“A usability analysis of the website for Centre County Library and Historical Museum”

Kirsten McGroary
Alec Redman
Ryan Czapka
Curtis Robb

December 17, 2013

Class Project for IST 331
Instructor: Frank.Ritter@psu.edu
Abstract (Kirsten McGroary)

Interface design has a large effect on the usability of a website. For some websites, sacrificed aesthetics may be better for functionality, or vice versa. When it comes to website design there are no universal rules. The designer has to keep in mind what the user will be using the website for during the design phase.

For this project we used the Centre County Library and Historical Museum website. The Centre County Library and Historical Museum provides books, information, and technology resources free of the charge to the community. We performed a task analysis, a perception analysis, and a comparative analysis on this website in order to improve the usability.

We would like for the menus of the Centre County Library website to be clear and concise. The visuals that are used on the website should be a good representation of the resources that the library provides. Also the website tasks should not be tedious, so we hope to improve the usability of the website.
Table of Contents

1. Introduction
2. Explanation of the Website
3. Task Analysis
   3.1 Introduction
   3.2 Task and Method of Analysis
   3.3 Methodology
   3.4 Results
   3.5 Analysis and Comparisons
   3.6 Conclusion
4. Perception Analysis
   4.1 Introduction
   4.2 Methodology
   4.3 Results
   4.4 Analysis
   4.5 Conclusion
   4.6 Relation to Centre County Library Website
5. Comparative Analysis
6. Recommendations
   6.1 Recommendation 1
   6.2 Recommendation 2
   6.3 Recommendation 3
   6.4 Recommendation 4
7. Conclusion
8. References
1. Introduction (Alec Redman)

For this report, we chose to analyze the website for Centre County Library & Historical Museum, www.centrecountylibrary.org. The Centre County Library & Historical Museum is a non-profit organization that provides books, information, and technology resources free of charge to the community. They are based in Bellefonte, Pennsylvania, with three branch locations in East Penns Valley, Centre Hall, and Philipsburg, Pennsylvania. Taken directly from their website, Centre County Library’s vision is “To be an inviting and vital part of the community by providing access to current technology and services to foster education and to enhance the community’s quality of life”.

In today’s world, the internet is the predominant resource for users to find information about organizations. Therefore, it’s important for Centre County Library’s website to be efficient from a usability standpoint. Today, many people think of libraries as outdated, and as places that simply provide books. In reality, many libraries including Centre County Library, provide modern technologies that users desire such as downloadable audiobooks, ebooks, and videos/movies. By providing these resources online in an easy to use manner, the organization can attract more users throughout the community and fulfill their vision. For this reason, we chose to analyze their website and hope to provide recommendations that could enhance its usability.

In our report, we chose to employ task analysis, perception analysis, and comparative analysis to base our recommendations on. We performed these analyses by running studies on actual participants using Centre County Library’s website. We believe that the data collected from these studies, coupled with knowledge gained throughout the semester, has allowed us to provide valid recommendations that could improve the website.
2. Explanation of the Website (Alec Redman)

Figure 1 displays a screenshot of the top portion of Centre County Library’s homepage. Located at the top of page, beneath the organization’s logo is a search bar that allows users to search for books, videos, and audiobooks. The search bar contains a drop down menu that allows users to search by title, author, subject, or general words. We will focus on this feature for a portion of our analysis.

![Screenshot of Centre County Library homepage](image)

**Figure 1.** A screenshot of the top portion of Centre County Library’s homepage.

Below the search bar are links to pages for the various branches of the Centre County Library system. These pages are located within the centrecountylibrary.org domain. On these pages, much of the website material is the same as the homepage. The difference is that on the pages for
the individual branches, information is displayed about the branch’s address, hours, and upcoming events. Figure 2 displays a sample of one of the branch pages.

**Figure 2.** A screenshot of the page for an individual branch location of Centre County Library.

On the left-hand side of the homepage, as well as all the other pages of the website, there are links to other pages within the site that lead to information about the organization. These links include information about the library’s location and hours, programs, resources that the library provides, and more. The usability and functionality of these links will be focused on as part of our analysis. Figure 3 shows a display of these links located on the homepage.

