

Typographical Factors Affecting Reading in Digital Environment

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Abstract

Rapid development of the World Wide Web (WWW), along with the widespread use of text processors has increased the volume of documents that are reading from screen. As with reading printed documents, there are many different ways of reading electronic texts, which may be determined by the reader's purpose, skills, or circumstances of reading. Web pages are frequently skimmed, rather than reading in depth or detail, but there are also circumstances where reading can be done in a normal rate. For this there are some ways of presenting text on screen which facilitate more effective reading, this may ultimately reduce the amount of documents that are print from screen. Several typographical factors such as text layout, font, format, background colour, eye fatigue are affecting the online reading. This paper discusses the typographical factors that are affecting the reading in digital environment.

Keywords

World Wide Web, Screen Based Reading, Typographical Factors, Online Reading, Digital Environment, E-learning

Introduction

Reading is one of the oldest habits of human civilization. It has been the passion of the greatest personalities of all times. One of the first documentary sources for reading was manuscript, and it was accessible only to the elite class of society. With the arrival of the Gutenberg printing press, printed word was available to all. The Gutenberg printing press brought drastic changes to the fundamentally oral society of the day. It was certainly a great jump in the humanity's onward march to the reading society. The scope of reading resources has changed drastically in the digital environment to include websites, webpages, e-books, e-journals, e-papers, e-mail, discussion boards, chat rooms, instant messaging, blogs, wikis, and other multimedia documents. Today the reading has social, academic, economic and survival significance, because democracy of a country can survive when people at large have reading competence. Therefore, reading gives both power, and pleasure with understanding, by reading the material as a unified whole, by which one can expand the frontiers of knowledge and scholarship.

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Reading is the most important task that people perform on computers. It is the core task not only in reading news and other content on the Web but also in composing office documents and spreadsheets as well as communicating via e-mail and text messaging on mobile phones. The amount of time spent on reading from computers is only growing. As the computer becomes a common platform for the dissemination of information, it has become increasingly important to reexamine the presentation of text to this medium. Wright (1995) stresses the author's role in designing readable documents; the message is that the onus for achieving successful communication cannot be safely left to the readers. Writers need to see themselves as catalysts for the strategies that their readers adopt; and they need to be aware of the design features that promote the selection of particular strategies.

Reading in the 21st century networked society is no longer confined to print reading. The printed publications were the main medium for traditional reading culture. Various electronic resources come to forefront that changes the traditional reading habits of the readers. People tend to rely more on electronic resources such as e-books, e-papers, e-mails, e-zines, e-journals, e-catalogues, databases, social networking sites, etc. These electronic resources have fully or partially, entered in reading habits of people, who have opened their eyes in full bloom of electronic revolution, adopt these resources most of all. This has increased the global dissemination of information.

When reading electronic texts, readers need basic ICT skills, such as moving a mouse, scrolling down pages and clicking on links, as well as advanced cognitive skills such as scanning and skimming among hyperlinks to search for meaningful and relevant material or judging the credibility of a text (Leu et al., 2008). Therefore, the cognitive process and strategies involved in reading these two types of texts are similar, but the process are much more complex for electronic texts. Both online and traditional text readers construct their own mental models to make meaning of text. The fundamental difference between printed text and new reading literacy is that new literacy is centered on a problem and requires the readers to choose among different online links to actively construct their own interest and to evaluate the quality as well as coherence of the text they read (Coiro & Dobler, 2007). Compared to the printed text, the intertextual connection in online reading is often made more explicit so that it provides increasing access to complex texts for readers to explore in their mind and on the screen.

Moreover, new skills and strategies are required to communicate effectively online using tools such as email, blogs, wikis, discussion boards, chats and messaging. Among these reading practices, locating information is unique to online reading. When searching for information online, one needs to use a search engine, to read the results provided by search engine, to locate information on WebPages, and to make an inference and determine which link will lead to the desired information from one site to another (Henry, 2006).

Impact of Online Reading

With the growing amount of digital information available and the increasing amount of time that people spend on electronic media, the digital environment has begun to affect the reading behaviour; as a result a screen-based reading behaviour is emerging. The screen based reading behaviour is characterized by more time on browsing and scanning, keyword spotting, one-time reading, non-linear reading, and reading more selectively; while less time is spent on in-depth reading and concentrated reading, and sustained attention is decreasing. They also introduce a number of powerful advantages that are traditionally absent in the printed environment, such as interactivity, nonlinearity, immediacy of accessing information, and the convergence of text and images, audio and video (Liu, 2005).

