Appeal of Web Page Layout and Characteristics Based on Age: Usability Research through Eye Tracking at Fidelity Investments Inc.

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ABSTRACT

This project examined various web page features to determine which would be most appealing to two large market segments, Generation Y and Baby Boomers. Three sets of hypotheses, grounded in previous research, were developed, and an online survey and two laboratory experiments using eye tracking equipment were conducted. The results of this study provide valuable information on the design preferences of different generations. Based on these results, the study provided future recommendations for the design of the Fidelity Investments homepage.

EXECUTIVE SUMMARY

This project was completed in collaboration with the e-Business Design group at Fidelity Investments Inc. in Boston, MA. The goal of this project was to identify web page design preferences based on different age groups in order to provide recommendations for the Fidelity homepage. 2.4 million Internet users visit the Fidelity website daily, and 95% of their customer transactions are conducted online; it is essential that Fidelity both inform and engage users.

This project focuses on two age groups: Baby Boomers, aged 44-62, and Generation Y, aged 18-31. A great deal of background research was performed, particularly in the areas of web usability and the Internet behavior. Based on this prior literature, three hypotheses were formed.

To test these hypotheses, data was collected through three studies: Study I, an online survey, an intermediate eye tracking study, and Study II, the main eye tracking study. Analysis shows that, overall, Generation Y and Baby Boomers have similar web page preferences. Some differences between the generations were found during analysis of eye tracking data. Results across studies were consistent, and the hypotheses were confirmed.

The discovery that both generations have similar preferences is beneficial to Fidelity Investments – the ability to appeal to two large age groups simultaneously simplifies the design process for the Fidelity website. The results of this project provide Fidelity Investments with several recommendations for improving their homepage. The implications of this study, its limitations, and avenues for future research are discussed.

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1. INTRODUCTION

Since the inception of the Internet, it has been recognized as a powerful tool for both individuals and businesses. As its popularity and accessibility has increased, it has become an indispensable part of modern life and business. One of the main goals of businesses on the Internet is to deliver the most personalized and efficient experience to the customer while directing attention to certain aspects of the site. This strategy benefits businesses by both satisfying the customers and inducing them to return to the company in the future.

1.1. Fidelity Investments

Fidelity Investments is one of the leading financial institutions in the world, specializing in retirement planning. Fidelity prides itself on innovation, utilizing technology to improve all aspects of its business.

1.1.1. History

According to Hoover's, Inc., in 1943, Edward C, Johnson bought the Fidelity Fund from the money management firm Anderson & Cromwell, and became its president and director. It was not until 1946 that he formed the Fidelity Management and Research Company to serve as an investment advisor to the Fidelity Fund. Fidelity introduced the Trend and Capital Funds in 1958. They were two of the industry's first aggressively managed equity funds. In 1962, Fidelity established the Magellan Fund, which became the largest mutual fund in the world. In 1964, Fidelity launched FMR Investment Management Service Inc. for corporate pension funds. It was also one of the first firms to service customer accounts in-house when it formed the Fidelity Service Company in

1969. Fidelity Investments Inc. is still privately owned by the Johnson family (Hoovers, 2007).

Headquartered in Boston, Massachusetts, Fidelity Investments has locations throughout the globe, including Europe, Asia, and Australia. There are ten regional operations centers in the United States alone. Presently, Fidelity Investments serves more than 23 million individuals and institutional clients and manages customer assets totaling 3.2 trillion dollars (fidelity.com, 2007). As of 2007, Fidelity had over 44,000 employees managing over 300 funds (Hoovers, 2007).

1.1.2. Fidelity Technology Group

Fidelity's commitment to technology began early. In 1965, the company purchased its first mainframe computer (personal.fidelity.com, 2007). Since then, several groups have been created with the sole purpose of utilizing technology to support the business of Fidelity Investments.

The Fidelity Technology Group "uses the latest technologies to deliver more value to customers and employees" (Fidelity Investments, 2007). As there are many ways that technology can benefit business, this group is broken into several collaborative parts, including Enterprise Solutions, Enterprise Technology and Architecture, Information and Security Risk, Operations, Fidelity e-Business (FeB) Design, FeB Wireless, and Fidelity Center for Applied Technology (FCAT). The MQP team will be working directly with the FeB Design group at the FCAT site. The project is of particular interest to FeB Design, which spends a great deal of time working to redesign and improve the Fidelity website.

The current FeB design team includes 16 full time usability analysts along with a few part time analysts and interns. According to the Usability Professionals Association Salary Survey, a usability analyst earns an average annual salary of 90,000 dollars ("UPA 2007 Salary Survey" 2008), so needless to say Fidelity Investments include web usability as a high priority. These analysts at the FCAT site conduct approximately 80 to 100 research studies every year in order to gather data that improves the user experience with the Fidelity website.

1.1.3. Fidelity Center for Applied Technology

Fidelity Center for Applied Technology (FCAT) was established in 1999 as a division of Fidelity Technology group. There are two usability labs at FCAT, headed by the Human Interface Design (HID) group. The HID group was initially created as an expansion of the documentation department, which created literature explaining the development of applications within the company. The group discovers or is directed to a business problem, then designs a solution and tests its effectiveness utilizing the two usability labs at the center.

Usability labs are located in many organizations in order to improve current websites, products, and services, but few are as technologically comprehensive as those at FCAT. The proponents of FCAT believe in imagination inspiring business solutions, as stated on the internal FCAT website, fcat.fmr.com, "At Fidelity Center for Applied Technology, we listen to customer needs, explore emerging technologies, apply the best ideas, and promote creative solutions ("Welcome to Fidelity Center of Applied Technology" 2007)."

Since many transactions are now completed online, a company's website is often viewed as a gateway to its business. Usability is a very important topic for Fidelity. For example, in 2003, 90% of commissionable equity trades and more than 50% of mutual fund transactions were completed online (Kapler 2003). Currently, 95% of Fidelity's customer transactions are completed online, with 2.4 million users visiting the site daily -- this is equivalent of $1.516 trillion in total managed assets ("Fidelity Investments Corporate Fact Sheet" 2008).

There are often multiple usability studies occurring simultaneously. Some tests include answering surveys, while others utilize the eye tracker. Many studies are conducted in a small, soundproofed room. The subject's facial expressions, comments, clicks, and eye movement can be tracked, and multiple analysts are able to observe the subject from behind a one-way mirror while viewing the data (Kapler 2003). Furthermore, a video camera can be used to tape the entire session. In addition to the smaller observation rooms, there are also larger meeting rooms in which researchers can view sessions and discuss what is occurring.

Many important projects have been tested in usability labs. For example, in 2002, a product called an Automated Deposit Machine (ADM) was created by Fidelity. This machine takes check deposits and distributes the funds among accounts. The ADM required a great deal of usability testing, and the group that created it benefited greatly from the use of FCAT's technologies. Additionally, the ADM won multiple awards for best financial services application and was able to be implemented within a year. This success would have not have been possible without the cutting edge technology available at FCAT (Kapler 2003).

1.2. Motivation for Project

Fidelity Investments is one of the many businesses working to develop a website that both satisfies its customers' needs and meets the company's business needs. To that end, Dr. Tom Tullis, a Senior Vice President in the Fidelity Technology Group, has asked the team to investigate the website design preferences in order to increase usability of the Fidelity homepage. It was also requested that particular attention be given to increasing retirement planning. Based on this information, the team decided to investigate the webpage design preferences of both Baby Boomer and Generation Y users in order to increase the efficiency and attractiveness of the Fidelity website. The reasons for the focus on web usability and these particular age groups are discussed below.

1.2.1. Web Usability

Fidelity Investments is one of the largest financial services providers for both investors and assets under management. Their business includes mutual funds, brokerage services, and particularly retirement plans, an area that Fidelity Investments wishes to expand upon (Tullis 1997). But what many people do not realize is that 95% of the customer transactions regarding these services are conducted online (Tullis 2008). These transactions account for approximately $1,516.39 billion of the total assets managed at Fidelity Investments for 2007. Furthermore, an average of 2.4 million users visit the company website per day, providing financial services for 24 million customers total in 2007 (Tullis 2008). In addition, approximately 35,000 employees at Fidelity use the company web pages for business purposes (Tullis 2008). The need for a functional and appealing website is absolutely essential in order to retain and attract future customers and potential employees. Investment in usability research can produce many benefits for Fidelity Investments.

The main purpose of investment in usability is to both attract and retain users, therefore increasing profit (Hunter, Rothstein & Memsic, 2002; Tullis 2008). It is estimated that over 25 billion dollars was lost in 2007 due to website usability issues nationwide (Weisfeld 2008). An established and efficient website also leads to a stronger brand image for the company (Tullis 1997).

Research in usability can give Fidelity Investments the competitive edge when conducting business online, where data can be collected to understand the website user. Not only will this attract new customers and increase retention rates, and therefore revenues, it will also enable workers to complete online tasks at a more productive rate. A functional and attractive website is essential to increasing profit.

Table 1: Figures of Web Usability at Fidelity Investments (Tullis 2008)

Average Daily Users	% Annual Transactions	Equivalent Total Managed Assets	Employees Online
2.4 million	95%	$1.516 trillion	35,000

1.2.2. Age

This project focuses specifically on the web page design preferences of Baby Boomers, aged 44-62 (Fox and Madden 2005), and Generation Y, 14-31 (Norum 2008). For the purposes of this study, the age range for Generation Y was narrowed to ages 18-31 because increased financial independence is gained at the age of 18. The investigation of web preferences of those between 14 and 18 years would not add a great deal of value to this study.

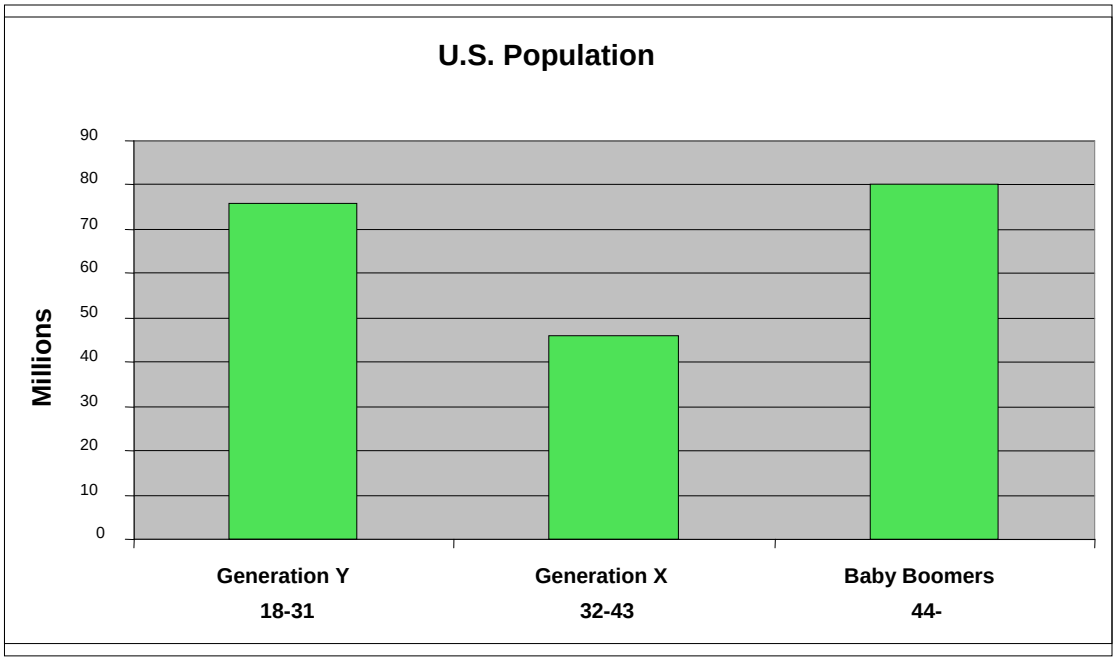

Figure 1: Population of Age Groups in U.S.A. (East Tennessee State University 2006)

As can be seen in the bar graph in Figure 1, Generation Y and Baby Boomers dominate the population in the United States (East Tennessee State University 2006). When looking at Generation X, which is the age group between Baby Boomers and Generation Y, the population is significantly less. Beyond sheer numbers, there is an incentive to target Generation Y because many individuals in this age group are entering the job market. In particular, this allows Fidelity the opportunity to help manage their money and plan for retirement early. Similarly, many individuals from the Baby Boomer generation are planning or have planned for retirement. Since retirement is an area in which Fidelity Investments Inc. wishes to expand its business, these generations present excellent opportunities..