**Figure 3.** A screenshot of the links located on the left-hand side of each of the website’s pages.

3. Task Analysis (Kirsten McGroary, Alec Redman, Ryan Czapka, Curtis Robb)

3.1. Introduction (Kirsten McGroary)
Task analysis is the analysis of how a task can be accomplished. Task analysis may include a detailed description of both manual and mental activities that will be performed, the durations of the task, task frequency, task allocation, the complexity of the task, environmental conditions, necessary equipment to perform the task, and any other unique factors required to perform the given task (“Task Analysis”).

Team six of clubs is performing two tasks to complete the task analysis lab on our project website, which is a website for the Centre County Library & Historical Museum. The first is to find out what activity the library will be hosting on a certain day. The second task is to find a specific book in the website's database. To complete our analyses of the two tasks, we looked at the tasks in the context of the Keystroke Level Model as well as the GOMS (Goals, Operators, Methods, and Selection rules) model. Using these models, we sought to perform an analysis of the time taken to perform these tasks, which could provide insight to the website’s effectiveness from a usability perspective.

3.2. Task and Method of Analysis (Alec Redman)

Like any business, the Centre County Library maintains a website for advertising what it is they have to offer. In the case of a library, this primarily includes books and other reading materials, as well as book readings and other events held for the community. Therefore, we decided to focus our task analysis on how users find information about such topics using Centre County Library’s website. Specifically, we chose to analyze two different tasks; finding information about the book *Harry Potter*, and finding out what events, if any at all, are being held at the Centre Hall library on the specific date of November 20th, 2013.

To perform a Keystroke Level Analysis, we took a look at the website and broke both of the tasks down into distinct steps. For example, to complete the task of locating information about a certain book on the website, some of the required steps included locating the search bar with a mouse or touch pad, typing information about the book into the search bar, and clicking on the results. The Keystroke Level Model predicts how much time it will take a user to complete these types of subtasks, which collectively can predict how much time it will take the user to complete the task altogether.

When calculating the predicted times to complete the tasks using the Keystroke Level Model, we found that the second task of locating information on a specific book at the library had a greater predicted time of completion than the other task of finding information about an event on a certain day. This makes sense as the second task requires typing while the first task requires only clicking. However, these predictions are unlikely to be completely accurate as the display of information on the website can greatly affect how long it takes the user to find the desired information. For example, the search bar for
locating information about books is prominently displayed at the top of the website’s homepage while a link to the library’s calendar is displayed in smaller print under a separate heading.

In addition to the Keystroke Level Model, we sought to implement the GOMS model into our task analyses, which is concerned with the procedural knowledge required to operate a system (Kieras, D.E. 1998). The GOMS model indicates that tasks requiring the learning of complex procedures will take greater time to execute. For example, if the method of searching for information about books on the website is highly unique and hard for a new user to learn, such a feature will be inefficient from a usability perspective. For our task analyses, we looked at the display of the website and it’s features to determine how they impact the speed at which users can learn relevant procedures, and to determine where bottlenecks may occur when performing the tasks.

3.3. Methodology (Alec Redman)

To obtain the data for these tasks, four members of our group first completed both of the tasks and the amount of time taken was recorded. We then had four other participants complete the tasks and recorded their time taken. By doing so, we hoped to get a comparison of how being familiar with the website affects the time taken to complete the task,

When performing the tasks, the participants were placed in front of a computer screen on the homepage of Centre County Library’s website (image 1 in Appendix). The four participants that were not in our group were unfamiliar with the website. A stopwatch was used to record the time from when they started the task to when they found the desired information. These participants were also college-aged and had moderate computer skills, so we assumed the typing speed of an average typist for our Keystroke Level Model calculations.

3.4. Results

The first step in completing our task analyses was to calculate the predicted time to execute the tasks using the Keystroke Level Model. For the two tasks, the following calculations were made. The numbers in the equations refer to the amount of time in seconds predicted to complete a certain subtask, and the letters refer to the subtasks themselves. The letter M refers to the amount of time taken to mentally prepare for the task, the letter P refers to the amount of time taken to point to an object with the cursor, the letter K refers to the amount of time taken to press a key or button, and the letter H refers to the amount of time taken to move one’s hand to the keyboard or other advice.