A number of scholars argue that the arrival of digital media, together with the fragmentary nature of hypertext, is threatening sustained reading. If a webpage does not load within three seconds, readers click their way to another webpage or site. Clicking is fast becoming a substitute for thinking. Clicking requires less effort than thinking and is in some instances less painful than thinking. Birkerts (1994) notes that the younger generation lacks the ability to read deeply and to sustain a prolonged engagement in reading. The digital transition has resulted in readers moving from a vertical to a horizontal information seeking model, which leads to them becoming viewers rather than readers. Their behaviour is best described as bouncing, flicking or skittering: they move rapidly along the digital surface, usually with frequent light contacts or changes of direction. Multitasking while reading online is not a new issue. While people are at their laptop or desktop, they will keep a number of browser windows open, blinking images on the web, scrolling and turning of pages, check their email and might also be on their mobile phone checking their twitter feed, also listening to the radio or television as well (Nicholas, 2011). This will lead to decrease in in-depth and concentrated reading. Eveland and Dunwoody (2001) write that it is very difficult for readers to devote full attention to reading because they have to decide which text to read, which hyperlink to follow, and whether to scroll down a page. These problems need to be solved for reading with full concentration. The possible solutions are to take print out of the documents for reading or save them on computer and read offline.

Other possible factor responsible for decreasing in in-depth reading is that the readers are surfing of the free portion of the web where the subjects are not discussed deeply but extensively. Moreover, they may not be aware about the deep-web and open access web resources. The solution is to make the users aware about the deep-web collection, qualitative web resources, and its search tools (Loan, 2011). The other concern is decrease in reading of literature. The possible reasons are lack of awareness of literary collection, lack of adequate literary collection and lack of access to it. The need is to aware people about literary collection on the Web like Gutenberg book project which gives free access to literary collection of famous writers like William Shakespeare.

While new media bring unprecedented freedom for readers, they also induce a new form of constraint. In the print environment, the text is fixed and the author determines the order in which ideas are presented. In hypertext, however the author provides options, but readers choose the order through activating links. The proliferation of hyperlinks has a profound impact on readers reading behaviour such as non linear reading (e.g., jumping from page to page and from site to site). Even for readers who start reading from the same page, what they read may be different depending on which link is activated.

Hyper reading may also reduce the sustained attention to any textual source and lead to more fragmented reading, since each page on the web has to compete with many pages for the user's attention. Links imposed may not be logically associated with the original topic, which may send readers to a site for no discernible purpose and result in disorientation. So online reading has a great impact on readers in the digital environment. As a result, reading practices of new generation are in transition slowly shifting from sequential reading to non-sequential reading, passive reading to interactive reading, concentrated reading to superficial reading and in-depth reading to extensive reading, restricted access to unrestricted access, local sources to worldwide sources, print sources to online sources, local languages to English language and individual reading to participative reading.

Typographical Factors Affecting Online Reading

Reading text is a complex and highly automated process during which readers extract visual information from the page and comprehend the text's meaning. Depending on a reader's motivations, the text type, the media format, and the context, the process of reading varies between and within readers. For example, reading a printed book may be an engrossing, effortless, and relaxing experience that lasts for hours, whereas reading the same text in electronic format may be a consciously demanding process because of poor text legibility and technology-related limitations (Polonen, Jarvenpää & Hakkinen, 2012). As a result, the reader may experience frustration, fatigue, eyestrain or visual discomfort, which could affect reading-related practices.

During the past decades, several typographical factors have been shown to have an important role in text legibility. According to Hill (1986) designers of electronic books should pay attention to the font typeface, font size, inter-character and inter-word spacing, line length, full justification of lines, inter-line spacing, number of lines per page, page size and layout, as well as the internal navigation options. However, because reading on a screen is dependent on both the software and hardware characteristics, most of the published results related to reading experiences are dependent on the display characteristics, which are most often related to the display resolution and size.

Background colour

Reading text from computer screens is better when text is printed in dark letters on light background (positive polarity) than what it is printed in light letters on dark background (negative polarity). Because positive polarity displays higher luminance which leads to better readability of text presented on computer screen. Readability of text presented on computer screen (e.g. on websites) is better when the overall display luminance level is high, as in positive polarity displays. Display polarity does not affect readability (Buchner, Mayr, & Brandt, 2009). Horton (1991) warns that if not used carefully and sparingly, colour can make the tasks of reading text and interpreting small objects slower, less accurate, and more painful. Colour reduces legibility, produces fuzzy edges and tires the eyes. So selection of colour is important as it can affect a reader's speed and ability to read with ease.

Text layout

One variable that has been identified as a possible influence on comprehension is the amount of text that can be viewed simultaneously. The amount of text displayed on screen can be manipulated by varying line length. It has been argued that both very short and very long line lengths slow down reading through disrupting the normal pattern of eye movements. This disruption is associated with the relationship between line length and interlinear spacing. When reading a long line, the eye must make a large movement from close to the end of one line towards the beginning of the next line. If the interlinear space is misperceived, the eye may rest on the wrong line. By increasing interlinear space with longer lines, this problem can be reduced. Another way of making efficient use of the space available on screen is to combine shorter line lengths with a multi-column format. Newspapers and magazines which typically use such formats are increasingly being made available as webpages. To aid readers in their identification of the online products, it may be desirable, at least for some time, for such publication to maintain a similar graphic appearance to the print counterpart (Dyson & Kipping, 1997).