1.3. Scope

This document will provide background on theories about website design; based on this prior research, several hypotheses will be presented. The studies used to examine these hypotheses will be explained. Several recommendations for redesign of the Fidelity homepage will be discussed.

2. LITERATURE REVIEW

In support of the project, background in several areas is provided. Sections included cover background on the web preferences of Generation Y and Baby Boomers, and the two main methods of research for this project, surveys and eye tracking.

2.1. Web Preferences

Although some research has been done regarding Baby Boomers and the web, very little has been done on Generation Y. Further, there is little research comparing differences in web preferences between generations.

2.1.1. Baby Boomers

The studies that have been conducted using Baby Boomers as subjects involve their abilities to navigate through web pages. Exploring how Baby Boomers use the web has been essential because, as the internet has become ubiquitous, more people from this age group are using computers (Fox and Madden 2005). Specifically, members of this generation typically use the web for services that require some capital, such as travel reservations and online banking (Fox and Madden 2005). Due to the advanced age of some members of the Baby Boomers generation, presentation of legible text is of great importance (Hart 2004). Designers should also be sensitive to the specific preferences of

the mature users regarding other webpage components, such as dropdown menus, animation, image maps, text links, and text in general (Groff, Liao and Chaparro 1999).

2.1.2. Generation Y

Some usability studies have also been conducted to determine how website designs can better cater to Generation Y. In contrast to the older generations, they are more easily bored (Nielson 2005). A website that will interest younger individuals should support plenty of interactive features, such as animation and eye catching graphics (Piacentini and Mailer 2003). This age group uses the Internet for school assignments, hobbies, entertainment, learning about the news and health issues, and online purchases (Nielson 2005). Moreover, Generation Y individuals are the fastest growing consumer group in online business transactions, with a projected rise of 9% that reaches a total of 30.5 million individuals by 2010 that are more likely purchase online (Sago 2004).

Previous usability studies show evidence that Baby Boomers and Generation Y react differently to website designs (Chadwick-Dias, Tedesco and Tullis 2004). Our study extends previous research by examining the age differences in preference for specific web components, such as animation, graphics, and text.

2.2. Methods for Research

There are two main methods for the research utilized in this project: surveying and eye tracking. Both are discussed in detail below.

2.2.1. Survey

Many researchers have used surveys to garner information from large groups. They can help companies and individual research groups gather a great deal of information without absorbing a great deal of time or resources.

In the field of usability studies, surveys are most often utilized and are most appropriate as an environmental scanning tool. Surveys can provide a basis from which to start, providing focus to experimental and research groups. The results of surveys can also aid usability professionals in gaining a sense of the competitive environment. Surveys can provide data on user preferences, which, in turn, help analysts decide how to proceed with projects (MacElroy 2003). Many companies, like Fidelity Investments, utilize surveys to discover what aspects of interfaces appeal to users. In this project, a five-point Likert scale is used to indicate visual appeal.

2.2.2. Eye Tracking

The movement of the eye has been a subject of academic interest for over a century. Despite the interest in the subject, the ability to track eye movement was not possible until recently. Today, eye tracking is both possible and extremely useful to businesses for studying human behavior in relation to many applications. Eye tracking has become an invaluable part of human computer interaction studies.

2.2.2.1. Eye Movement

The study of eye movement began in 1879 when Emile Javal, a former professor at the University of Paris, observed that a reader's eyes do not move smoothly across print but rather consist of a series of pauses. She observed that these pauses were made at different lines or spots before reading the end of a print. Before Javal, people assumed that the human eye glided sequentially across text, providing limited details regarding the reading process. Once Javal's observations were publicized, many became interested in eye movement. Many questions were posed, including "Where does the eye stop?" and "Why does the eye stop and regress at times?" (Huey 1968).

Numerous research studies have been conducted on eye movement and how it can be translated to reveal the cognitive process. Research on eye movement and usability has been conducted in the fields of neuroscience (Findlay and Walker, 1999), psychology (Rayner 1998), industrial engineering and human factors (Duchowski 2002), and computer science (Duchowski 2002). Eye tracking equipment is an invaluable tool in studying eye movement.

2.2.2.2. Eye Tracker: A Brief History

The first precise, non-invasive eye tracking technique was developed in 1901 using light reflected from the cornea (Jacob 2003). This system required the participant's head to be motionless and only recorded the horizontal eye position onto a falling photographic plate. Shortly after, in 1905, Judd McAllister tried to improve this methodology by using applied picture photography to record eye movements in two dimensions (Jacob 2003). This technique recorded eye movements by inserting a small white speck of material into the participant's eyes rather than light reflected from the cornea. These and other researchers who are interested in tracking eye movements made additional advances during the first half of the 20th century by combining the corneal reflection and motion picture techniques in various ways (Jacob 2003).

In 1948, Hartridge Thompson invented the first head-mounted eye tracker. This innovation served as a start to solving tight constraints on head movements for study participants of eye tracking. In 1962, advancements were made in head-mounted eye tracking systems by reducing restrictions on head movements and making necessary restrictions less obvious. Massive improvements were made in the 1970s, as technical enhancements increased the accuracy and precision of eye movements. These

improvements were discovered through multiple reflections from the eye rotations through head movement. Using this discovery, two joint military industry teams which included the US Airforce / Honeywell Corporation and the US Army / EG&G Corporation developed remote eye tracking systems that reduced tracker obtrusiveness and constraints on the participants. The technological advances made in eye tracking during the 1970's are still reflected in many commercial eye tracking systems today (Jacob 2003).

Recently, eye tracking in HCI has shown gradual growth in means of studying the usability of computer interfaces and as means of interacting with the computer. As further advances are being made in Internet, E-mail, and videoconferencing, more information is shared and researchers turn to eye tracking to answer questions about usability. Additional research in tracking eye movements is still on-going today and is a main focal point of our project (Jacob 2003).

2.2.2.3. Eye Trackers at FCAT

The eye tracker that is utilized at FCAT is the MyTobii D10, which is provided by Swedish-based firm Tobii, founded in 2001. The MyTobii D10 eye tracker is a 17" flat screen monitor with built-in eye control. The monitor can be placed on a desk, mounted on a wall, or connected to an external monitor. It also comes with software, MyTobii Basic and VS Communicator Pro, which is used to capture the eye movements of the user. There are three MyTobii D10s present at FCAT as usability analysts continue their research in various areas. The specifications for the MyTobii D10 are found in Appendix C ("MyTobii D10" 2006).

Figure 2: MyTobii D10 Eye Tracker

2.2.2.4. Data Collection

Many key variables have emerged as significant indicators of eye movement, including pupil dilation and fixation (Mistry 2005). Fixation indicates how long the participant looked at one spot, while dilation indicates how much the pupil expanded or contracted.

Fixation is a reliable indicator of the participant's attention. It is defined as a spatially stable gaze, which lasts for approximately 200-300 milliseconds, during which visual attention is directed to a specific zone of a visual display (Mistry 2005). The left graph, below, shows pupil fixation on an area of a webpage over time, while the graph to the right shows the number of fixation points on a webpage (Mistry 2005).

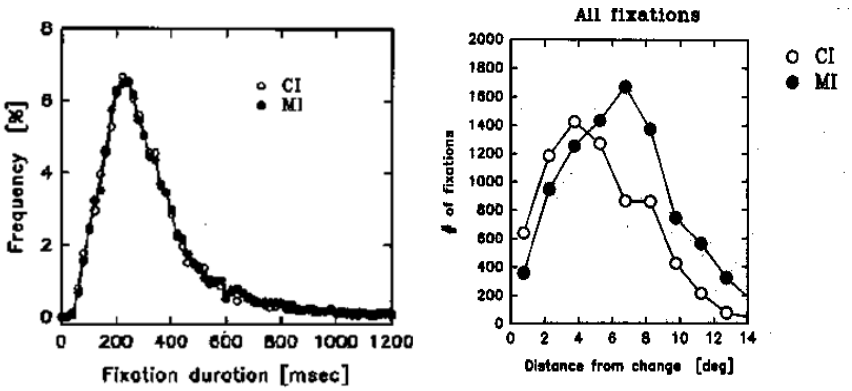

Figure 3: Graphs of Pupil fixation (CI: Central Interest, MI: Marginal Interest) (Mistry 2005)

Although fixation data can be extracted as raw data, a visual interpretation of the data is often useful. The MyTobii software makes visual representations available in two forms – see Figure 4. Heat maps indicate which areas of a webpage a user looked at longest, with red representing a great deal of fixation. Because data from one participant may not be an accurate representation of the population, heat maps are often created by compiling the data from several participants. A second visual interpretation of eye fixation data is a gaze plot. Gaze plots indicate the sequence the user's eye followed (Tullis 2008). The blue circles indicate fixation – the bigger the circle, the more the participant fixated on that spot.

Below is a picture of a sample webpage with hot spots and a gaze plot:

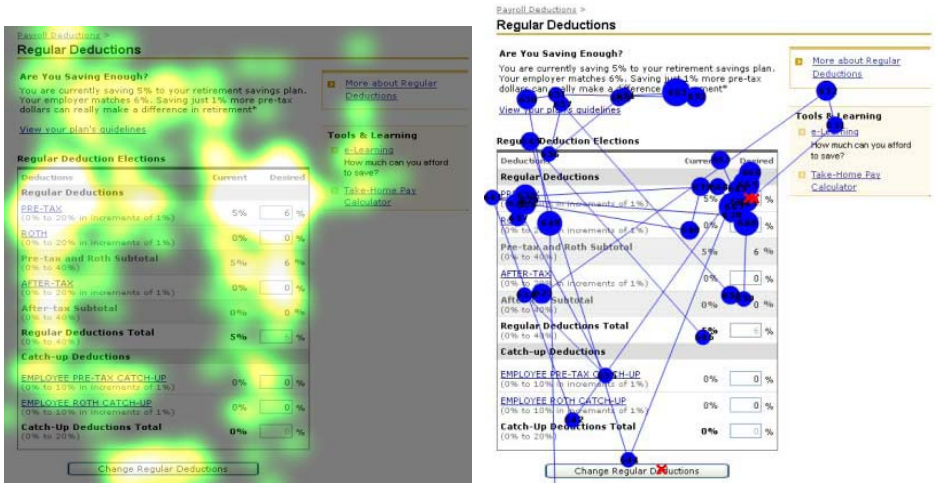

Figure 4: Left - Gaze Plot and Right - Heat Maps (Tullis 2008)

Dilation is another type of data that is collected by the eye tracker. Analysis of this data is useful in circumstances in which mental concentration or emotional arousal is the focus of the research (Tullis 2008). Pupil dilation is typically used to measure an individual's level of interest in or emotional arousal by the viewed item. An example of a measurement in pupil dilation is shown in the graph below:

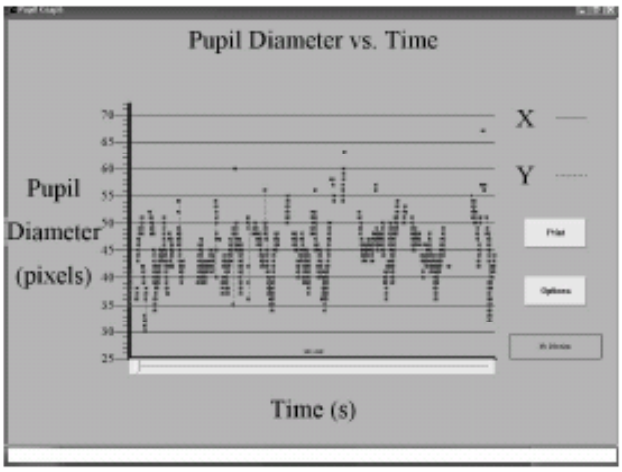

Figure 5: Graph with relationship of Average of Left and Right Pupil Diameter through Time (Mistry 2005)

3. HYPOTHESES & RESEARCH MODEL

In this project, we focus on webpage design preferences based on different age groups, specifically Generation Y and Baby Boomers. The research model that guides this project is displayed in Figure 6.