Predicted time for task 1: $1.35M + 1.50P + .20K + 1.50P = 4.55$
Predicted time for task 2: $1.35M + 1.10P + .20K + .20K + .40H + 12(.20)K + 1.0T + 1.10P + .20K = 8.55$
Once we calculated the predicted time to complete each task, we were able to compare it with each subject’s actual time taken. The results can be seen in the table below. In the table, the “Professional” column indicates times taken for members of our group, and the “Amateur” column indicates times taken for non-members of our group. All times are recorded in seconds.

<table>
<thead>
<tr>
<th>Task 1</th>
<th>Time Predicted</th>
<th>Self (Professional)</th>
<th>Other (Amateur)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject 1</td>
<td>4.55</td>
<td>6.93</td>
<td>29.74</td>
</tr>
<tr>
<td>Subject 2</td>
<td>4.55</td>
<td>8.76</td>
<td>104</td>
</tr>
<tr>
<td>Subject 3</td>
<td>4.55</td>
<td>6.9</td>
<td>21.3</td>
</tr>
<tr>
<td>Subject 4</td>
<td>4.55</td>
<td>7.5</td>
<td>25.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task 2</th>
<th>Time Predicted</th>
<th>Self (Professional)</th>
<th>Other (Amateur)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject 1</td>
<td>8.55</td>
<td>9.01</td>
<td>18.38</td>
</tr>
<tr>
<td>Subject 2</td>
<td>8.55</td>
<td>12.04</td>
<td>17.3</td>
</tr>
<tr>
<td>Subject 3</td>
<td>8.55</td>
<td>9.6</td>
<td>17.2</td>
</tr>
<tr>
<td>Subject 4</td>
<td>8.55</td>
<td>9.5</td>
<td>18.2</td>
</tr>
</tbody>
</table>

Figure 4. Our estimated and resulting completion times for a “professional” and for an amateur to complete two different tasks.

3.5. Analysis and Comparisons (Curtis Robb)

According to our results, there is a large difference between the time it takes a “professional” to execute these particular tasks and the time it takes an amateur to execute them. Our own times in executing each task, when acting as a professional, are relatively close to the estimated time for a
professional to complete these tasks. While they all were slightly above the predicted time for a professional to complete them, which can largely be attributed to factors that are difficult to measure or predict, such as the speed in which the computer responds to button clicks and loads the next page. For simplicity’s sake, these factors were left out of our prediction time, but they proved to alter our times.

In contrast to our relatively close and small measurements for each professional to complete the tasks, our amateur subjects, on average, both took longer to complete the tasks, and their times were much more sporadic. Our results, specifically subject two’s first task, also demonstrates how the layout of this particular website may negatively affect that individual’s ability to find information on this site. In this task, there were multiple distracting factors which could contribute to difficulty in finding the necessary information. Our first task instructed user’s to find the events of a specific day, but there were 2 ways to achieve this information; one was to find the page for that specific library’s events, and one was to find the calendar and search for that specific day.

The first way seems to be easier to begin, as there is clearly a link to each library’s page at the top of the screen (figure 5 below). However, when one executes this method, the page that is linked has a list of events, but no dates next to them (figure 6 below), and so in order to discover the events on a certain day, one must click the link for each event to discover the date it takes place. This is compounded in difficulty because in some situations there are two event entries for the same event, which can further confuse the user.

![Figure 5. Another look at the home page, with links to the various library sites at the top.](image-url)
Figure 6. A list of events for a specific library. The event lists a day of the week, but not an actual date.

