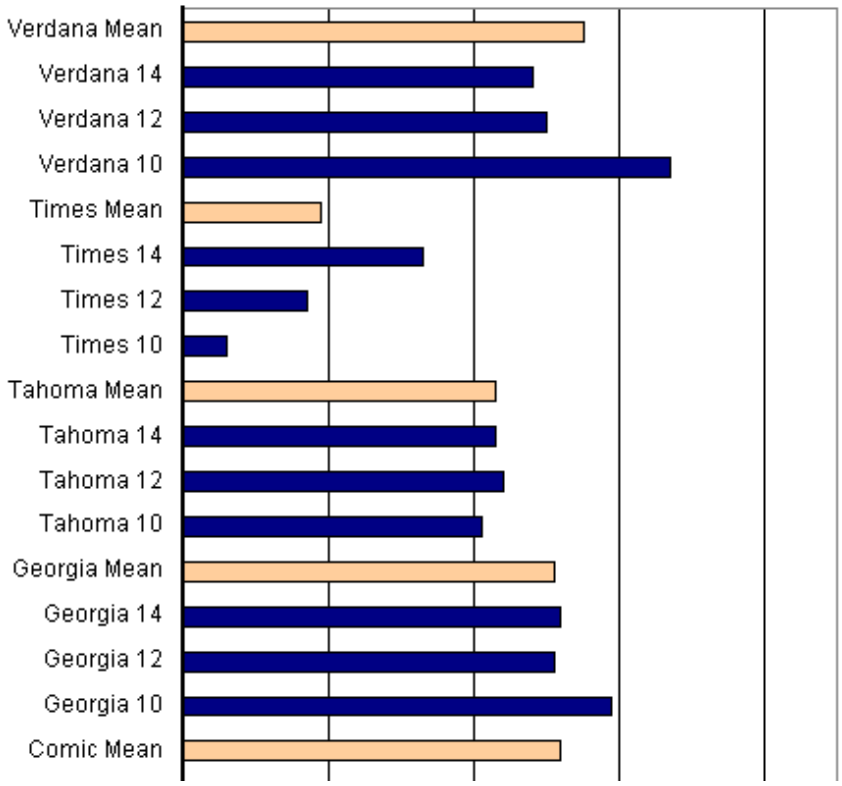
12-point

Comparing fonts at the 12-point size also revealed significant preference differences [X^2 (7, N = 20) = 20.67, p < .01]. Arial, which was the most preferred font, was significantly preferred to Times, which was the least preferred font at this size.

14-point

At the 14-point size, preference differences approached significance [X^2 (7, N = 20) = 13.33, p = .064]. Comic was the most preferred and Times was the least preferred font at this size. It is likely the preference differences were not as striking at this size because at the 14-point size, the letters for all fonts were generally large enough to be comfortably read.

Overall, the analysis of the participants' font preference when considering all three sizes revealed a significant difference [c^2 (7, N = 60) = 72.77, p < .001] in that Times was significantly less preferred to all fonts except Schoolbook. Schoolbook was significantly less preferred to Verdana. Overall, Verdana was the most preferred font, while Times was the least preferred font (see Figure 4).



