Change blindness in web pages

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Abstract

This research paper focuses on the effects of change blindness through examining one of the largest used and most heavily, on the fly, modified webpages out there, Facebook.

Key Words

- Change blindness
- Attention to detail
- Conscious/unconscious thoughts
- Vision
- Daily routine
- User interfaces

Introduction

People are using social media more and more to be one of their primary means of communicating with other people. One of the major social media sites used by people is Facebook which, as of September 2011, has 800 million active users (according to Wikipedia). Facebook is always introducing new features to allow people to keep in contact with others. Some of these features include instant chat between friends as well as small pop-up notifications and news feeds which inform the user about their friends' activities. With all these features that Facebook developers are implementing, are they truly necessary and do the users of Facebook

actually make use of these features or are the developers spending their time developing features that, for the typically Facebook user, they would never notice?

In the late 1970s, the first research into the new recognized phenomenon, change blindness began. "Change blindness is a normal phenomenon of the brain which shows in light that the brain does not have a precise representation of the world but a lacunar one, made of partial details." (Wikipedia). In spite of its name, change blindness does not have to do with a person's eyes and lack of vision, but in fact how the brain perceives information. Research in this phenomenon is still fairly new; however the research "suggests that the brain estimates the importance and usefulness of information prior to deciding to store them or not. Another issue is that the brain cannot see a change happening to an element that it has not yet stored" (Wikipedia). Many examples of change blindness can be found by simply searching on YouTube. An example of chance blindness on YouTube was a scenario where several people, one-at-a-time entered an office, we'll call them candidates, and someone behind a counter, we'll call them the employee, handed them a simple survey to fill in. Once the survey was completed and returned to the employee, the employee would duck behind the counter to file the survey. While the employee was ducked behind the counter, another employee would stand back up, in the same location as the first employee, and gave them a form and asked the candidate to walk down the hall. Once the candidate walked down the hall, someone asked them how many employees they dealt with at the counter. Over 80% of the candidates said that they dealt with one employee only. The person at the end of the hallway had to inform all the candidates that they were incorrect and explained that they had in fact dealt with two employees.

When we first were introduced to change blindness in our BTH740 - Human Factors in Computing course at Seneca College and looked at change blindness videos online, we found it to be fascinating phenomenon. As someone watching these videos or hearing stories, we couldn't believe that people could have something major change in front of them, but because they were so focused on something else, typically something even smaller, they didn't notice the big picture changing. With this in mind, we started thinking about how software systems are very dynamic and may contain several sections of a page automatically updating and being modified at once. We started wondering if change blindness would have any effect on the software that we will be writing in the future. When we were thinking of the future, we started thinking about the present and whether we might even be unaware of change blindness in software or other systems that we used currently. That is when we started wondering if even while we are using Facebook if there might be things that occur on the screen that we are completely unaware occurred.

Context

This research resides in the stream of change blindness within the field of visual perception in psychology. Our research is put into this context because it expands on and explores how the mind copes and deals with changes in fields of vision that are actively being processed. Our research fits in amongst other works that has been conducted on this topic by researchers such as "Bridgeman, Hendry, & Stark, 1975; French, 1953; Friedman, 1979; Hochberg, 1986; Kuleshov, 1987; McConkie & Zola, 1979; Pashler, 1988; Phillips, 1974" (Daniel J. Simons, Page 1).

Purpose

The purpose of this research paper is to explore whether or not the effects of change blindness affect users of Facebook as part of our final research paper for Seneca College's fourth year Bachelors of Software Development - Human Interactions with Computers course.

Interpretations

Although limited by sample size, our research eludes to change blindness not being a factor of a user's interaction with Facebook.

Thesis Statement

How do the effects of change blindness affect the usability of Facebook?

Body

External Research

When researching our topic, Change Blindness, we found several documents concerning this topic. Out of the many documents we found, we choose seven documents to focus on. After reading each document, we decided upon five documents. One was dismissed due to many grammatical errors while the other was dismissed due to it being almost identical to another document which was found. With the remaining five documents, we settled upon what our test would cover, which is "Can users notice one thing while being occupied by another?" Here are our results and findings from these documents.

Our primary document is titled *Current Approaches to Change Blindness*, and was written by Daniel J. Simons of Harvard University. This document is a great overview to the topic of change blindness. This document also provides challenges to studying change blindness. For instance, for someone to notice that a change has occurred, they must be paying

attention. But in the document, Mr. Simons states that "although attention appears to be necessary for change detection, it may not be sufficient" (Daniel J. Simons, Page 5). This means that regardless if you are paying attention, you may not notice a sudden change, "All observers failed to notice when the central object in a brief motion picture (a soda bottle) was replaced by a box following a brief pan away from the table" (Daniel J. Simons, Page 5). With this in mind, we started to form out test parameters.

Our secondary document is titled *Change-blindness as a result of mudsplashes*, collaborated by J. Kevin O'Regan, Ronald A. Rensink, and James J. Clark. This document is actually an article from Nature, Volume 398, published March 4th, 1999. This article is interesting, as it provides a study to help "validate" change blindness. It also follows closely with our own personal test, but along with a different path (pictures vs. Facebook). In the article, they displayed 48 pictures, for 3 seconds, with a 'mud splash' for exactly 80 milliseconds. Whereas with our research we displayed "notifications", either by liking a post, or posting something on the tester wall. This was done in intervals, ranging from every second up to 10 seconds. After seeing the similarities between this and our initial idea for a test, our test appeared to be finalized.

