

*The Effect of Visual Aspects of Website  
Design on User Perception:  
Project Specification*

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# I. Introduction

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## A. Overview

A user interface (UI) is the tool that allows the interaction between humans and objects (1). UI design is the study of how user interfaces can be improved and developed to create a simple and enjoyable experience for the user (2). User interfaces employ aspects of interaction design, visual design, and the structure of information to create the best possible user experience (2).

### *Project Objective*

In this project, I study a specific aspect of user interface design: website design. Good website design can, in many cases, increase a company's profit. . As determined by Sillence et al, users are far more likely to trust a company or product that has a good web design than a bad one (4).

### *Project Design*

To complete my website, I began by developing an array of nine websites to test three separate visual aspects. Second, I used the results of user feedback to design a final website that incorporates the comments received from the user feedback. I asked for further feedback on this website and fine-tuned the functionality to create a final product. I then coded it using CSS, HTML, and JavaScript, all new languages for me.

Through the course of this project, three different visual aspects of websites were examined: whitespace, color, and navigation. I selected these visual aspects as fundamental to web design features according to a study done by Human Factors International (5).

### ***Visual Aspect 1: Whitespace***

In 2004, it was found that the correct use of whitespace has the potential to increase a user's comprehension(6). In addition, Lin found that the use of text and whitespace can affect the user's recall (6). In my project, I devised three variations of a website that show increased and decreased whitespace on a page, as well as large and small amounts of text. I then evaluated the user's recall and opinions on this layout format. Based on the feedback received, I adjusted the amount of whitespace on each page.

### ***Visual Aspect 2: Color***

Much research has been done on colors and people's perception of them, as well as the associations certain colors lead them to form. In Faber Birren's various books on color he goes into great detail about what different colors make a person feel (7). The knowledge gained from this book has been applied many times to web design. Now, designers study the use of color in a website and online, to brand a person or a company (8). In addition, it has been found that users decide how much they like a product within the first 90 seconds of

interacting with it (9). The majority of this decision is based on the color scheme of a site (9). In addition to testing the color scheme of the site, I change the main header image. I believe that this image also affects people's perception and aid developing a brand that accurately defines me. As this image is the background of my final site, it is an extremely important to my final product.

### ***Visual Aspect 3: Navigation***

Navigation is one of the most critical aspects of good web design; many users have a predefined sense of how they feel the navigation should look (10). Navigation can affect the ease of a user's experience. It impacts how frustrated they get while using a site, and how much they enjoy being on the site (11). As a result, it can also affect their likelihood to return to the site (11). Since navigation seems so important, I tested three commonly used navigation structures.

### ***The Testing Process***

In order to complete the formative testing of the website, I used heuristic evaluation and task-based testing. Heuristic evaluation asks users to look at an interface, and provide their opinions and feelings invoked by the interface (12). Most evaluations are conducted via this method in real life therefore making it an accurate assessment of how usable the site is (12).

For whitespace, I used a word list to complete a recall test. I allowed one minute reading time. Once the minute passed, I asked them to recite as many

words as they can remember. In addition, I asked for feedback regarding the amount of whitespace. In order to test navigation, I provided users with a list of tasks to complete. I followed this task-based testing with a series of questions that assessed their opinion of the site as well as any feedback they may have. Finally, for the color testing I gave users a few minutes to assess the site and then ask a series of questions that results in a discussion on the colors used in the site, in an effort to conclude something about how perception of me and my brand is affected by different colors. After gaining this feedback, I made informed decisions on what visual aspects allowed me to have the most efficient and aesthetic website design.

Once the first round of testing was completed, I returned to the users for further feedback involving their likes and dislikes. Throughout the development of this project, I tested varying degrees of whitespace and layout, color use, and navigation to determine if these visual aspects have a strong impact on user satisfaction and trust. In addition, I learned new coding languages (CSS, JavaScript, and HTML) and became familiar with many of the constructs used in website design, such as jQuery.

## **II Goals**

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- Test how each of the following affects user perception of a website:
  - White space

- Colors
- Navigation
- Design a basic website to be used for testing.
- Conduct user surveys and draw conclusions from responses.
- Incorporate changes into personal website.
- Receive further user feedback and adjust site accordingly.
- Implement the website.
- Learn CSS, HTML, and JavaScript.