Effect of font and format

Typefaces which are commonly used in electronic mediums are Times New Roman and Arial. The popularity of these two typefaces is ostensibly caused by the fact that most computer operation systems today are pre-configured to have Times New Roman as the default serif typeface, whereas Arial has generally served as a popular sans serif alternative to Times New Roman. Typically, the presentation of Times New Roman and Arial has been displayed in either 10 or 12 point sizes on the Web. The size that is used is often determined at least in part by the x-height (the height of the torso for lower-case letters, or simply the height of a lowercase 'x') of that particular typeface. Arial, which has a proportionally larger x-height than Times New Roman, is often displayed in a smaller text size-such as a 10 point size-whereas Times New Roman is often displayed in a 12 point size, giving them approximately the same x-height and general appearance in height. To a certain degree, for online reading larger text sizes are considered more readable than smaller sizes.

In online reading, commonly used typefaces of around 11 point sizes or more, are generally readable on screen resolutions as small as 1024 x 768 pixels. Tullis, Boynton and Hersh (1995) found no significant differences between 9 point Arial, 9.75 point MS Serif and MS Sans Serif, and 9 point Arial typefaces. However, reading the smaller, 6 point small fonts and 7.5 point Arial was found to be less accurate in detecting typographical errors than when reading the larger, 9 and 9.75 point Arial and 9.75 point MS Sans Serif typefaces.

Reading text with a serif typeface on a computer screen may affect reading differently than from printed material. That is the presumed greater readability of serif typefaces for print material might be reduced, or even eliminated on a computer because of the screen's display characteristics. One such display characteristic is the aliasing or 'stair-casing' phenomenon that is associated with the dot-matrix characters on computer screens which, in effect, can make letters look jagged on medium to low-resolution screens. Efforts to reduce the aliasing effects associated with dot-matrix characters have been accomplished through the use of anti-aliasing techniques, which produce 'smoothed' text within a graphical image (such as JPEG or GIF files) or use formats such as Adobe Portable Document format (PDF) files. Anti-aliased formats are designed to make text more readable by adding several shades of darker contrast to the aliased area as a means to reduce the contrast differences between the background and the characters (Chaparro, Mills & Halcomb, 2003). However, this type of smoothing can blur the letterforms somewhat, possibly making anti-aliased text less readable for particular typefaces and sizes of text than the equivalent in a dot-matrix format.

Reading speed, methods and comprehension

There is a difference in reading speed when reading from printed and online. Reading speed in online reading is slow when compared to print reading. It may be due to a declined sense of orientation when reading long lines of online text presented in single wide columns. Not only the length of line but also the number of characters per line is an important variable influencing the speed of reading. Kurniwawan and Zaphiris (2001) report that people reading paper texts use different methods to keep track of where they are in a passage. Some used their finger to point to the words they were reading. Others tended to use a pencil or a pen to guide them through their reading path. These methods was observed to be used less often when reading documents presented online, although some users did use their mouse pointer to guide them in keeping track of their reading location. Navigation through the document while reading online or on a screen was slow, laborious, and detracted from reading. Online readers failed to make explicit use of cues, such as page length and they had only pictures as anchor points.

Usability problem when reading PDF documents

A PDF document was designed to be distributed for printed and not to be read on a computer screen. Nielsen (2001) points out that PDF readers show higher task time compared to those who read HTML texts. Slower reading of PDF files might be caused by various factors. PDF are optimized for letter-sized sheets of paper but not display in a browser window, which impacts the reader's navigation of the document. Slow navigation/scrolling movement from the top to the bottom of the page and jumpy transitions from one page to the next further slow down the reading process and diminish the reader's sense of orientation within the text. Finally, PDF format lacks efficient note-taking, search, and navigation tools necessary for effective processing of the material and deep learning. Eventually advanced formats and software need to be developed to better accommodate the reading and processing of online and digital texts. Since HTML documents are easier and faster to read, online learners has to give the option to read documents in both PDF and HTML formats.

Eye fatigue

Human eyes may suffer physical injury from a reading environment that is not optimized for their benefit. Although computer screens do not damage vision, eye fatigue can still be experienced in online reading. One of the disadvantages of reading an e-book or e-journal on a backlit computer screen or other LCD or OLED device is that, over time, it places stress on the eyes and becomes fatiguing. Cushman (1986) found that visual fatigue is significantly higher when reading texts on a screen than on paper. Today in the stage of technological development, the display of text on computer screens has been found to have a negative impact on surface legibility (Dillon, 1994). Texts and documents on screen have a lower surface legibility than printed documents. Display contrast and resolution of an e-book cause tiredness when reading on screen. Kang et al. (2009) found that the eye fatigue from an e-book was due mainly to the low display and resolution of the onscreen text.

Conclusion

Several typographical factors influence the reading performance, regardless of the media used. Advances in display technology, especially the increased resolution and development of device-related typographical features, have removed or reduced many text legibility problems. Overall, authors must be aware of the differences between reading from print versus onscreen in order to design documents more effectively and to improve readability.

Rather than deprecating digital technology as hurting our reading quality in the online environment, it should embrace its potential and expect technological advances will reduce the problems even further. While many people do not see digital media as a source for concentrated reading, it should keep in mind that technology is constantly improving and reading practices themselves are evolving.

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