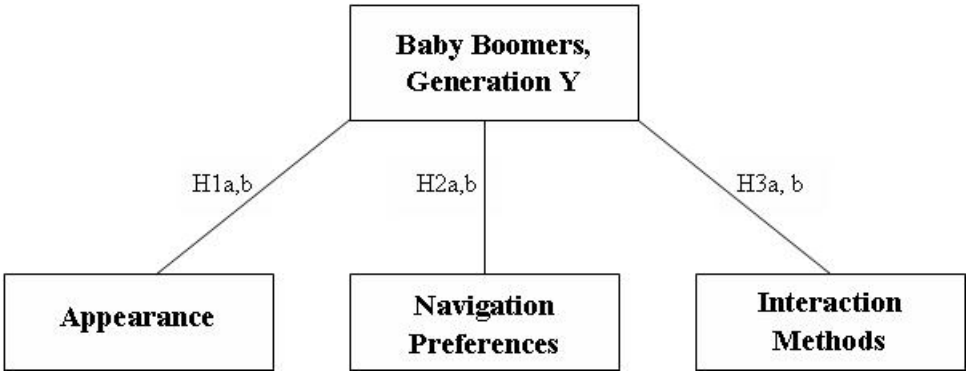

Figure 6: Research Model for Usability Study

3.1. Appearance

The appearance of a web page, or how nice a page looks, is the main focal point of this study. Before the Internet or even computers existed, eye tracking studies have been conducted to determine appealing features of print media (Groff, Liao and Chaparro 1999). For example, participants were given a piece of paper with an advertisement,

which was designed with a combination of both pictures and text. Subjects were required to evaluate whether the text had appropriate font size and rate the appeal of the picture. Later, similar studies were conducted online using eye trackers. Eye trackers were used to measure fixations, gazes, and hot spots (Given, Ruecker, Simpson, Sadler, and Ruskin 2006).

Literature suggests that the Baby Boomer generation is rather traditional when it comes to the visual appeal of web page design. Traditional designs in web pages include plain white backgrounds with few graphics and very limited interaction. In addition, baby boomers are more willing to read large bodies of text, especially the older portion from this age group. Text must be of reasonable size, preferably size 12 and Arial or Times New Roman font. In addition to this, due to vision issues, older individuals prefer text to be spread out; therefore, having double spaced text is beneficial (Bernard, Liao, and Mills 2001). Web users from this age group simply want to get on the core content of the web page and not focus necessarily on how visually appealing web pages are (Fox and Madden 2005). Thus, we hypothesize,

H1a: The Baby Boomer Generation prefer web pages with simple designs that includes bigger font sizes, have more text, and limited or no animation.

There is evidence that Generation Y prefers an excessive amount of pictures along with animation and with less text involved when using the web (Nielson 2005). This is because the younger individuals are less patient as they get dragged into boredom much faster than Baby Boomers and will not read for long periods of time (Nielson 2005). Moreover, because the younger generations are exposed to the media more than the older generations from both television and the Internet (Piacentini and Mailer 2003), it is likely

that having a popular figure promoting the web page would be eye-catching for this group. Therefore we hypothesize,

H1b: Generation Y prefers web pages that include animation and graphics, with pictures of celebrities in particular.

3.2. Navigation Preferences

Navigating a web page is a key factor to consider when designing a web page. This is because navigation guides the user to the page they wish to view. Therefore, the main page of any website should provide visible links that will catch the eye's attention regardless of what age group the user is part of (Russell 2005). In addition to the placement of links within the web page, the loading time is also taken into account because this helps determine whether the user will stay with the web page or not (Dennis 1995).

When taking the two age groups into account, the Baby Boomer population is more patient than Generation Y, which means that the older users will read more text and endure longer page loads (Nielson 2005). However, older Baby Boomers may have computer anxiety, which is the lack of confidence and familiarity with using a computer due to lack of training (Hart 2004). As a result, older Baby Boomers may get lost while navigating through a website. Older Baby Boomers prefer web pages with as many links possible to make navigation easier (Hart 2004). Another solution for easy navigation is to include a search engine. A search engine is useful because not everybody organizes information in the same manner and is now the primary way for users in general to find what they are looking for in a website (Heng 2007). Therefore, having a search bar in the

main web page will improve navigation for visiting users by locating what they are looking for within the website. Thus, we hypothesize,

H2a: Baby Boomers prefer a web page that includes many links or a search engine that leads to other web pages.

As mentioned before, Generation Y is not as patient as Baby Boomers. A web page that loads quickly is essential in order keep younger users engaged (Nielson 2005). Unlike the older generations, younger users have been trained to use computers since they were very young (Anderson 2007). Therefore, users of Generation Y will not have problems navigating through multiple pages if the main web page does not include links to all their web pages (Anderson 2007). However, a search engine on the homepage is also beneficial to younger users because it increases the ease of navigation (Heng 2007). Based on this, we hypothesize,

H2b: Generation Y prefers a web page with a search engine and fewer links.

3.3. Interaction Methods

The next section of the hypotheses is the functionality of the website. The use of interactive features in a website can include animation, videos, audio, or web blogs just to name a few. Generation Y enjoys interacting with the web page through, for example, polls, discussion boards, videos, music, or games. This is due to the fact that the Generation Y population tends to get bored easily and the interactions will help them stay amused (Nielson 2005). Websites such as *YouTube* and applications such as *iTunes*, Apple's music program which allows users to purchase songs over the Internet, have built a huge customer base due to the interactive features that they have offered with very fast loading times (Dennis 1995). Baby Boomers on the other hand prefer to read plain text

since these interactive features do not appeal to their age group (Given, Ruecker, Simpson, Sadler, and Ruskin 2006). Consequently, we hypothesized,

H3a: Baby Boomers prefer less interactive features and prefer to read text instead.

H3b: Generation Y prefer more interactive features since they are easily bored, therefore the more interactive functions available within the web page, the more appealing the page is.

4. STUDY I: SURVEY

Study I provided an overview of what aspects of web pages participants in the target age groups liked and disliked.

4.1. Method

Study I was an online survey. Although data for all generations was collected, only data for Generation Y and Baby Boomers was analyzed.

4.1.1. Participants

Participants were solicited through online forums targeted to Generation Y and Baby Boomers and e-mails sent to contacts of the MQP team. A total of 421 participants completed the online survey, with approximately one hundred lying in each of the desired age ranges.

Table 2: Total Participants for Study I

	Number of Participants
Generation Y	102
Baby Boomers	104

Participants were entered into a raffle for one of two $25 Amazon gift certificates upon completion of the survey.

4.1.2. Procedure

For this study, fifty homepages were randomly selected from the top one hundred retail websites based on volume according to ForeSeeResults. ForeSeeResults is an independent company that rates websites based on customer satisfaction (foreseeresults.com). Screenshots of the majority of the chosen sites were taken in order to maintain consistency over the length of the study. Two live links were also used to test participants' reactions to animation. Screenshots of each web page were randomly displayed for participants to view and rate on a five-point Likert scale of visual appeal.

4.1.3. Measurements

As mentioned previously, participants rated web pages on a five point Likert scale of visual appeal, with one being not at all appealing and five being very appealing. In addition, demographic data was collected regarding the participants' age, gender, and internet experience.

4.2. Results

A characteristic tally for each web page was completed – this can be seen in Appendix E. For each characteristic, an average score for the pages with that characteristic was calculated for each participant. For example, if Abercrombie, Bidz, and Gap all have a main large picture, the ratings the participant gave for each of these pages would be averaged for the Large Picture rating. Statistical analysis (multiple regression ANOVAs) was then conducted for each characteristic to determine if there were differences between or within generations.

Analysis of this survey showed no statistically significant difference between the two age groups for any of the characteristics. However, it did show a significant difference between the characteristics both generations preferred. The results can be seen in the table below:

Table 3: Results of ANOVA for Survey I

Dependent Variable	N	M	SD	F	p
Design Characteristic Rating					
Within Participants Effects					
Navigation Type				222.36	0.00
Many Links	203	2.83	0.80		
Search	203	3.36	0.58		
Navigation Type * Participant Age				0.72	0.40
Many Links, Gen Y	102	2.88	0.79		
Many Links, Baby Boomers	101	2.77	0.80		
Search, Gen Y	102	3.38	0.61		
Search, Baby Boomers	101	3.33	0.56		
Text Type				214.63	0.00
Lots of Text	203	2.66	0.87		
Little Text	203	3.74	0.72		
Text Type * Participant Age				2.01	0.16
Lots of Text, Gen Y	102	2.71	0.86		
Lots of Text, Baby Boomers	101	2.60	0.88		
Little Text, Gen Y	102	3.69	0.71		
Little Text, Baby Boomers	101	3.80	0.73		
People Type				253.47	0.00
People	203	3.18	0.63		
Celebrities	203	3.71	0.70		
People Type * Participant Age				2.18	0.14
People, Gen Y	102	3.18	0.64		
People, Baby Boomers	101	3.18	0.62		
Celebrities, Gen Y	102	3.67	0.74		
Celebrities, Baby Boomers	101	3.76	0.65		
Layout Type				167.44	0.00
Clean	203	3.70	0.67		
Cluttered	203	2.96	0.71		
Layout Type * Participant Age				2.52	0.11
Clean, Gen Y	102	3.68	0.67		
Clean, Baby Boomers	101	3.73	0.68		

Cluttered, Gen Y	102	3.03	0.71		
Cluttered, Baby Boomers	101	2.89	0.71		
Interaction Type				89.28	0.00
Animation	201	3.91	0.93		
No Animation	201	3.30	0.59		
Interaction Type * Participant Age				1.35	0.25
Animation, Gen Y	101	3.87	0.84		
Animation, Baby Boomers	100	3.96	1.01		
No Animation, Gen Y	101	3.34	0.60		
No Animation, Baby Boomers	100	3.27	0.58		

These results can also be found in graph form in Appendix J.

Both generations rated web pages with a search function significantly higher than web pages with many links. Moreover, the mean visual appeal rating of web pages with little text was significantly higher than that of web pages with lots of text. Web pages with pictures of people were rated highly, but this was significantly lower than the mean visual appeal rating of web pages with celebrities. There was also a significant difference between the mean visual appeal rating of web pages that have a clean design and web pages that are cluttered. The mean visual appeal rating of sites with animation was higher than sites without animation. Further discussion of these results can be found in Section 7.1, Discussion of Results.

5. INTERMEDIATE EYE TRACKING STUDY

While not a full scale study, this intermediate study was valuable in providing background information on Generation Y's web preferences and gaining experience with the eye tracking equipment.

5.1. Method

This study was very similar to Study I with the additional collection of eye tracking data. This study was conducted in two locations, the FCAT usability labs and the Brookline Senior Center in Brookline, MA.

5.1.1. Participants

Participants for this study were members of the Brookline Senior Center, Fidelity Investments employees, and students from nearby colleges who signed up in advance. Fifteen participants from each generation completed the study, although all the data was not viable for all participants.

Table 4: Total Participants for Preliminary Eye Tracking Study

	Number of Participants
Generation Y	15
Mature	15

Participants at the Brookline Senior Center were given a twenty-dollar Amex Express gift check upon completion of the study. Participants who travelled to the usability labs were provided with a fifty-dollar Amex Express gift check.