### III Use Cases

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Potential use cases for the website:

#### *Recruiters for tech companies*

I believe this will be the most important use case. As this is a personal site that details my abilities and accomplishments, I feel that this will be the most frequent user for my website.

#### *Industry Associates and Colleagues*

As part of my occupation, I expect to meet other software developers and plan to establish an active network. Colleagues can use the website to stay in touch.

## IV Procedure

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I presented each user with a task list and set of questions to gauge their understanding of the site. Based on their responses I was then able to draw conclusions on the website design that would be most appealing and useful to users. I tested a total of 15 users, and tested them for each section listed below.

### A. Navigation Tasks

Every user was given a set of navigation tasks to be used on each website. These tasks were followed by a series of questions in order to gauge the user's response to the tasks. Each task was presented orally to the user.

#### *Tasks*

- You are a recruiter. Where would you look to find out if the technical skills I have are applicable to the position you are looking to fill?
- Where would you look to find my resume and say where I attended University?
- You are someone I met at a conference. Where would you look to see what my background is?

#### *Questions*

- Which task was the easiest? Why?



- Which task was the hardest? Why?
- Which task was the most intuitive? Why?
- Which task was the least intuitive? Why?
- What would you change about the navigation?

## **B. Color Perception**

Each user was presented with a list of questions regarding color to test perceptions after viewing different pages.

### *Questions*

- Is the color too dark?
- Is it too bright?
- How does [insert color] affect your perception of me?
- Does the color affect your ability to focus on the text?
- Would you prefer multiple colors?
- Is there a particular color you would like to see?
- How does the background image affect your perception of me?
- Does the background image affect the type of programmer you think I am? If so, how?

## C. Memory Recall

The memory recall tested how varying amounts of whitespace can affect a user's ability to understand a website or how to use it. I presented each user with three separate pages with 40 different words and different white space sizing. I gave them a minute to study all the words and then had them recite the words they had memorized. I left two minutes between each test in order to allow their mind to refresh as it is possible that memorization ability decreases over time.

## VI. Results of User Testing

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### A. Navigation

#### *Horizontal Navigation*

The horizontal navigation structure received the most positive feedback. The majority of users felt that it was straightforward and easy to use. They found that having all the menu options lined up along the page made them easy to understand and access. The size of the menu options were not so small that they had to slowly move the mouse to reach the target, and they were not overly large so as to impede access options that were further to the right of the page.

One thing users did not like about the current layout was that there was no small down arrow on the ‘experience’ button indicating the section could be expanded.

When asked to search for my technical skills, users felt this was fairly intuitive, although they did feel that the button name “skills” could be renamed to something more obvious, such as “technical skills”. Nowhere on the front page does it say I am a software engineer; therefore, technically my skills could be anything. They either suggested stating I was a software engineer or calling that section technical skills.

Originally, I had a link to my resume stored under experience. Users found this extremely confusing. As this was a personal branding site, they felt that “resume” should be a top-level link, easy to find and access. They believe that most recruiters would look for that first rather than going through experience and project sections on the website.

Finally, for the last task, users ended up looking through every page of the site. They felt that the “about” section was not detailed enough, and ended up looking mostly at the experience section. They felt this would be the most useful. No one found the interests section particularly useful.

### ***Vertical Navigation***

Vertical navigation received some positive feedback, although not as much as horizontal navigation. With this layout, the users really liked that there was a small arrow next to the experience button. It was very clear to them that this section expanded. Thus, completing Task #1 was much easier. However, one thing users did not like was that when the experience accordion expanded, the text shifted to the left. They felt that this was confusing and unaesthetic. They suggested keeping the text aligned with larger margins the whole time versus having the margins expand shrink.

They felt that it was easy to tell that the menu expanded downwards. One thing they did not like was that when the accordion menu expanded the text on the page moved to the side. They said they would prefer if the text was aligned with a larger margin the whole time versus having it move around. My users were now able to more intuitively understand how to use the site. As a result, they had fewer comments about the naming of headings in order to navigate.