The second way to execute this task would be to find the link to the calendar and use that calendar to find the day you are searching for. This is the method we used for our prediction, as it is the fewest links in the end, and thus should be the fastest. This method is harder to initiate for users because the link to the calendar is “hidden” among a plethora of links on the sidebar, hindering its visibility. Furthermore, when one clicks on that link, they are taken to a calendar page with events listed for each day, but it appears as though all future dates are blank (figure 7 below). If the user stops here, they will not discover the events on the particular day, but instead they must click on the number representing the day to be taken to a page listing all events for that day. This is quite unintuitive, as one would expect events to be listed, which is only even more confusing considering past events were listed.
Our second task was simply searching for a book using the database. This task was estimated to take longer because of the number of keystrokes required to execute the tasks. The difficulty of these tasks lied in the fact that, when searching for a book on the library website, it would link you to a list of books on a different website, which could confuse the user. This other website was effectively a catalog for all the books in the library system. Beyond this fact, the database had a number of books that could be considered distractors. For example, we had our users locate the search bar and search for “Harry Potter” (capitalization not necessary) and click on the first book in the *Harry Potter* series. While the desired book was still on the first page of search results, there were five other results above it, which for an inexperienced reader may lead to a lot of confusion about which book they are looking for (for example, if somebody had never read the Harry Potter series but wanted to start, this may lead them to rent the wrong book.)

### 3.6. Conclusion (Ryan Czapka)

While the Keystroke Level Model and GOMS model are by no means 100% accurate, considering that execution times are estimated based on assumptions, it gave us a good benchmark to judge the usability of our project website. For each of our two tasks, we used the KLM as a framework to model how efficiently headers and functions are placed throughout the Centre County Library website. This analysis directly related to how well the website was...
designed to work for its users. For those of us who had experience navigating around the website prior to this assignment, the time it took the “professional” group members to complete the two tasks was considerably less than the “amateur” users. This showed that there needed to be a couple changes made in order for the website to become more navigable to new users.

For task one, it was hard for the amateur users to find which events were taking place on a particular date. As mentioned above there were two ways to complete this task, both of which either weren’t very efficient, or were a little unintuitive. The calendar link was lost in a sea of distractors that included many other links of a grey color which tended to blend in with the background white. When clicked, the calendar did not show any events for a given day in the future unless the user actually selected that day. This required extra time and effort by the user, as well as being unintuitive. The other way the user could complete this task was by selecting the library and going through each listed event, one by one, many of which were listed twice. Again this was unintuitive. For task two, it was a bit easier for our subjects to complete the given task. The website had a clearly visible search box that was labeled for new users to know this was where you were to search the library catalog. The confusion lied in the fact that the search results opened a new website and listed results that loosely matched the users search string, which for this lab was “Harry Potter.”

Our group used KLM and GOMS to analyze the issues within these tasks and effectively make changes to enhance the usability of the Centre County Library website. For task one, we recommended to reorganize the way in which the links were categorized as well change the font and color of those links, specifically so that something like the Calendar would be easier to locate. As the website currently stands, the Calendar link is categorized under programs with other items such as “children, adult, and teens.” The grey color of the text can easily be lost in the white background of the site as well. We also recommended that the user be able to choose a particular library and see the calendar of events as it pertains to that location. If the user chose to find an event by clicking the library’s link at the top of the website, we would like to see each event only listed once and the date in which it was occurring visibly listed next to it. This should make it much easier to identify when certain events were taking place. For task two, our group recommended embedding the search results of the library catalog into the Centre County website rather than linking to a different site, if that is something that is possible. Another useful change would be highlighting the result that matched the users search string the closest so that it did not get lost amongst other results which would require the user to search through a list.

The changes that our group recommended came from analyzing our two tasks and what parts of the website caused the most issues in completing those tasks. We used the results generated from the Keystroke Level Model and GOMS model to assist us in doing so. By completing a task analysis, we would hopefully be able to improve the efficiency and effectiveness of our project website so that its users would not become lost in confusion which in turn would require unnecessary help.
4. Perception Analysis (Kirsten McGroary, Alec Redman, Ryan Czapka, Curtis Robb)

Our perception analysis intends to look at common perceptual problems people encounter with things such as color schematics and attempt to create a set of guidelines, or at least some common errors to avoid. As such, our perception analysis is not specific to the Centre County Library website, but rather just a generalized experiment, after which we will attempt to relate the lessons we learned from it to the Library website.

4.1. Introduction (Kirsten McGroary)

Webster’s dictionary defines perception as the ability to understand or notice something easily, and the way that one understands or notices something through the use of the senses. To analyze perception related to the field of human computer interaction, we chose to perform a visual search experiment. This type of experiment serves to determine how easy it is to identify objects amidst an image containing similar objects. Searching for a known object in an image can often be difficult and time consuming. By adding colors or more similar looking letters to the image, the visual search becomes more difficult. The purpose of this analysis was to test how subjects perceive images and gain insight to the implications for interface design. By doing so, we believe we are better able to provide recommendations that improve the usability of Centre County Library’s website by making pertinent information easier for users to perceive.

