

Legibility of figure/ground colour combinations for the electronic display of text

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The purpose of this research was to provide an empirical basis for improving the legibility of text (letters, words, sentences) on colour monitors in a workstation setting.

There is an expressed need for display legibility research involving colour in the literature yet until recently¹ very little empirical work has been done.

Print legibility research has been conducted for over one hundred and fifty years.² Work on display legibility is still in its infancy. The methods and results of previous research in both print and display provided the raw material from which a framework for display legibility research was constructed.

Thirty subjects were chosen randomly from the undergraduate student body at Western. The methodology consisted of developing and implementing a microcomputer administered, repeated-measures, experimental design. The colours used were the electronic primaries; red, green, and blue; the secondaries; brown, cyan, and magenta; plus black and white. These colours combine to form fifty-six unique figure/ground colour combinations. The legibility of each combination was measured at three levels of performance: at the character identification level (Experiment 1), at the word recognition level (Experiment 2), and at the sentence readability level (Experiment 3). Experiment 4 measured preference at the intermediate or word level. The experiments were preceded by pre-tests for visual acuity, colour-blindness, and astigmatism. Since responses to the textual stimuli were made at the keyboard, each subject's keyboarding skill was also assessed.

¹ The first study was done by Bruce and Foster in 1982. It was entitled: "The Visibility of Colored Characters on Colored Backgrounds in Viewdata Displays" and was published in Visible Language, Autumn, p.382-390.

² Tinker's Legibility of Print published in 1963 by The Iowa University Press is the classic monograph in this area.

Data analysis consisted of primary and secondary analysis. The primary analysis programs were written by the investigator and produced graphical displays called legibility scales. A legibility scale consisted of a full screen display made up of eight horizontal bars representing each background colours. These bars were arranged in ascending order of luminance from black, at the bottom of the screen, to white, at the top. Figure colours were plotted as small rectangles of that colour on these bars. The plot position of these rectangles on each bar was determined by the standard legibility score for that figure colour on that background colour. This technique made it possible to display the relative legibilities of all fifty-six figure/background colour combinations on a single screen. These legibility scales provide the required empirical basis for selecting legible figure/ground colour combinations for the electronic display of text. Secondary analysis used standard statistical procedures to produce quantitative results which supported and complemented the legibility scales produced in the primary analysis.

It is hoped that the programs developed for data collection and analysis and the legibility scales produced from the formal experiments will help end-users, software suppliers, and information providers to choose legible figure/ground colour combinations for the display of text.