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Text Simplification and Generation Y: An Eye Tracking Study

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ABSTRACT

While important information is often communicated via text, people read only a small fraction of textual content. Ignoring text is particularly prevalent among Generation Y, who prefer image-based communication and exhibit impatient viewing behavior. One way to improve the effectiveness of text-based communication for younger users is to construct textual information in a way that it can be understood with short glances, a hallmark of Generation Y's impatient viewing behavior. To test this assertion, we used a set of plain language standards (PLS) to simplify a text passage from an actual website. The results of our eye tracking study showed that PLS were successful in improving textual communication for Generation Y users. The simplified text passage was processed with shorter glances, facilitated a more effective visual search behavior, and improved task performance significantly.

Keywords

Cognitive Effort, Millennials, Plain Text, Fixation Duration, Saccade Amplitude

Introduction

Internet has become an essential source of information in our daily lives and thus paying close attention to how effectively online content is communicated is relevant and important to both IS practitioners and scholars. One important factor that has significant impact on effective communication of information is cognitive effort (Gregor and Benbasat 1999). Not surprisingly it is commonly accepted that a good webpage should communicate information to its intended users easily and efficiently (Krug 2005). Because websites are visual displays, a great deal of research has focused on understanding how the arrangement of web elements can communicate information to viewers with less effort (Djamasbi et al. 2010). For example, through careful selection of elements (e.g., text and images) and their characteristics (e.g., size and location), designers can cue users the order in which they would want users to view the provided information

on a web page (Faraday 2000). Little work, however, has focused on content which is a more critical part of information communication process. Eye tracking studies show that textual information is often ignored, e.g., only about %20 of all provided text on a page is viewed by users (Nielsen 2008). When people view textual information they don't seem to read it carefully. This pattern of viewing is particularly true for younger users; millennials tend to pay less attention to textual information than their older counterparts (Djamasbi et al. 2010, Djamasbi et al. 2011). Because younger users exhibit "impatient" viewing behavior, designing textual content in a way that it could be read and understood in a short glance, is more likely to improve the effectiveness of online communication for this group of users. In order to test this assertion, we took a text passage from an actual website and simplified it using a set of plain language standards (PLS) (Djamasbi et al. 2016). The objective of plain language rules is to generate clear and to-the-point textual content that is understood easily. Because Generation Y users tend to scan text passages quickly rather than reading them carefully (Djamasbi et al. 2010, Djamasbi et al. 2011), PLS is likely to be successful in developing effective textual communication for younger users. We examined the impact of PLS-generated text on effective communication of content for Generation Y users. In particular, we examined how the simplified content affected viewing behavior and comprehension performance of college students via an eye tracking experiment.

Theoretical Background

When it comes to using technology, Generation Y tend to exhibit impatient behavior (Bolton et al. 2013, Jain and Pant, 2012, Martin 2005, Simons 2010). Generation Y users tend to favor image based communication. They tend to find reading long blocks of text boring and not surprisingly often avoid reading them altogether (Djamasbi et al. 2010, Djamasbi et al. 2011). It is argued that younger users exhibit this behavior because they grew up with technological breakthroughs that made it possible for them to connect to their friends and peers any time anywhere (Abram and Luther 2004, Tulgan

2009). They are used to an “always connected” world where even a small amount of delay in response time is considered unacceptable (Tulgan 2009, Sullivan et al. 2009). Consequently, Generation Y users have developed a heightened sense of immediacy (Tulgan 2009, Olson 2005), which tends to affect the degree to which they are willing to expend effort when processing information (Djamasbi et al. 2011). Hence, simplifying textual information in a way that can be read and understood quickly is likely to result in a more effective communication for this group of users. One way to achieve this goal is by using plain language rules, which refer to standards for developing clear, short, and to-the-point content. Plain language rules were originally designed to develop clear communication for people with limited literacy (PLAIN 2011). Because the objective of these rules is to create text that can be understood the first time it is read, we believe that these rules are likely to improve the effectiveness of online communication for Generation Y users, who tend to have a short attention span (Tulgan 2009, Sullivan et al. 2009). In particular, we argue that text simplification using plain language rules: H1) allows users to read text in short glances, H2) facilitates a more effective visual search behavior, and thus H3) improves comprehension

Method

We used a set of plain language standards (PLS) from a recent study (Djamasbi et al. 2016) to make an actual online text passage easier to read. We then recruited 47 college students to read one text passage (either the original or the simplified version of the text passage), and then answer two questions about the text passage. The text passages and their related questions were displayed on a computer screen. All participants saw two screens, first they saw the text passage and after clicking the “next” button on the first screen, they saw a second screen that had both the text passage and 2 questions related to the text passage. Half of the participants saw the simplified version of the text and the other half the original version of the text in a random order. In order to examine users’ viewing behavior we conducted an eye tracking study. We used Tobii X300 and Tobii software version 3.2.3. to collect eye movement data and used the IV-T filter with 30 deg/sec saccadic velocity threshold to process raw gaze signals into fixations and saccades.