### ***Pop Out Navigation***

The pop out navigation received an interesting response from users. Most users felt that this type of navigation should only be used for mobile sites. They suggested having this navigation appear after the page had been made smaller. Users also felt that having the experience section with two subheadings in this format was annoying and inconvenient. In addition, users felt that the pop out

navigation should be moved to the bottom right corner of the header. This is general the standard placement for that type of navigation and is clearer and more natural for the user.

Overall, users liked the horizontal navigation best. They felt that it was the most natural and straightforward style for a user. In addition, it suited my site as I do not have many subheadings and is preferable to a vertical navigation, which they believe are best suited for sites with many layers.

A second notable change from the testing was that users felt that the website should have different names for headings to enhance clarity or more clearly indicate the primary function of the site is as soon as the user enters. From this feedback, I selected a version of horizontal navigation to use on my website.

## **B. Colors**

In order to test user's perception of the site based on color, I used red, black, and blue based websites and tested their impressions.

### ***Red***

Users felt that red color on the website made it appear as though I had an aggressive and edgy personality. My users felt that if they were looking to hire me for a position they would be less likely to do so as they felt the color showed that I was difficult to work with and unreliable. The color wasn't too dark, but

they recommended using a deeper shade of red such as a maroon as an alternative to bright red. The color did not affect their ability to read the page.

With regards to the background image, they liked the red that was in the image as it added interest. However, they felt that with the color scheme it was too much red and emphasized the negative emotions they equated with my personality.

### ***Black***

Most users liked the black site generally stating that black emphasized strength and reliability. In addition, they felt using black made them feel like I was a better coder, producing higher quality and more reliable code. They felt that the black showed that I would not be afraid to lead or take charge of a group, and in difficult situations. I would be a voice of reason providing well thought out solutions, not creating problems.

Users also really liked the background image that accompanied this color. They felt that it convinced them that I knew how computers worked, and that I was able to fix issues and bugs that may arise in my code.

Something the users did not like with the black was the radial gradient used in the buttons. They felt that this was outdated and looked tacky. They stated that there were better, more modern ways of creating styles in my website.

## ***Blue***

Users also liked the blue site. They felt that this demonstrated my ability as a calm person and a voice of reason. They felt that I would be able to handle challenging situations well although I may not present as a leader. They also felt that I would write code in a timely fashion. Users liked the background image that accompanied this color, although not as much. They felt that it showed that I was involved in computers, although my users who were not in Computer Science did not come to this conclusion so quickly.

In conclusion, I chose the black background for my website. This color and background received the most positive feedback from users—or at least the feedback I was most interested in receiving. I felt that using black would help most effectively communicate my field of choice, personality, and work ethic. With regards to my question for users about color schemes they suggested using one major color for the site and adding accents. I decided to use the black site with blue accents – from the blue seen in the picture.

## **C. Whitespace**

I used the three different amounts of whitespace – no white space, extra whitespace, and normal whitespace and tested user's recall ability. Users were given lists of different words for each test in order to remove any chance of overlap and previous memorization.

### ***Extra Whitespace***

First, I added extra whitespace and padding to my word list. Surprisingly, users found it hard to remember words that were in this list. The words were spaced so far apart it seemed inefficient to move from one word to another. Some users did not even finish reading the list. Users averaged a recall of 45%.

### ***Normal Whitespace***

Normal whitespace had better results. In order to create a list of words that had an average amount of whitespace I used padding of 5px around each word. Users found this list much easier to read than the previous list as all the words were on a single page. This allowed them to focus on reading them faster and possibly read them a second time. Overall users were able to recall approximately 50% of the words. This was a much higher success rate than for extra whitespace.

### ***No Whitespace***

Without whitespace, users read considerably slower. Memory was impaired. Word recall was 35%.

Overall, based on my user results, I used the average whitespace used on most web browsers, a line spacing of 1.5, and ensured margins were large enough to easily read and interpret text.



## VIII. What I Learned

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### *User Testing*

For the first few parts of my project, I completed a formative user study using 15 users. This was my first experience designing, executing, and analyzing a user study, so the first thing I learned was how to execute a user study. As I was doing a formative user study on a variety of different site aspects, I had to first make sure to only change one aspect at time. Once I had decided to do a set of three sites for each I had to make sure to adapt the testing to work for each feature I was testing.

