Exploring Interface Effect on Skimming Comprehension: Comparing Low-Clutter and No-Clutter Documentation Presentation Environments

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ABSTRACT
Due to the wide variety of web-based reading environments, it is important to study reading environment effects on the skimming comprehension of information foragers. New readability applications have been developed to reduce visual clutter on web pages and enhance elements of text. This pilot study explored the effects of one of these new readability applications on skimming comprehension in a low-clutter research environment. When comparing the results of skimming for meaning tests between a low-clutter document display and that of the same article in the readability application display, no significant benefits were found. These findings suggest that if a readability application were to have a beneficial effect on skimming, then it would only potentially affect skimming pages presented with higher amounts of web page clutter. Additionally, the exit interview revealed that almost all of the participants preferred the readability display.

For these reasons this poster focuses on the following research questions:

RQ1: To what extent, if at all, does using a readability application improve skimming comprehension when reading a low-clutter web-based article?

RQ2: What are the perceived benefits or effects of using a readability application to skim articles for meaning?

LITERATURE REVIEW
This literature review has been reduced for this poster.

Information foraging (Miller, 1983) assumes individuals make sensible choices about what information they consume. Miller’s ideas have been embraced by Sandstorm (1994) and later by Pirolli and Card (1999) as a theoretical framework for understanding on-line information selection and time allocation. This framework has been used in several studies into online reading (Duggan & Payne, 2006, 2009, 2011; Reader & Payne, 2007; Wilkison, Reader, & Payne, 2012) and informed this study’s investigation of interface effect on online skimming.

Skimming is essentially a way of foraging for information. Due to the sheer volume of text on the web, the way it is searchable, and interlinked, many people compensate by using rapid reading strategies like omitting words, paragraphs or pages entirely (Duggan & Payne 2011, Liu, 2005; Morkes & Nielsen 1997). Several studies have also shown that a skimmed text can still be understood and remembered (Carver 1984; Kiwan, Ahmed, & Pollitt, 2000; Dyson & Haselgrove, 2000).
Reading a multimodal web page is considerably different than reading print text or a PDF article. “Multimodality, in its most fundamental sense, is the coexistence of more than one semiotic mode within a given context” (Gibbons, 2012, p.8). As Coiro (2003) points out, reading online presents many challenges that can impact an individual’s ability to comprehend. On a web page the reading path is “to-be-constructed” by the reader, where the reader can chose links or start reading something else, creating their own path rough a variety of pages (Kress, 2003). Web pages are also often cluttered. Rosenholtz, Li, Mansfield, and Jin (2005) define clutter as “the state in which excess items, or their representation or organization, lead to a degradation of performance at some task.” We define low-clutter in this instance as web pages with minimal clutter and fewer multimodal options, but with the potential to embark on a reading path through the availability of hyperlinks.

METHOD
For this study the Gunning Fox index was used to measure readability of two articles. The index was developed by Robert Gunning in 1952 and was also used by Duggan and Payne (2009) in their study to assess Scientific American articles. Respondents skimmed two articles of comparable difficulty (referred to in this study as either Bionic or Joy due to their subject matter) for meaning in each of the two documentation presentation environments. The low-clutter environment selected was the HTML document interface provided by EBSCO, a journal database. The no-clutter, streamlined environment was the Safari Browser (Apple) Reader application. The Reader display (on the right) has larger text and fewer characters per line (see Figure 1).

![Figure 1: Document presentation environments tested: EBSCO (L), Safari Reader (R).](image1)

Afterwards, respondents answered a series of true/false comprehension questions using Masson’s (1982) method for assessing reading comprehension that was also used by Duggan and Payne (2006, 2009).

Participants
Twelve undergraduates at the University of Missouri were recruited via email. Nine participants were female and three were male; the mean age was 20.83 year old (SD = 1.3). They received $10 USD for taking part in the study.

RESULTS
Those skimming the Bionic article in the EBSCO interface answered 72.74% ($M =39.28, \text{SD} = 4.46$) of the true/false questions correctly. This is higher than the 65.18% ($M =35.2, \text{SD} = 4.6$) questions answered correctly after subjects skimmed using the Reader interface (see Figure 2).

![Figure 2. Bionic article skimming for meaning scores.](image2)

Those skimming the Joy article in EBSCO interface answered 61.11% of the questions correctly ($M =33, \text{SD} =3.31$) and 65.87% ($M =35.57, \text{SD} =3.4$) of the questions were answered correctly after skimming in the Reader interface (see Figure 3).

![Figure 3. Joy article skimming for meaning scores.](image3)

Articles skimmed in the EBSCO interface, regardless of article, yielded correct response rates of 67.88% on the skimming for meaning test ($M =36.66, \text{SD} =5.03$); this is comparable to the number of questions answered correctly after participants skimmed using the Reader 65.57% ($M =35.41, \text{SD} =3.7$) (see Figure 4).

![Figure 4. Combined skimming for meaning scores.](image4)

DISCUSSION

Participant Debriefing
All twelve of the participants liked the reader interface and six thought it improved their ability to skim for meaning.
These limited results indicate that the Reader interface with its more readable font and spacing had no effect on skimming for meaning as compared to the EBSCO document presentation interface and there for would not aid in information foraging. Despite the little bit of clutter, the EBSCO interface, a low-clutter reading environment with more difficult font sizes an spacing and the potential to click hyperlinks in lieu of staying on task, did not necessarily hinder skimming comprehension in a controlled environment.

Based on these results, it is possible to make a series of preliminary suggestions. Database designers may be interested in knowing that the Reader was the preferred interface. Some of the participants found themselves reading rather than skimming when using the readability application; this may imply that the readability for tasks other than skimming was enhanced. For this reason, instructors may encourage students to use such applications once they have selected articles to use for assignments. One participant did reveal that s/he had a severe learning disability when it came to reading and his/her individual score was greatly improved by the readability application, scoring a total of ten more answers correctly.

**Limitations**
The sample size of this pilot study was too small to make the results generalizable or allow for more sophisticated statistical analyses.

**Future Study**
Further research should be done in high clutter environments; additional research should also investigate the effects of readability application on tablets and mobile devices.

**REFERENCES**