Results

We expected users to understand the simplified text with shorter glances (H1). Because fixations are reliable indicators of effort (Poole and Ball 2006, Djamasbi et al. 2011), we expected participants who read the simplified text to have shorter average fixation duration. The results of one-tail t-test supported our expectation (Table 1). Next we looked at search behavior (H2) by comparing saccade amplitude between the two groups. Saccades refer to fast ballistic eye movements between fixations. Saccade amplitude refers to the path that a saccade

travels when moving from one fixation to other (Holmqvist et al. 2011, Nystrom et al. 2010). Larger saccade amplitudes have been associated with more effective information retrieval (Poole and Ball 2006). The results in Table 2 show that participants who read the simplified text had significantly larger saccade amplitudes compare to those who read the original text. Finally, we looked at performance (H3), which was measured by counting the number of correct answers to questions about the text (Albert and Tullis 2013). We expected participants to have more correct answers when reading the simplified version of the text. The results of the one-tailed t-tests (Table 3) supported this expectation and showed that participants on average had significantly more correct answers when they read the simplified text passage. These results together show that the simplified text was communicated more effectively to participants in our study.

Average Fixation Duration (ms)		
	Mean	SD
Original Text	259.82	16.02
Simplified Text	247.26	15.72
df= 45, t-stat= 2.48, p(one-tail)= 0.017		

Table 1. Cognitive Effort

Average Saccade Amplitude		
	Mean	SD
Original Text	3.76	1.94
Simplified Text	4.27	2.07
df= 45, t-stat= 8.59, p(one-tail)= 0.000		

Table 2. Search Behavior

Performance		
	Mean	SD
Original Text	1.52	1.23
Simplified Text	1.83	1.35
df= 45, t-stat= 1.85, p(one-tail)= 0.035		

Table 3. Comparing Average Number of Correct Answer

Discussion

We argued that text simplification using PLS is likely to improve the effective communication of textual information for Generation Y users, who tend to dislike reading text and show an impatient viewing pattern (Djamasbi et al. 2011). Our results showed that users in

the simplified text condition were able to deliver significantly more accurate answers to questions about the text and did so with significantly shorter average fixation durations. Users' search behavior, measured as average saccade amplitude, was also significantly better in the simplified text condition. These results together show that participants in the simplified text condition in our study outperformed their counterparts in the original text condition. This in turn provides evidence that the simplified text in our study communicated the provided information more effectively to Generation Y users. In other words, the plain language rules that were used in our study to simplify a sports news text passage (from 10th grade reading level to 5th grade reading level) were effective in writing clear text that could be understood in short glances (i.e., with average fixation duration shorter than 0.25s).

These results have important implications. First the results show that the plain language rules used in our study are effective in writing clear online text passages for college students. This is important because it is often believed that plain language rules are only beneficial for providing access to public information for people with literacy issues (PLAIN 2011). Our results show that simplified text is beneficial not only to people with language deficiency but also to educate Generation Y users, who don't have literacy issues but tend to have an acute sense of immediacy.

These results also suggest that simplified text using PLS is likely to be beneficial to all users (not just the younger population) because in today's digital world, we all often feel pressed for time and need to look up information quickly. Finally, the results support the use of eye movement data in understanding user experience of online content, such as cognitive effort when viewing content (e.g., fixation duration) or search behavior (e.g., saccade amplitude).

As in any experiment, the results of this study are limited to the setting and task. In order to generalize these results, future experiments using simplification at different reading levels (e.g., 20th, 10th, and 5th grade reading levels) are needed to refine our analysis. In this study we used an actual text passage from a news website. Future experiments using different genres of websites are needed to increase confidence in generalizability of our results. The participants in this experiment were Generation Y users. Testing a different group of users can help to see if the results can extend to other populations as well (e.g., Baby Boomers). We are in the process of extending this work to different reading levels, different populations, and different genres of websites.

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