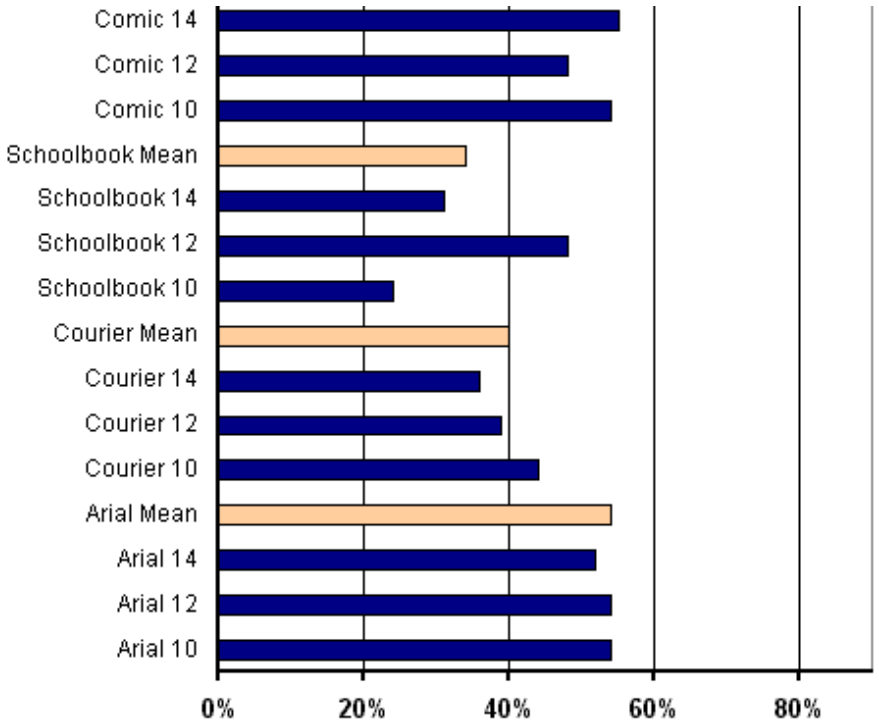


Figure 4. Font preference (longer bars indicates more preferred font choice).

CONCLUSION

Several observations can be made regarding the examined font types. First, no significant differences in reading efficiency were detected between the font types at any size. There were, however, significant differences in reading time. Generally, Times and Arial were read faster than Courier, Schoolbook, and Georgia. Fonts at the 12-point size were read faster than fonts at the 10-point size. In addition, a font type x size interaction was found for the perception of font legibility. In general, however, Arial, Courier, and Georgia were perceived as the most legible.

For font attractiveness, Georgia was perceived as being more attractive than Arial, Courier, and Comic, while Times was perceived as more attractive than Courier. This contrasts with participants' general preference for a particular font type. Overall, Verdana was the most preferred font, while Times was the least preferred. Thus it seems that the Georgia and Times serif fonts are considered more attractive, but they are generally less preferred. Of the fonts studied, Verdana appears to be the best overall font choice. Besides being the most preferred, it was read fairly quickly and was perceived as being legible.

As with all studies that examine reading performance, caution should be made in generalizing these outcomes to other font types. Many factors should be taken into account, such as individual text characteristics, the text size, the line and character spacing, the computer settings, as well as the user characteristics.

REFERENCES

Bernard, M., & Mills, M. (2000). So, what size and type of font should I use on my website? *Usability News 2.2* [Online]. http://psychology.wichita.edu/surl/usabilitynews/22/font.asp

Bernard, M., Mills, M., Frank, T., & McKown J. (2001). Which font do children prefer to read online? *Usability News 3.1* [Online]. http://psychology.wichita.edu/surl/usabilitynews/31/fontJR.asp

Bernard, M., Mills, M., Peterson, M., & Storrer, K. (2001). A comparison of popular online fonts: Which

are best and when? *Usability News, 3. 2*. [Online].
http://psychology.wichita.edu/surl/usabilitynews//32/font.asp

Boyarski, D., Neuwirth, C., Forlizzi, J., and Regli, S. H. (1998). A study of fonts designed for screen display. *Proceedings of CHI'* 98, 87-94.

Mills, C. B. & Weldon, L. J. (1987). Reading test from computer screens. *ACM Computing Surveys*, 19 (4), 329-358.

Ramsden, A. (2000).Annabella's HTML Help. [Online].
http://www.geocities.com/annabella.geo/fontface.html

Rudnicky, A. I., & Kolers, P. A. (1984). Size and case of type as stimuli in reading, *Journal of Experimental Psychology in Human Perception and Performance*, 10, 231-249.

Tinker, M. (1963). *Legibility of Print*. Ames, IA: Iowa State University Press.