5.1.2. Procedure

This study was very similar to Study I. The general purpose of the study was explained and then the eye tracking equipment was calibrated to the participant so that eye tracking data could be collected. The participant viewed the same fifty web pages used in Study I. While the participant was viewing a web page, the experimenter requested a visual appeal rating. The same demographic information was collected upon completion of the eye tracking portion of the study and the participant was debriefed.

5.1.3. Measurements

As in Study I, the visual appeal rating for each page and the demographic information of the participant were collected. Additionally, fixation and dilation data were collected through eye tracking. This data was measured for specific areas of interest (AOIs) – this allowed analysis of specific categories, such as images, to determine if there were differences. Recordings were made of each session so that qualitative data, such as comments and facial expression, could be reviewed.

5.2. Discussion

This study provided preliminary data on Generation Y, which helped to refine and improve the next study. However, due to equipment and software issues, not enough data was recorded to support significant results. Despite these problems, the study did provide useful experience with the eye tracking equipment, as well as the software.

Additionally, from this study we discovered an issue with the eye tracking equipment and were able to develop a solution. Included in Appendix I is the email sent to Fidelity discussing the problem, the detailed solution to the problem, the response from Fidelity, and the impact it will make on Fidelity. This solution will increase the efficiency of eye tracking studies three-fold due to expedited analysis

6. STUDY II: EYE TRACKING

The final study is the main eye tracking study, which provided empirical evidence to support both the hypotheses and the results of Study I and the Intermediate Study.

6.1. Method

Study II was conducted at the FCAT usability lab in Boston, MA.

6.1.1. Participants

Fidelity Investments employees were solicited to participate in this study through advertisements in their daily corporate e-mails and on Fidelity's internal website. A total of forty-one participants completed the study, evenly split between Generation Y and Baby Boomers.

Table 5: Total Participants for Study II

	Number of Participants
Generation Y	20
Baby Boomers	21

For participating, subjects received either two movie tickets or two ten dollar American Express gift checks.

6.1.2. Procedure

Based on the analysis from Study I and the Intermediate Study, twelve web pages – six of the highest rated and six of the lowest rated – were selected for Study II. These pages had a good mix of the characteristics that the hypotheses addressed. As in the Intermediate Study, the eye tracker was calibrated to the participant. Participants viewed the twelve web pages and were verbally asked for a visual appeal rating. Additionally, they were asked whether they had visited the web page previously. Upon completion of the eye tracking portion, participants filled out a questionnaire on their web preferences and provided demographic information. The materials used in this study can be found in Appendices F, G, and H.

6.1.3. Measurements

In addition to the five-point scale rating of visual appeal, dilation and fixation data were collected. The sessions were not recorded due to the high volume of the video files and time constraints. The areas of interest in this study were also refined to more specific regions.

6.2. Results

Analysis of the visual appeal ratings was conducted as in Study I; results were consistent. Areas of Interest (AOIs) were created using the MyTobii software to allow analysis of specific areas about which we hypothesized – these were consistent with the characteristics used in the characteristic categorization in Study I. The results of the analysis of the eye tracking data are displayed in the tables below:

Table 6: Results of ANOVA for Eye Tracking Fixation

Dependent Variable	N	M	SD	F	p
Design Characteristic Rating					
Within Participants Effects					
Picture Type				123.07	0.00
Large Picture	40	12.51	3.76		
Many Pictures	40	5.42	1.88		
Picture Type * Participant Age				3.45	0.07
Large Picture, Gen Y	19	11.17	2.13		
Large Picture, Baby Boomers	21	13.73	4.50		
Many Pictures, Gen Y	19	5.31	2.26		
Many Pictures, Baby Boomers	21	5.52	1.51		
Navigation Type				48.08	0.00
Search	40	1.01	0.42		
Many Links	40	4.31	2.94		
Navigation Type * Participant Age				1.77	0.19
Search, Gen Y	19	0.79	0.26		
Search, Baby Boomers	21	1.21	0.45		
Many Links, Gen Y	19	3.43	1.87		
Many Links, Baby Boomers	21	5.10	3.52		

Table 7: Results of ANOVA for Eye Tracking Dilation

Dependent Variable	N	M	SD	F	p
Design Characteristic Rating					
Within Participants Effects					
Picture Type				2.996	0.091
Large Picture	40	0.0301	0.0034		
Many Pictures	40	0.0289	0.0029		
Picture Type * Participant Age				0.446	0.508
Large Picture, Gen Y	20	0.0301	0.0037		
Large Picture, Baby Boomers	21	0.0302	0.0032		
Many Pictures, Gen Y	20	0.0293	0.0030		
Many Pictures, Baby Boomers	21	0.0285	0.0028		
People Type				0.443	0.509
People	41	0.0304	0.0037		
Celebrities	41	0.0311	0.0065		
People Type * Participant Age				2.781	0.103
People, Gen Y	20	0.0302	0.0028		
People, Baby Boomers	21	0.0305	0.0044		
Celebrities, Gen Y	20	0.0329	0.0066		
Celebrities, Baby Boomers	21	0.0294	0.0061		

According to the analysis, Generation Y fixates significantly less on large images than do Baby Boomers. There was no significant difference between the mean fixation on large pictures compared to many pictures for Generation Y, though Baby Boomers did fixate more on large pictures than many.

The mean fixation on search bars for Baby Boomers is significantly higher than the mean fixation for Generation Y on search bars, while the mean fixation for Baby Boomers on many links is significantly higher than the mean fixation for Generation Y on many links. The fixation on many links is significantly higher than the mean fixation on search bars for both generations – this is likely due to the disparity in the amount of time it takes to process images as opposed to text. This is supported by the finding that both generations dilate significantly more for many links than for a search bar.

The mean dilation on large pictures for Baby Boomers was significantly higher than their mean dilation on many pictures. Interestingly, Generation Y's dilation while looking at celebrities and while looking at animation is significantly higher than Baby Boomers'. Furthermore, Generation Y dilates more while looking at celebrities than while looking at people. Further discussion of these results in conjunction with the results of Study I can be found in Section 7.1, Discussion of Results.

7. CONCLUSION

The following sections provide more detail on the meaning and impact of the results of these studies.

7.1. Discussion of Results

The results from the studies both support the hypotheses and each other. Although few differences were found between generations in Study I and the Intermediate Study, Study II did provide some evidence of differences. Appendices D, Table of Hypotheses, provides a table indicating which hypotheses were supported by which studies.

Analysis showed that both generations enjoy looking at pictures of people, but prefer pictures of well-known celebrities. Although, in Study I, both generations like pages with celebrities better than pages without, Study II dilation data showed that Generation Y dilates more when looking at celebrities. This suggests that Generation Y has a more emotional response or more cognitive processing when viewing celebrities. From user comments during our eye tracking study, we found out that they also prefer people who seem pleasant or appear to be enjoying what they are doing. From the hot spot analysis, we also found that participants focus on a person's face, so images of people need not include their entire bodies.

It was also found that participants prefer one large image on a web page instead of multiple small or medium sized images. One large image retains the focus of the user and allows a resource or product to be predominantly displayed. The inclusion of many images may seem as if it would be appealing, but users consider it cluttering and distracting.

Through analysis and user comments during eye tracking, it was found that users prefer clean web pages that are not too busy or cluttered. A busy or cluttered web page is defined as a page with too many pictures, not enough spacing, or conflicting colors. A clean web page has little on it and is consistent. Just like multiple images verses one large image, the clean design of a web page can keep a user's focus as well as increase the time they stay on the web page.

Further, in the category of fonts and text on a web page, results show that both generations prefer large fonts and little text. It was found that Baby Boomers read more than Generation Y; additionally, Baby Boomers fixate more on large text than small text. Even though it is important to include text on a web page to explain certain products or resources, it is a recommendation to keep it as limited as possible on the homepage.

The search bar on a web page can be located anywhere, but the standard location is the top right of a web page. Both generations claim to prefer a search bar instead of many links on the webpage, but research shows Generation Y rely on the search bar more. It is important to keep the search bar in this location and, in addition, make it visible. Hot spots show that if the search bar is not on the top right, there is less fixation on it. This is likely because the participant had difficulty finding it.

Analysis showed that neither generation looks at the bottom of web pages, particularly if scrolling is necessary. They looked significantly more at the main part of the page (the center) than the top or bottom, and significantly more at the top than the bottom. This suggests that placing pertinent information at the top or main part of a web page is necessary in order to have the customer notice it.

Both Study I and Study II analysis showed that both generations like animation. In Study I, participants from both generations liked pages with animation significantly more than pages without. The questionnaire in Study II was consistent with the Study I findings. Dilation data, however, showed that Generation Y dilated more for animation than Baby Boomers, suggesting a more emotional response or more cognitive processing.

7.2. Recommendations to Fidelity Investments

Fidelity Investment's main goal was to attract new customers and retain current customers. Specifically, they wanted an increase in retirement planning. Since 95% of customer transactions occur through their website, it is imperative that their website appeals to their users, particularly Generation Y and Baby Boomers. This project focused on making Fidelity's homepage, fidelity.com, more appealing since it is the first contact a customer will have with the website. Based on the research conducted during this project, there are several suggestions for modifications to the Fidelity homepage to improve its visual appeal.

Images of a celebrity or multiple celebrities were popular for both generations throughout this study. Celebrities that appeal to both generations, as well as celebrities who are retiring or planning retirement, would be appropriate for Fidelity. An example that Fidelity might consider is Carlos Ray Norris Jr., or Chuck Norris.

One large image, particularly containing people or celebrities, on the main web page would be beneficial on the Fidelity Investments homepage. This would attract and maintain the users' attention. Little text, preferably with large font, keeps the page clean, while the inclusion of menu options and a search bar makes the site easily navigable. Some subtle animation, such as drop down menus or movement to emphasize select areas, would satisfy both generations without distracting from content.

7.3. Contributions

These results have important implications for both industry and usability research.

7.3.1. Industry

The results of this research have implications for both the financial industry and other industries, particularly for business seeking Baby Boomer and/or Generation Y customers. Colleges, for example, can certainly put these findings to practical use. Since their prospective and current students are Generation Y and their parents are Baby Boomers, colleges certainly want to have a website that appeals to both.

There are many industries that target multiple generations; for these, the comparison of the two generations will be most helpful in creating pages that engage both or pages that are customized to each.

7.3.2. Research

Previous literature has indicated that very little research has been conducted on human computer interaction with Generation Y. This project has provided a foundation for prospective studies with this age group in addition to other demographics groups mentioned in Future Research. We specifically contributed to research in comparison of Generation Y and Baby Boomers. Our methodology and research can be implemented

for comparisons between other generations and other demographics, which will be discussed in the next section.

7.4. Limitations and Future Research

As with any experiment or study, there are numerous limitations that occur. Since our experiment dealt with visual appeal and focused on where users looked on a web page, the ability to eye track was essential. This technology is the only way to collect gaze and fixation data unobtrusively. The eye tracking experiment was conducted within Fidelity's usability labs, where outside factors are, for the most part, controlled. There is some limitation in that the user is not within a completely natural setting. To mitigate this, the labs have been designed to be as normal and comfortable as possible. Additionally, Study I, the online survey, was conducted in the natural setting of the home or office. Another limitation is that users were asked to view the pages and rate them on visual appeal. Giving participants a task to complete would be more realistic to their regular web experience.

Little research has been conducted on Generation Y and web page appeal. This research sets the foundation for additional research. Apart from age differences, other factors that can be taken into consideration in other experiments may include preferences in web page design based on gender, nationality, or computer literacy. In addition to examining these demographics, a task-based exploration study can be implemented in order to attain more in-depth analysis on navigation and user activity.