First for navigation testing, I needed to create a list of tasks that the users would have to complete regardless of navigation type. Designing these tasks was difficult. I wanted them to be straightforward so that the users would not have to ask questions during testing, but I also wanted them to thoroughly test the different navigation style. Thus, I created a suite of tasks that I felt would accurately represent the purposed use cases of the website. In addition, I followed these tasks with a series of questions that I felt would accurately gauge a user's response to the different navigation types.

For color testing, I allowed users a few minutes to explore the page. I then presented them with a series of questions that would allow me to gauge their perception of the website and me. Choosing these questions was difficult as it is hard to get a full idea of what a user means based on open-ended questions. I had

to make sure my questions were specific, but not overly specific so as to annoy the user by requiring an unreasonable amount of time to complete.

Finally, for whitespace I had to create a list of words that was arranged on the page so as to ensure that there was no whitespace, extra whitespace and a normal amount of whitespace. As these are all relative things this proved slightly challenging although I felt it worked quite well.

Once I had created the different websites that would provide me with information on developing a final product. I had to figure out how to conduct the user testing in a way that would receive accurate results. I did this by drafting processes and testing them until I felt like I was addressing the right aspects.

I think my results were aided by the fact that all users tested the sites on my computer so appearance, color display and whitespace were all controlled..

The results were quite interesting. Although I see why someone's perception of black may have a positive effect on their opinion of me as a programmer, I was surprised that it had so much of an impact. I would have expected it to possibly have a negative connotation in that users would view me as too controlling or find the site depressing.

For navigation, I was not completely surprised that horizontal navigation had the most positive feedback, although, I was surprised that vertical navigation received such negative feedback. It is not uncommon for websites to have vertical

navigation. The negative response to the pop up menu was also interesting to me as I have seen this on some desktop sites and I would not have expected the feedback on it to be so negative.

Finally, for whitespace I am not surprised by these results as they closely aligned with my previous research.

### ***Learning Software Related to Websites***

The second big learning experience for me was learning how to create mock ups of possible websites for which I learned Fireworks and Photoshop. I used Photoshop to edit the background image to give it the appearance I wanted. I used Fireworks to design mock ups of some different websites to get feedback on. I found Fireworks to be difficult but managed to learn how to complete the layout of a page, as well as add lines, colors and images to create a .png that looks like a real webpage would. To me, what was important about using these design tools was being able to explore my creativity.

### ***Coding Websites***

The third big learning experience for me, and arguably the largest was learning how code in CSS, HTML, and JavaScript and connect the three languages to design an accurate functioning website. This development took a long time. I began by learning how I should structure my HTML.

Originally, I tried developing my sites using a table layout, and filling in different areas of the table with different values based on what information I wanted where. This created a clunky website that was difficult to manipulate. As a result, I removed my tables and started fresh. I ended up using divs to structure my pages for my user testing.

I started off not using CSS directly, but rather attempting to incorporate it into the HTML. However, this was difficult to manage as I had a lot of repeated code and sometimes changing the CSS in one area would affect other areas I did not expect it to. Thus, I took the CSS and created separate files for it. I was able to reuse much of the CSS in my development of testing sites.

Finally, for testing sites for JavaScript, I had to work on creating a popout menu. In order to do this I had to learn how to complete an image swap and swap out one image with my new div containing the navigation.

My next step was to create my actual website. This involved learning much more CSS, HTML, and JavaScript. For my final site I changed the whole website structure. As a result, I had to recode much of it. In addition, because of the new design, making the website responsive was difficult. At first, I did not understand how to name and denote my classes and divs so that when I made a change I often could not see any change reflected on the screen. In this case I had to see if I could change it in a way that would show the effects. For the JavaScript, I had to learn how to make my divs have the ability to disappear and

reappear when certain values were clicked. I also had to make sure that they were high enough with the z index to appear over other values.

## **IX. Possible Expansions**

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It would be interesting to conduct infrared eye tacking tests as well as Fitt's law tests on the final product to further design a site that would be more convenient for users. In addition, it would be interesting to design a few completely different site and take that to users to compare to the current site.

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