Our three remaining documents were *Beyond the Grand Illusion*, collaborated upon by Alva Noë of the University of California, Luiz Pessoa of the University of Rio de Janeiro, and Evan Thompson of York University. This document shows a more physical look at change blindness, including how human biology can be a factor. The second document is *Neural correlates of change detection and change blindness*, collaborated upon by Diane M. Beck, Geraint Rees, Christopher D. Frith and Nilli Lavie. This document talks about how research was done with MRI's to see how the brain reacts when experiencing change blindness. The final

document studied was *Change Blindness Blindness: The metacognitive Error of Overestimating Change-detection Ability*, collaborated upon by Daniel T. Levin, Nausheen Momen, Sarah B. Drivdahl as well as Daniel J. Simons. This final article helped with our primary research the most, but does not pertain to our subject as much since it did not deal with our thesis. It was more of presenting findings from someone else's research.

The Setup

As part of our primary research, we decided to conduct two experiments. The first was a surface quiz of sorts where we simply polled people on their Facebook experiences to see if we were heading in the right direction. The second was a longer form of analysis where we had them use Facebook and we would record the results.

To begin our research, we surveyed Facebook users about their Facebook use habits. Our demographic for our tests were young adults between the ages 17-25 who were attending a post-secondary institution. To begin, we sat down as a team and discussed what questions we would need to ask people to gather information about how they use Facebook. We also needed to determine what areas of the main Facebook page we would want to focus our attention when we would test them in our second wave of testing.

Our second wave of research consisted of a booth setup outside of Seneca@York's library and computing commons. Our demographic for our tests were young adults between the ages 17-25 who were attending a post-secondary institution. We had a table setup with three laptops, two running Windows 7 for the testers and one running Fedora 15 for the subject. The subject's computer had gtk-recordMyDesktop installed. This allowed us afterwards to view the user's actions on the webpage in conjunction with a FujiFilm Finepix camera mounted above the screen to record their eye movements. We utilized three supervising researchers throughout the

process, the first two operating the Windows 7 laptops and the third to setup and supervise the subject.

Procedure

The procedure for our first experiment was simple; we printed off our questionnaire and asked a few people to complete the survey. We never collected any personal information about the people being surveyed and the people being surveyed were informed about this. Once the person was finished filling in the survey, they returned it to us.

The procedure for the second experiment was quite simple contrary to the setup. It consisted of a very basic premise. The test subject would be viewing the Facebook homepage where a chat window was open to one of the researchers. The researcher would then periodically send simple elementary maths to the subject to which they would have to solve and respond. Periodically the second researcher would 'Like' or 'Post' something on the subject wall causing a popup to appear in the bottom left-hand corner of their screen. The subject would then have to verbally say 'notification' to show that they noticed the change.

Data Collection

For collecting data, for both tests we ran into difficulty due to the sample size. For our second test, we were setup near the entrance to the library and computing commons we were frequently turned down for volunteers to participate in either of our studies. That being said we managed to get a larger sample for our smaller test due to its small temporal footprint. The longer test got mixed answers ranging from ignoring our offer to promising to come back. We also had the difficulty that since we had a Student Federation banner (this because we needed permission, which we obtained from Student Federation, to perform our survey in the halls of

Seneca College), students thought we were representing Student Federation and would ask us about bus schedules or information regarding services offered at the college.

For our first test the process of collecting data was done by asking a few students in the Open Lab to fill in our survey. As stated before, we simply just had the people answer the questions in the survey. Most of the questions were of the genre of circle which ones apply to you or circle one and explain why/why not.

For our second test the data extraction process was a bit more complex. We had three pieces of data that we had to look at: The eye movement in the film of the participant, so we could not when their eyes moved to the notification; the screen recording which shows us when the notifications appeared to the subject; and the audio also from the film which recorded when the user noticed the change. We then took the eye movements and compared them to the desktop recording to piece together whether or not they were blind to the notifications. The audio was later referenced to determine if their eye movements lied in a fashion and although they saw the change they did not actively process it.

Results

Our results were varied depending on the tests we completed and admittedly, although our research only represents a small sample size, it seems to have some consistency of results.

In our first test, our results showed that for most people the most popular method of communication with others was using the Facebook chat feature. This was because this gave people instant communication with the person they were talking with. The second most popular means of communication was using the Facebook messaging feature and finally the least most popular means of communication is communication through wall posts. Knowing how most people communicated with others allowed us to know how to flood users with information to see

if change blindness would come into effect when we tried to send other forms of communication and to see what the response times where like.

In our second test we experienced a relatively small array of results. They ranged from participants immediately recognizing the change to users who had only a minor delay, i.e. two or three seconds. The average participant seemed to recognize the notifications almost as soon as they appeared. The most challenging aspect to analyzing the results was the fact that we lacked the tools to properly account for small changes in reaction times. This is important because in such a small amount of data, small variance could prove to provide tangible results if the scope of the participant selection were larger.

Things we would change

One of the main things we would change when gathering our primary data is a substantial increase in our sample size. With a combined total of roughly 20 people, there is a lot of room for error. If we surveyed 100 or more people per survey, there would be a more accurate result.

Another thing we would change is the hardware we used for the second survey, the interactive booth session. We used a combination of hardware, ranging from an external camera to an open-sourced screen capturing program. If we could have used a laptop or desktop with a built in camera, and a screen capturing program that allowed the software to automatically tie in the camera feed, the data gathering step would be much quicker. Since there is a delay between what the camera shows and what the screen capture shows (both where running at a different frame rate), there was room for error. Only with this better hardware and software, would this error be eliminated once and for all.

Conclusion

Based on the research we conducted it is hard to make any definite conclusions, but upon combining our research with what we have learned from other papers the evidence eludes to the fact that change blindness is not prevalent with Facebook users. Another conclusion, although accidental, brought about by our research is that conducting human interactions with computer testing is difficult to attempt in a public setting. The general setup for the test is daunting to most and takes up too much time for most to place into their schedules unless you have some relation to them.

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