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APPENDICES

A. Meeting Agendas

MQP Meeting Notes: August 22, 2007

Attendees: Soussan Djamasbi (faculty advisor), Tom Tullis (Fidelity sponsor), Daniel Capozzo, Robert Groezinger, Keet-Fung F Ng,; Marisa Siegel

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Agenda for the team meeting (8:30-9:00 AM):

1. MQP guidelines (handout)
2. Discuss/set up weekly meeting times

Agenda for meeting with the client (9:00 AM- 11:00 AM):

1. Time table, the nature and scope of MQP projects, expectations, etc.
2. Project problem definition and scope
3. Security passes
4. Computer access and space
5. Contact person/liaison

Minutes:

NA (since this is our very first meeting)

Deliverables:

- Agenda and minutes for the next meeting
- meeting times for MQP team meetings

MQP Meeting Notes: August 29, 2007

Attendees: Tom Tullis (Fidelity sponsor), Daniel Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng,; Marisa Siegel

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Agenda for Meeting with the client (1:30 PM- 3:00 PM):

1. Project Topic Discussion
2. Establish List of Contacts for Project
3. Security Passes – Turn in forms
4. Computer Access and Workspace
5. Contact Person/Liaison

Minutes:

8:30 - 9:00 AM: Overview of Project Guidelines
9:00 - 9:30 AM: Tour of FCAT
9:30 - 10:15 AM: Discussed Project Topics
10:15 - 10:30 AM: Review of Meeting

Deliverables:

- Agenda and minutes for the next meeting
- Meeting times for future MQP team meetings
- Contact list for project scope

MQP Meeting Notes: September 4, 2007

Attendees: Soussan Djamasbi, Daniel Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 2:30 PM):

1. Continue discussing (narrowing) project topics
2. Discuss Articles posted on Sourceforge
3. Discuss "next steps"
    a. Next meeting with Tom
    b. Meeting with Eric Gold
    c. Eye Tracker Experience
    d. Further Ideas
4. Discuss possible statistical analysis?

Minutes (from Wednesday, August 29, 2007):

1:45 – 2:30 PM: Overview of project guidelines with Tom and office tours
2:30 – 3:15 PM & 3:25 – 3:45 PM: Eye Tracker Experiment
3:15 – 3:25 PM: Made Badge Appointments
3:45 – 4:00 PM: Wrap up

Deliverables:

- Agenda and minutes for the next meeting
- Notes and minutes of meeting with Eric Gold
- Narrowed Topic

Fidelity Badge for everybody

MQP Meeting Notes: September 11, 2007

Attendees: Soussan Djamasbi, Daniel Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Discuss Gantt Chart for project
2. Review meeting with Tom Tullis & Eric Gold
3. Discuss finalist project topics

Minutes (from Wednesday, September 5, 2007):

1:30 – 3:00 – Meeting with Tom Tullis & Eric Gold
3:15 – 4:00 – Badge Appointment

Deliverables:

- Agenda and minutes for the next meeting
- Final topic
- Draft of general Fidelity background
- Finalized Gantt Chart

MQP Meeting Notes: September 18, 2007

Attendees: Soussan Djamasbi, Daniel Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Discuss topic ideas (survey, eye tracker, subjects, giftcards, etc)
2. Review meeting with Tom Tullis
3. Discuss the deliverables

Minutes (from Wednesday, September 12, 2007):

2:00 – 3:15 – Meeting with Tom Tullis (Topic Discussion)
3:15 – 3:30 – Met with Ann Chadwick-Dias, Princiblity and Usability Analyst regarding selection of subjects for surveying.

Deliverables:

- Agenda and minutes for the next meeting
- Topic Confirmation
- Survey Items
    - Questions (Age, visited website?)
    - Rating system (Likert)
    - Incentives to take survey
- Discuss future deliverables

MQP Meeting Notes: September 25, 2007

Attendees: Soussan Djamasbi, Daniel Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Discuss narrowed topic ideas
2. Discuss the deliverables

Minutes (from Wednesday, September 12, 2007):

2:00 – 3:00 – Meeting with Tom Tullis (Topic Discussion)

Deliverables:

- Agenda and minutes for the next meeting
- Discuss future deliverables

MQP Meeting Notes: October 02, 2007

Attendees: Soussan Djamasbi, Daniel Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Proposal Drafts
2. Survey Ideas

Minutes (from Wednesday, September 12, 2007):

1:00 – 2:00 – Confirmed Final Confirmation on Topic and Proposal Dates with Tom

Deliverables:

- Agenda and minutes
- First draft of MQP Proposal

MQP Meeting Notes: October 09, 2007

Attendees: Soussan Djamasbi, Daniel Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. MQP Proposal
2. Proposal Presentation
3. Survey

Minutes (from Wednesday, September 12, 2007):

12:30 – 2:00 – Group discussion
2:00 – 3:00 – Meeting with Tom Tullis
3:00 – 3:30 – Group discussion
3:30 – 4:30 – FCAT Tour
4:30 – 5:30 – Eye tracker orientation with Oliver Brooks

Deliverables:

- Agenda and minutes
- Final draft of MQP Proposal

MQP Meeting Notes: October 23, 2007

Attendees: Soussan Djamasbi, Daniel Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Feedback on Proposal
2. B Term Schedule

Minutes (from Wednesday, October 10, 2007):

11:00AM – 12:00PM: Proposal Presentation

Deliverables:

- Agenda and minutes
- Scheduled time for eye-tracking facilities
- Survey layout (including questions)

Survey sites (and alternate plans)

MQP Meeting Notes: November 06, 2007

Attendees: Soussan Djamasbi, Daniel Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Review articles
2. Overview of meeting with Tom Tullis
3. Eye tracking details

Minutes (from Wednesday, October 24, 2007):

1:00 – 3:00PM: Meeting with Tom Tullis

Deliverables:

- Agenda and minutes
- Preliminary survey
- Design for study survey

MQP Meeting Notes: November 13, 2007

Attendees: Soussan Djamasbi, Daniel Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Discuss preliminary survey
2. Eye tracking study details
3. Scheduling at FCAT

Deliverables:

- Recruit Participants of Study
- Complete draft of outline surveys

MQP Meeting Notes: November 20, 2007

Attendees: Soussan Djamasbi, Daniel Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Discuss Finalized Survey Studies
    a. Script
    b. Consent Forms
2. Recruitment of Participants
3. Setting up Eye Trackers

Deliverables:

- Agenda and minutes
- Set up appointment quest with Tom Tullis for participants
- Confirm Eye Tracking dates with Oliver Brooks

MQP Meeting Notes: November 27, 2007

Attendees: Daniel Capozzo, Soussan Djamasbi, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Show final survey
    a. Study with Eyetracker
    b. Study without Eyetracker
2. All Appointments for Gen Y are filled
    a. Marisa and Frankie
3. Going to Brookline Senior Center tomorrow
    a. Dan and Rob and Oilver
    b. Go in early and set up equipment
    c. Call Ruthann Dobek
4. Emailed Jeanine Skorinko about ways to analyze data
    a. Haven't met yet, but we can set up a date

Deliverables:

- Agenda and minutes
- Final survey for both studies
- Analytical tools

MQP Meeting Notes: December 04, 2007

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Overview of first eye tracking session
2. Website Categorization
3. Online survey status

Deliverables:

- Agenda and minutes
- Website Categorization
- Eye Tracking Data
- Set up additional eye tracking dates (backup)

MQP Meeting Notes: December 11, 2007

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Overview of eye tracking last week
2. Discuss adding more days
3. Meeting with Jeanine Skorinko
    a. Repeated Measures ANOVA
    b. Classifying webpages
    c. Excel sheet setup
4. Dissemination of survey

Deliverables:

- Agenda and minutes
- Classified webpages
- Finalized spreadsheet design
- Determination of additional eye tracking days

MQP Meeting Notes: January 10, 2008

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Changing meeting time to Thursdays, 2pm
2. Setting up eye tracking
3. Meeting with Jeanine Skorinko tonight
    a. Survey
    b. Analysis
4. Time constraints

Deliverables:

- Agenda and minutes
- Classified webpages
- Finalized spreadsheet design for analysis
- Completed survey & posting information
- Determination of additional eye tracking times
- Preliminary list of eye tracking participants

MQP Meeting Notes: January 17, 2008

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Survey (creation and posting)
2. Eye tracking
3. To do list

Deliverables:

- Agenda and minutes
- Classified webpages
- Finalized spreadsheet design for analysis
- Completed survey & posting information
- Determination of additional eye tracking times

MQP Meeting Notes: January 28, 2008

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Survey Status
2. Eye Tracking Data and Analysis Status
3. Webpage Zones
4. myWPI Status

Deliverables:

- Agenda and minutes
- Methodology
- Theoretical framework literature review
- Send survey out to target population (Gen X & Y)

MQP Meeting Notes: February 4, 2008

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Survey Status
    a. Survey is complete
    b. Need to post on forums and send through fidelity
2. Eye Tracking Data Status
    a. Backup Hard Drive
    b. Analyzing data for hotspots
3. Website Zone selection (Areas of Interest)
4. Updated outline of the paper

Deliverables:

- Draft of Written Abstract for conference submission
- Send survey out to target population (Gen X & Y)
- Updated MQP paper
- Agenda

MQP Meeting Notes: February 11, 2008

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Survey
2. Eye tracking analysis
    a. Data gathered
    b. Software
    c. Meeting at FCAT
3. Paper status

Deliverables:

- Analysis of eye tracking (hot spots)
- Analysis of survey
- Draft of MQP paper

MQP Meeting Notes: February 19, 2008

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (11:00 – 12:00 PM):

1. Survey analysis
2. Eye tracking analysis
3. Paper status
4. Timeline – Due Dates

Deliverables:

- First Draft of MQP Paper
- AMCIS Paper Draft

MQP Meeting Notes: February 25, 2008

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (2:00 – 3:00 PM):

1. Survey analysis
2. Eye tracking analysis
3. Paper status
4. D-Term Meeting Time

Deliverables:

- First Draft of MQP Paper
- AMCIS Paper Draft

MQP Meeting Notes: March 17, 2008

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (10:00 – 11:00 AM):

1. Timeline
2. Additional Eye Tracking experiments

Deliverables:

- Complete Data Collection
- Begin Data Analysis
- Revised Literature Review

MQP Meeting Notes: March 21, 2007

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (10:00 – 11:00 AM):

1. Pages selected for eye tracking
2. Preliminary eye tracking analysis
3. Preparation for eye tracking
    a. Scheduling
    b. Printing & Testing
4. Eye tracking materials
    a. Consent Form
    b. Script
    c. Demographic Information/Questionnaire
5. Updated hypotheses progress

Deliverables:

- Agenda and minutes
- Eye tracking data, prepared for analysis
- Any additional eye tracking dates (if necessary)
- Updated hypotheses

MQP Meeting Notes: March 28, 2007

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (10:00 – 11:00 AM):

1. Eye Tracking Experiment Results
2. Analyzing Results
3. Eye Tracking for next week
4. Revised Theoretical Framework

Deliverables:

- Agenda and minutes
- Analysis on Eye Tracking Data
- Finalize Theoretical Framework, Place into MQP Paper
- New Methodology

MQP Meeting Notes: April 4, 2007

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

---

Agenda for Meeting (10:00 – 11:00 AM):

1. Eye tracking analysis
2. Literature Review Status
3. Methodology Status
4. Poster Status

Deliverables:

- Agenda and minutes
- Eye tracking data analysis
- Finalized MQP Components
- Final Draft of Poster (Monday)
- Submit Poster (Wednesday)

MQP Meeting Notes: April 11, 2007

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (10:00 – 11:00 AM):

1. Presentation practice
2. Literature review status
3. Poster Status
4. Conclusion, analysis, results

Deliverables:

- Agenda and minutes
- Finalized MQP Components
- Fidelity presentation
- WPI presentation

MQP Meeting Notes: April 18, 2007

Attendees: Soussan Djamasbi, Dan Capozzo, Robert Groezinger, Frankie (Keet-Fung) Ng, Marisa Siegel

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Agenda for Meeting (10:00 – 11:00 AM):

1. MQP Paper Draft
2. AMCIS Paper revisions

Deliverables:

- Agenda and minutes
- MQP Draft components

B. Interview with Tom Tullis, 04/01/08

Tom Tullis, Senior Vice President of User Experience at Fidelity Investments

Hi Tom, before I begin, the main purpose of this interview is to gather additional information about FCAT and Fidelity's online business operations. My group would like to use this information to demonstrate the impact and importance of our project within Fidelity Investments.

1) Use of technology in Fidelity Investments in General
    a. How much money has Fidelity Investments spent on implementing state of the art technology?
    Confidential information because Fidelity Investments is a private company.

    b. What percent of this amount spent is on web technologies (Add Names)?
    Ditto.

    c. What kinds of web technologies are used at Fidelity Labs?
    The most up-to-date/available web technologies are implemented at the Fidelity Website (such as: Flash, Java Web, and Web 2.0)

2) Staffing and Resources used for Usability Research
    a. How many departments at Fidelity Investments are in charge of maintaining web pages and improving usability?
    Central Web Technology Group (formerly known as Fidelity Enterprise Business) is a design group with 100 employees who work with PWI (Personal Webpage Interface), HRS (Human Resources Services), and Financial group. The group is also divided into three groups: the Central group, IT group, and Business group.

    b. How many labs does Fidelity have available for usability research?
    Boston: two labs, Satellite labs in New York (1) and San Francisco (1) which are used for remote testing.

    c. How often do these labs operate during a fiscal year?
    80-100 studies per year, varies over time.

    d. How many staff members (researchers & usability analysts) work at Fidelity to improve the user experience?
    Approximately 100 employees (both full and part-time).

    e. What is the average salary for a usability analyst at Fidelity?
    Information available at www.upassoc.org

    f. What is the estimated annual budget for usability research at Fidelity? How much does this vary if at all over the years?

16 full time usability employees (2007), has varied from 12-20 employees over the past few years.

3) Fidelity Web Services
    a. How many clients use the Fidelity web pages for service?
    24 million customers in 2007. About 2 million customers access Fidelity's website on a daily basis. Additional information available on Fidelity's homepage.

    b. How many Fidelity employees use the company web page for work or services?
    Approximately 35,000 employees.

    c. What is percentage of Fidelity services are offered through the web for both external customers and internal employees?
    All services are available online.

    d. What is the percentage of Fidelity Investments' total revenue is from online transactions?
    95% of Fidelity's customer transactions are conducted online.

    e. How many online customers did Fidelity Investments had during the last fiscal year? How did it compare over previous years?
    Answered for Question a)

    f. What is the average age for these customers?
    Information unavailable.

    g. Is there a follow up survey after a business transaction regarding their experience using the Fidelity website? If so, what did it ask?
    Yes, but for a random percentage. Survey reflects on customer experience index.

4) In general why do you think web usability is important for Fidelity and how can this MQP help the company?

The usability research is important because it can help Fidelity Investments retain and attract new customers and employees. The project in particular will help attract younger customers who use the web.

5) Is there additional literature you would recommend that provides additional information regarding the use of technology at Fidelity Investments?

Fidelity Website: Bottom tab – News Media.
Jacob Nielson Literature: Web usability in general.

C. MyTobii D10 Specifications

The technical specifications of the MyTobii D10 are as follows.

Display	**17 inches**
Dimensions	**415 x 470 x 170 mm**
Weight	**9 kg**
Speakers	**-**
Working Distance	**50-70 cm**
Freedom of Head Movement	**30 x 15 x 20 cm**
Top Head-Motion Speed	**10 cm/sec**
Gaze Data Rate	**40 hz**
Accuracy	**0.5 cm**
Max compensation error	**< 1 degree**
Max long term deterioration	**< 1 degree**
Computer	**According to Tobii**
Software	**Windows XP**
Language	**All European**
Mounting	**VESA**
Accessories	**Adjustable height**

D. Table of Hypotheses

			Study I	Study II
Baby Boomers prefer…	*H1a*	Simple design	X	X
		Bigger font sizes	X	X
		Limited or no animation		X*
	H2a	Many links		X
		Search engine	X	X
	H3a	Few interactive features		X
		Text		X
Generation Y prefers…	*H1b*	Animation	X	X
		Graphics	X	X
		Pictures of celebrities	X	X
	H2b	Search engine	X	X
	H3b	Interactive features	X	
		Very little text	X	X

*Although Baby Boomers fixated as much on animation as Generation Y, they dilated less and reported disliking more than subtle animation.

E. Web Page Categorization Spreadsheet

	Cool Design	Clean Design	Cluttered Design	Main large picture	Pictures of people	Celebrities	Many Links	Lots of Text	Sparse text	Large font	Small font
1800contacts		1			1		1	1		1	1
1800flowers		1					1	1			1
aafes			1		1			1		1	1
abercrombie	1	1		1	1				1	1	1
amazon			1	1			1	1		1	1
americangirl	1	1			1			1		1	1
avon		1			1				1	1	1
bidz		1					1		1	1	
bluenile	1	1					1	1		1	1
cdw			1		1			1		1	1
coke	1	1		1					1	1	1
coldwater		1		1	1				1	1	1
costco			1				1		1	1	1
cratebarrel	1	1		1					1	1	1
crutchfield	1	1			1		1	1		1	1
cvs		1					1	1		1	1
delias	1	1		1	1				1	1	1
dell	1	1							1	1	1
drugstore		1	1	1			1	1		1	1
eddiebauer		1		1	1				1	1	1
footlocker			1	1					1	1	1
fostersmith		1						1		1	1
gap	1	1		1	1	1			1	1	
gateway	1	1							1	1	1
homedepot		1	1				1	1			1
hp	1	1					1	1			1
hsn		1			1				1	1	1
lowes		1		1			1	1		1	1
mac	1	1		1	1				1	1	1
marketday		1		1	1		1	1		1	1
mlb	1	1		1					1	1	1
neimanmarcus	1	1		1	1		1		1	1	1
netflix	1	1		1	1				1	1	1
newegg		1					1	1			1
northerntool	1		1	1			1	1		1	1
officedepot		1		1			1	1		1	1
orientaltrading			1		1		1		1	1	1
overstock			1				1		1	1	1
pcconnect		1					1	1		1	1
pcmall			1		1		1	1			1
peapod		1		1	1				1	1	
saks	1	1		1					1	1	
schwans		1						1		1	1
sears		1					1	1		1	1
sony	1	1		1					1	1	1
spiegel		1		1	1		1		1	1	1
staples			1				1	1		1	1
toysrus			1	1	1		1	1		1	1
victoriasecret	1	1		1	1	1			1	1	1
vistaprint		1			1		1		1	1	1
walmart		1		1	1		1	1		1	1
zappos			1				1	1			1

F. Study II: Consent Form

Fidelity Investments
Statement of Informed Consent for Usability Study

Thank you for agreeing to participate in this usability study. The purpose of the study is to obtain your feedback on some websites.

Information Collected: We will ask you to complete an online questionnaire giving us your ratings and feedback about some websites. While you are completing this questionnaire and looking at the websites, we will be recording where you are looking on the screen.

Use of Data: The information collected in this session will be used for web site development and educational purposes only. There will be no direct commercial use made of any materials from the session (e.g., for marketing, advertising).

Confidentiality of Data: Your name will not be included in any report of the results of this session. Data will be reported in the aggregate or, if any individual comments or data are included, they will be reported without naming the individual.

Your Compensation: In appreciation of your participation in this study, you will receive a $50 gift check or gift certificate. This in no way constitutes employment with Fidelity Investments.

Your Rights: Your participation in this session is completely voluntary and you may take a break or leave at any time. Just let us know if you wish to do either.

Your Agreement: I have read the above and agree to participate in this usability study.

Signature:

_____

Printed Name:

_____

Date: _____

G. Study II: Script

Icebreaker

Hi my name is:

How are you today?

What you will be doing today

- Today you will be evaluating a series of websites
- You will do this by visually examining a website and filling out two short questionnaires
- At any time during our evaluation today, of course you may stop, or take a break.
- The data we collect today will not be linked to you
- Do you have any questions about this?

About My Role

- I am a usability analyst and my role is to facilitate this session, primarily by asking you questions and reminding you to think aloud as you complete your tasks.

About The Setup

- Before we begin, I'd like to point out some details about the room we're in…
- Cameras here and here (side and ceiling and on top of monitor)
- Microphones here and here (either side of computer). We use these to record all of our participant's feedback.
- At any given time there may or may not be people on the other side of this window watching the session to see what our users have to say first hand.
- Do you have any questions so far?

About the survey

- During today's session, you will be looking at screenshots of sites. The sites are not interactive so you cannot click on any links. Two of the web pages are live and we ask that you do not click on any of the links.
- Do you have any questions about this?

Let's begin

- You will be shown a series of websites one at a time. I will ask you to examine each site for 10 seconds and then I will ask you a few quick questions after each site.
- Do your best to disregard the content of the site and focus on its visual design
- There are no right or wrong answers
- Feel free to ask me to repeat any instructions or questions.
- We'll start now…

Start

- Please examine this site for 10 seconds
- (…wait approx. 10 secs…)
- Have you ever visited this website before? (Yes or no...don't remember counts as no)
- How would you rate the site's visual appeal, or how nice it looks, on a scale of 1 to 5, where 1 means not at all appealing and 5 means very appealing?

- (Repeat above until done with last website)

Questionnaires

Bring participant into adjacent room.

- There are two questionnaires we'd like you to fill out.
- The second is a Demographics questionnaire that just asks for general information for our records.
- Again, none of this data will be linked to you.
- When you have completed these, please place them in the manila folder and knock on the door to let us know you are done.

Debriefing

- That concludes our study
- We greatly appreciate your participation
- We will be using this information to better understand the effect age has on website design preferences
- Please do not tell other people about the purpose of this study as it may affect our results
- Have a great day!

H. Study II: Follow-up Questionnaire

1. How important is visual appeal (how nice a page looks) to your satisfaction with a webpage?

☐	☐	☐	☐	☐
1	2	3	4	5
Not at all				Very much

2. Which was your favorite webpage? Feel free to note why in the comments section below.

☐ Abercrombie & Fitch
☐ Bidz
☐ Coke
☐ CVS
☐ Delia's
☐ Gap
☐ Gateway
☐ Mac
☐ Overstock
☐ PCMall
☐ Sony
☐ Victoria' Secret

Comments:

_____

3. Which was your least favorite webpage? Feel free to note why in the comments section below.

☐ Abercrombie & Fitch
☐ Bidz
☐ Coke
☐ CVS
☐ Delia's
☐ Gap
☐ Gateway
☐ Mac
☐ Overstock
☐ PCMall
☐ Sony
☐ Victoria' Secret

Comments:

_____

4. To what extent do you prefer webpages that have the following features?

   a. A lot of text

☐	☐	☐	☐	☐
1	2	3	4	5
Not at all				Very much

   b. Interactive designs and animation (e.g., video, java applets)

☐	☐	☐	☐	☐

1 2 3 4 5
Not at all Very much

c. Pictures

☐ ☐ ☐ ☐ ☐
1 2 3 4 5
Not at all Very much

d. One main large image

☐ ☐ ☐ ☐ ☐
1 2 3 4 5
Not at all Very much

e. Search bar

☐ ☐ ☐ ☐ ☐
1 2 3 4 5
Not at all Very much

f. Advertisements

☐ ☐ ☐ ☐ ☐
1 2 3 4 5
Not at all Very much

g. Advertisements that are targeted to your demographic or information you have previously searched for on the web

☐ ☐ ☐ ☐ ☐
1 2 3 4 5
Not at all Very much

h. Images of people

☐ ☐ ☐ ☐ ☐
1 2 3 4 5
Very much
Not at all

i. Bright colors

☐ ☐ ☐ ☐ ☐
1 2 3 4 5
Not at all Very much

j. Images of celebrities

☐ ☐ ☐ ☐ ☐
1 2 3 4 5
Not at all Very much

k. A Main Page that has only a few characteristics on it (e.g., a picture or animation, tabs to other pages).

☐	☐	☐	☐	☐
1	2	3	4	5
Not at all				Very much

l. Large font

☐	☐	☐	☐	☐
1	2	3	4	5
Not at all				Very much

m. A Main Page that has many characteristic on it (e.g., all possible links, pictures, tabs to other pages, several pictures or animations).

☐	☐	☐	☐	☐
1	2	3	4	5
Not at all				Very much

5. Please rank the following webpage features from most to least appealing, with "1" indicating the most appealing. Multiple features may have the same ranking if you find them equally appealing.

____ Advertisements
____ Animation & interactive features
____ Bright colors
____ Celebrities
____ Clean design
____ Cluttered design
____ Dark background
____ Large font
____ Little text
____ Lots of Text
____ Main large picture
____ Many links
____ Pictures of people
____ Search bar
____ Small font
____ Other:
_____

Did you recognize any of the people on the webpages you viewed? If you can, please identify anyone you recognized and on which page. If you cannot name the person, please note on which page you viewed him or her.

I. Tobii software problem – Letter to Tom Tullis

Capozzo, Daniel

From: Tullis, Tom [Tom.Tullis@fmr.com]
Sent: Monday, April 14, 2008 10:53 AM
To: Capozzo, Daniel
Cc: fidelity07@wpi.edu; Djamasbi, Soussan; Usability Team
Subject: RE: Eye tracking equipment solution - WPI MQP Team

I'm really glad you were able to figure that out. Yes, that will undoubtedly be very helpful in our use of the eye-tracker. We've run into a number of cases where we needed to combine data from multiple projects (e.g., from different computers).

Thanks!
Tom

From: Capozzo, Daniel [mailto:dcapozzo@WPI.EDU]
Sent: Sunday, April 13, 2008 11:50 PM
To: Tullis, Tom
Cc: fidelity07@wpi.edu; Djamasbi, Soussan
Subject: Eye tracking equipment solution - WPI MQP Team

Hi Tom,

As you know, we were having some difficulties with the eye tracking software in regards to the task of combining multiple projects into one local file. We needed to do this in order to extract hotspot pictures and expedite AOI analysis. The main problem was that we would have to set up AOIs on both computers and we were unable to get hotspot pictures with all the participants data.

We took many routes to solve this problem, which include contacting Tobii Software. This attempt was unsuccessful, mainly because the support at Tobii could not find a way to fix this problem, and their main engineers from Sweden were unavailable. We needed a solution to this problem instantly. In addition to contacting the developers, we also collaborated with Oliver, but we were unable to find a solution.

We had a theory in which to solve this problem which includes using the same test name on each computer. So here are the steps we took:

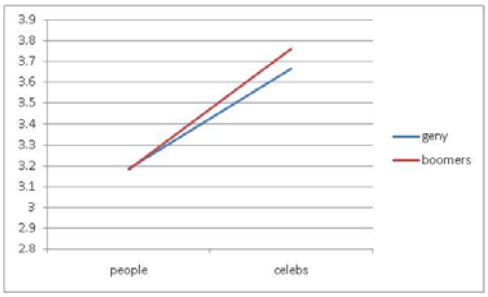
1. We initiated a test on one of the eye tracking computers, and recorded test data.
2. After that test data was completed, we exported the file to the Fidelity hard drive.
3. Next, we imported that file onto the other computer. Now we have two identical tests on both computers.
4. After all data collection was completed, we exported one of the files to the network drive with the same name.
5. Once this was completed, we imported it on the other computer. It is essential to import the file with the same name, in order to combine all data.
6. Once this was completed, we had 51 participant's data on one Tobii software file. This expedited our analysis of AOI and dilation.

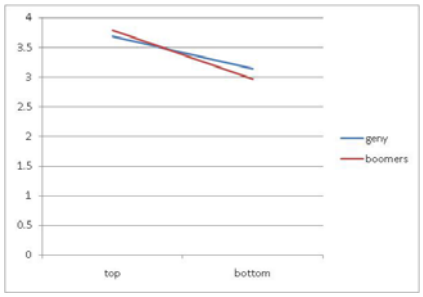
We hope that this information benefits Fidelity if this problem ever occurs again. We went through much stress navigating through this problem, but ended up finding a worthwhile solution. If you have any questions please do not hesitate to contact us.

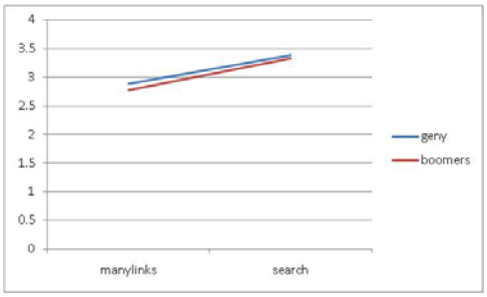
Sincerely,

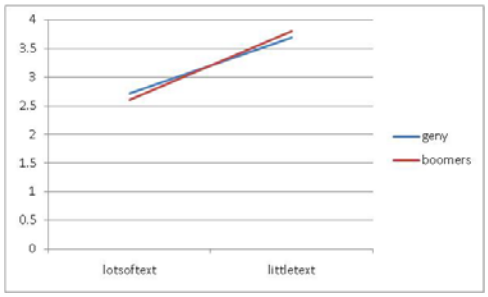
WPI MQP Team

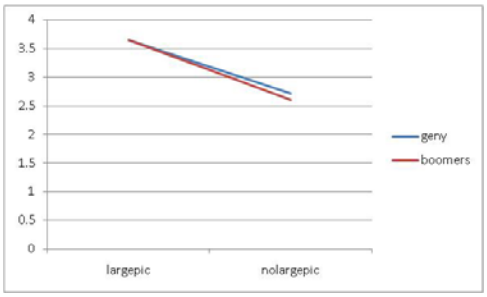
J. Graphs of Study I Results

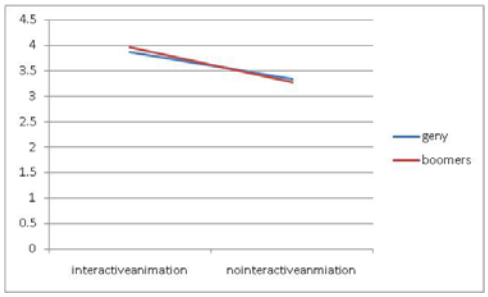


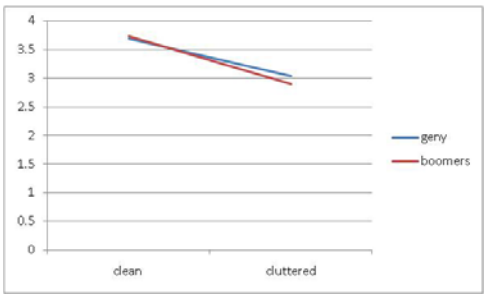


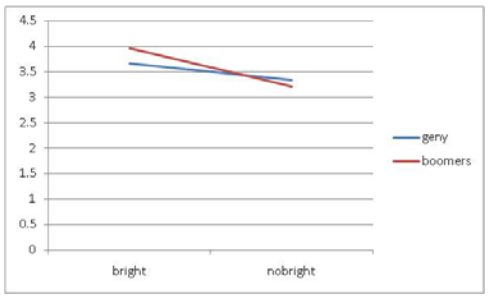


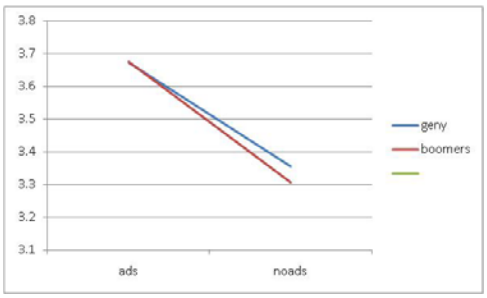




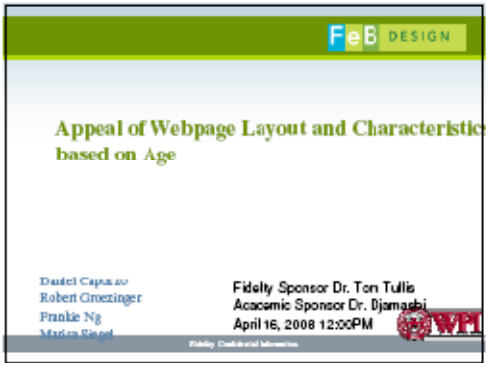


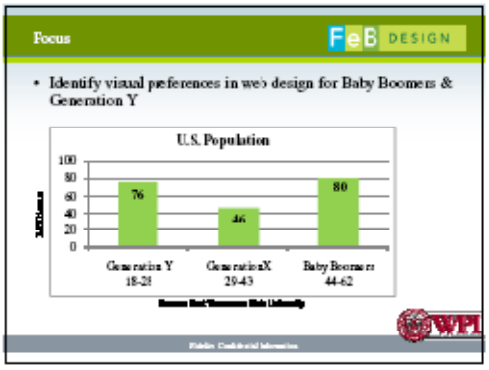


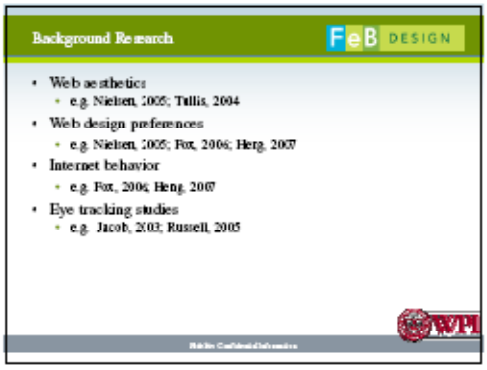




K. Fidelity Presentation







Hypotheses Model

FeB DESIGN

- H1a) Baby Boomers prefer [illegible] and no animation
- H1b) Generation Y prefer [illegible], and pictures of celebrities

FeB DESIGN

Study I: Survey

Study I: Participants

FeB DESIGN

- Posted on forums targeted to age groups
- E-mail solicitation
  - Fidelity Investments employees
  - Experimenter contacts

	Number of Participants
Generation Y	102
Baby Boomers	104

Study I: Procedure

FeB DESIGN

- Online survey
- Fifty web pages
  - Randomly selected from top one hundred retail pages viewed (ForeSee Results – Freed 2006)
  - Random Order
- Instructed to disregard content
- Rated pages on visual appeal

Study I: Measurements

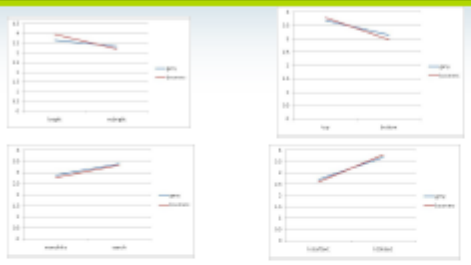
FeB DESIGN

- Demographics
- Visual appeal rating

FeB DESIGN

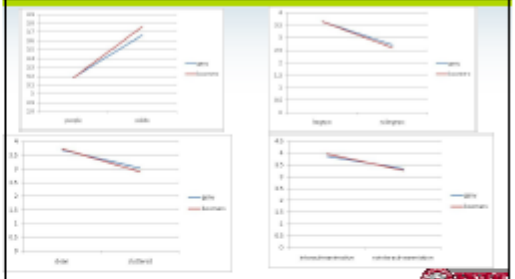
Results

Study I: Results



Fidelity Confidential Information

Study I: Results



Fidelity Confidential Information

Study I: Results

- Web page design preferences for Baby Boomers and Generation Y are similar
- Both prefer web pages with:
  - People in general – more specifically, celebrities
  - Animation and interactive features
  - Clean and simple design over cluttered design
  - Search features over many links
  - A large main image
  - Limited text

Fidelity Confidential Information

Study II: Eye Tracking

Fidelity Confidential Information

Eye Tracker: MyTobii D10

- Three units
- Over $30,000 each
- Unobtrusive

Old TobiiT60XL and D10 Eye Tracker

Fidelity Confidential Information

Eye Tracker Measurements

- Fixation
  - Defined as a gaze longer than 300 milliseconds
  - Indicates interest
- Dilation
  - Data recorded 50 times per second
  - Indicates emotional response, cognitive processing

Fidelity Confidential Information

Study II: Participants

- Fidelity NOW e-mails
- Internal Fidelity homepages

	Number of Participants
Generation Y	20
Baby Boomers	21

Fidelity Confidential Information

Study II: Procedure

- Briefing
- Participant consent form
- Calibration
- Questions asked
  - How would you rate the visual appeal?
  - Have you visited this page before?
- Questionnaire
  - Demographic information
  - Web page design preferences
- Debriefing

Fidelity Confidential Information

Study II: Measurements

- Fixation
- Dilation
- Questionnaire
  - Likert scale of web page characteristics
  - Rank of web page characteristics
- Demographic Survey
  - Age, gender, salary, internet experience

Fidelity Confidential Information

Results

Fidelity Confidential Information

Results

Generation Y

Baby Boomers

Fidelity Confidential Information

Results

Generation Y

Baby Boomers

Fidelity Confidential Information

Results

FeB DESIGN

Generation Y

Baby Boomers

Results

FeB DESIGN

- Supports Study I
- Found differences between generations
  - Boomers fixate more in general – especially text
  - Large picture
  - Animation
  - Celebrities

Conclusion

FeB DESIGN

Recommendations

FeB DESIGN

- People (celebrities)
- Minimal text – large font
- One large image
- Avoid scrolling
- Uncluttered
- Search feature
- Some animation

Consolidating Data from Eye Trackers

FeB DESIGN

- Initiate one test on one machine
  - Sample data
- Export file from first machine
- Import it on second machine
- Conduct eye tracking
- Export file from one machine (with least data)
- Import it onto other machine

Acknowledgements

FeB DESIGN

- Dr. Tom Tullis
- Oliver Brooks
- Ann Chadwick-Dias
- Dr. Soussan Djamasbi
- Dr. Jeanine Skorinko
- Mark Catalano
- Brookline Senior Center


Thank You!
FeB DESIGN
Questions?


Fidelity Investment
FeB DESIGN
Average Daily Users
% Annual Transactions
Equivalent Total Managed Assets
Employees Online
2.4 million
95%
$1.516 trillion
35,000
• Fidelity E-business Design group
16 full-time analysts
80-100 web studies per year

L. WPI Presentation

APPEAL OF WEBPAGE LAYOUT AND CHARACTERISTICS BASED ON AGE

Daniel Capozzo
Robert Groezinger
Frankie Ng
Marisa Siegel

Fidelity Sponsor: Dr. Tom Tullis
Project Advisor: Dr. Soussan Djamasbi
April 15, 2008

FIDELITY INVESTMENTS

Average Daily Users	% Annual Transactions	Equivalent Total Managed Assets	Employees Online
2.4 million	95%	$1.516 trillion	35,000

- Fidelity E-business Design group
  - 16 full-time analysts
  - 80-100 web studies per year

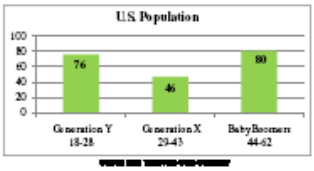
Source: Fidelity Investments News Media

BUSINESS NEED

- Attract new customers
- Retain current customers
- Specifically, increase retirement planning

FOCUS

- Identify visual preferences in web design for Baby Boomers & Generation Y



OVERVIEW

- Background Research
- Study I – Survey
- Study II – Eye tracking
- Results and Conclusions
- Final Recommendations
- Contributions

BACKGROUND RESEARCH

- Web aesthetics
  - (e.g. Nielsen, 2005; Tullis, 2004)
- Web design preferences
  - (e.g. Nielsen, 2005; Fox, 2006; Hong, 2007)
- Internet behavior
  - (e.g. Fox, 2006; Hong, 2007)
- Eye tracking studies
  - (e.g. Jacob, 2003; Russell, 2005)

HYPOTHESES

- H2a) Baby Boomers prefer [illegible], and no animation
- H2b) Generation Y prefer [illegible], and pictures of celebrities

STUDY I: SURVEY

STUDY I: PARTICIPANTS

- Posted on forums targeted to age groups
- E-mail solicitation
  - Fidelity Investments employees
  - Experimenter contacts

	Number of Participants
Generation Y	102
Baby Boomers	104

STUDY I: PROCEDURE

- Online survey
- Fifty web pages
  - Randomly selected from top one hundred retail pages viewed (ForeSeeResults - Freed 2006)
  - Random order
- Instructed to disregard content
- Rated pages on visual appeal

STUDY I: MEASUREMENTS

- Demographics
- Visual appeal rating

STUDY I: RESULTS

- Web page design preferences for Baby Boomers and Generation Y are similar.
- Both prefer web pages with:
  - Celebrities over than those with people in general
  - Animation and interactive features
  - Clean and simple design over cluttered design
  - Search feature over many links
  - A large main image
  - Limited text

STUDY II: EYE TRACKING

EYE TRACKER: MYTOBII D10

- Three units
- Over $30,000 each
- Unobtrusive

Eye Tracker

EYE TRACKER MEASUREMENTS

- Fixation
  - Defined as a gaze longer than 300 milliseconds
  - Indicates interest
- Dilation
  - Data recorded 50 times every second
  - Indicates emotional response, cognitive processes

STUDY II: PARTICPANTS

- Fidelity NOW e-mails
- Internal Fidelity homepage

	Number of Participants
Generation Y	20
Baby Boomers	21

STUDY II: PROCEDURE

- Briefing
- Participation consent form
- Calibration
- Questions asked
  - Have you visited this web page before?
  - What is your rating of visual appeal on a scale of 1 – 5?
- Questionnaire
  - Demographic information
  - Web page design preferences
- Debriefing

STUDY II: MEASUREMENTS

- Fixation
- Dilation
- Questionnaire
  - Likert scale of web page characteristics
  - Rank of web page characteristics
- Demographic Survey
  - Age, gender, salary, internet experience

RESULTS

Generation Y

Baby Boomers

Generation Y

Baby Boomers

Generation Y

Baby Boomers

CONCLUSION

FIDELITY

- People (celebrities)
- Minimal text – large font
- One large image
- Avoid scrolling
- Uncluttered
- Search feature
- Some animation

CONTRIBUTIONS

- Fidelity Investments
  - Customer satisfaction and retention
  - Attract new customers
  - Improve employee efficiency
  - Solved Tobii Studio software issue
- Research
  - Human-computer interaction
  - Lay foundation for future study on Generation Y
  - Comparisons between generations

FUTURE RESEARCH

- National Culture
- Gender
- Task-based exploration
- Other generations

ACKNOWLEDGEMENTS

- Dr. Tom Tullis
- Oliver Brocks
- Ann Chadwick-Dias
- Mark Catalano
- Brookline Senior Center
- Dr. Jeanine Skorinko

THANK YOU!

Questions?

M. WPI Poster

Appeal of Web Page Layout and Characteristics Based on Age

Daniel Capozzo (MIS), Robert Groezinger (MIS), Frankie Ng (MIS), Marisa Siegel (MIS)
Advisor: Dr. Soussan Djamasbi

Fidelity INVESTMENTS
245 Summer Street,
Boston, MA 02210

Abstract

This project examined various webpage features to determine which would be most appealing to two large market segments, Generation Y and Baby Boomers. Three sets of hypotheses, grounded in previous research, were developed, and an online survey and two laboratory experiments using eye tracking equipment were conducted. The results of this study provide valuable information on the design preferences of different generations. Based on these results, the study provided future recommendations for the design of the Fidelity Investments homepage.

Background

Fidelity Investments Inc. is one of the largest names in the financial industry, managing assets for of 24 million individuals. An average of 2.4 million users visit the Fidelity Investments website per day, constituting 95% of their annual customer transactions. In 2007, this was the equivalent of $1.516 trillion in total managed assets. In addition, over 35,000 employees use the company web page for business purposes.

Average Daily Users	% Annual Transactions	Equivalent Total Managed Assets	Employees Online
2.4 million	95%	1.516 trillion	35,000

This incredibly significant volume of users indicates that website usability and appeal is vitally important to Fidelity Investments.

The Fidelity E-Business Design (FeB Design) group is dedicated to usability research. This group includes sixteen full time usability analysts who conduct eighty to one hundred web studies per year. An important tool that this group uses is the MyTobii D10 eye tracker. This non-invasive equipment allows experimenters to track eye movement, dilation, and fixation. Fixation is an indicator of processing or interest and dilation is an indicator of cognition.

The use of cutting edge technologies, like the eye tracker, is extremely useful in gathering empirical data with which to measure customer experience. A functional and, further, appealing website is imperative to Fidelity Investments; retaining and attracting new investors is essential to increasing market share and profitability.

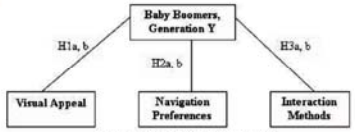
Acknowledgments

Dr. Tom Tullis, Oliver Brooks, Dr. Jeanine Skorinko, Ann Chadwick-Dias, Mark Catalano, Dr. Soussan Djamasbi & Brookline Senior Center

Project Goals/Objectives

To help Fidelity Investments attract new and retain old customers, particularly for retirement planning. The focus was on Gen Y and Boomers because these two groups form the largest segment of the market. To accomplish this objective we examined:
- If there are differences in web page design preferences based on age
- Which web page characteristics appeal to these two different age groups

Hypotheses



Research Model for the Usability Study

H1a) Baby Boomers prefer bigger font sizes and no animation
H1b) Generation Y prefer animation and graphics, pictures of celebrities

H2a) Baby Boomers prefer many links and a search engine
H2b) Generation Y prefer a search engine

H3a) Baby Boomers prefer less interactive features, favor reading text
H3b) Generation Y prefer interactive features

Study I: Survey

Overview
- Online survey
- Fifty web pages randomly selected from top one hundred retail pages viewed
- Participants rated pages on visual appeal, disregarding content

Participants

Generation Y	102
Baby Boomers	104

Results/Analysis
Preferences for Baby Boomers and Generation Y appear to be similar. Both prefer web pages with:
- Celebrities over than those with people in general
- Animation and interactive features
- Clean design (pages with little on them) over cluttered design
- Search feature over many links
- A large main image
- Limited text

Study II: Eye Tracking

Overview
- Eye tracking conducted at Fidelity Usability Labs
- Twelve web pages (selected from fifty web pages in Study I) viewed
- Eye movement, dilation, and fixation were recorded
- Pages rated based on visual appeal
- Questionnaire on web preferences completed

Participants

Generation Y	20
Baby Boomers	21

MyTobii D10 Eye Tracker

Results/Analysis

Baby Boomers

Generation Y

- Gen Y dilates more when viewing **celebrities** than do Boomers
  - Both dilate marginally more viewing celebrities than people in general
- Gen Y dilates more when viewing **animation** than do Boomers
- Boomers dilate and fixate more on **large images** more than Generation Y
  - Both generations fixate on a large image more than on many pictures
- Boomers fixate more on the **bottom of the page** than does Generation Y
- Boomers fixate more on **text** than Generation Y
  - Both generations fixate more on large text than small text

Contributions

The results of this study extends previous research and our understanding of users' reactions to web usage. These results contribute to human computer interaction (HCI) research and the use of available web technologies at Fidelity Investments. Additionally, these results can help companies attract and retain web customers and employees, consequently become more profitable and successful over the long run.

Recommendations to Fidelity

- Place pictures of celebrities or people on the main page
- Use moderate amounts of small and large sized text
- Instead of using multiple small images, use one large image
- To attract Generation Y users, use animation
- Include all essential information at top of web page to avoid scrolling
- Extend this study by examining other variables such as ethnicity, gender, computer literacy, and past web page experiences