4.2. Methodology (Alec Redman)

For this analysis we used a software program called VisualSearch (Tom Busey, Indiana University, 2005). This program allows users to create a set of images that displays various letters or shapes, for the purpose of determining how long it takes the user to identify a unique object within the image. For example, an image might contain five rows and four columns of the letters L and T of varying colors. The goal for the user would be to identify if the image contains a unique character (a target) such as a red-colored letter T. All characters in the image other than the target are called the distractors, as they serve to distract the user from noticing the target. For reference, an example of the type of images generated by the program can be seen in figure 8 below.
Figure 8. In these images, the target is a red-colored letter T and the distractors are the blue-colored L’s, blue-colored T’s, and red-colored L’s. (Visual Search, 2005)

The program displays an image that may or may not contain the target, and asks the user to select whether or not they believe the target is present in the image. Once selected, the program generates a new image and repeats the process. For each iteration, the program calculates in milliseconds the amount of time it took the user to determine whether or not a target was present in the image. At the end, the program calculates the average time taken for the user to make a decision for positive trials as well as for negative trials.

When configuring the experiment, the program allows the user to select how many positive trials (containing the target) as well as how many negative trials they want to occur. It also allows the user to set many other parameters of the experiment such as how many rows and columns of characters to be present in the images, what specific characters and colors they want to occur, and how many targets or distractors should be present in the images.

For our experiment we used three different trials with varying distractors, and tested four different subjects on each of them. Most aspects of the three trials were the same. In each trial, the target character to identify was a red-colored R. The positive trials contained only one red-colored R, and the negative trials contained only distractors. In each trial both the rows and columns of the images were set to contain 10 characters. The distractors used for the images differed for each trial, with the goal of making the task increasingly complex for subsequent trials. Finally, in each trial all the characters used were uppercase letters. The distractors used in the different trials are as follows:

- Trial 1: The distractors in the images were all blue-colored letter B’s.
- Trial 2: The distractors in the images were all red-colored letter B’s.
- Trial 3: The distractors in the images contained a mix of blue-colored letter B’s, red-colored letter B’s, and blue-colored letter R’s.

4.3. Results (Kirsten McGroary, Curtis Robb, Alec Redman, Ryan Czapka)

Upon conducting the trials with all four subjects, we compiled the chart below (figure 9). The Y-axis corresponds to time in seconds. The identifiers present and absent represent whether the target, the red capital R, was in the field of characters.
Figure 9. Chart representing each subject’s ability to detect the presence or absence of a given item, in this case a specific letter, in a field of similar letters.

This chart shows the comparison of the four subject’s three trials, divided into the runs where the stimulus was present and when it was absent. As our results demonstrate, the first trial was invariably the quickest and easiest in terms of identifying the presence of the target. The second trial’s times on average varied greatly depending on if the target was present or not. The third and final trial times were a little more sporadic, but showed that the absence of the target increased the times by a sizable factor.

4.4. Analysis (Curtis Robb)

In the first experiment, subjects were tasked to identify a capital red R amidst a field of capital blue B’s. In this experiment, the distractors had a very different color from the target, and thus identifying the target’s presence required one to search for the color red as opposed to searching for the specific letter. In general, identifying colors is easier for the human brain to process than identifying and comparing shapes. This ease is compounded based on how different the colors are. For example, in this trial of our experiment we used the color red for the target and the color blue for the distractors, which are very different and it is much easier for the brain to differentiate between. As opposed to that method, using a color such as purple for the target with blue for distractors would yield much different results, likely much longer, for these colors are very similar and thus harder to differentiate. With these factors in mind, the results of this experiment should indicate a relatively quick mean time for trial one, and our results support this theory.

Similarly, our second trial tasked the subjects with finding a capital red R amidst a field of capital red B’s. This trial emphasized shape recognition and comparison as opposed to color identification. Since all letters were red, a subject could not simply scan the field for a specific color, but had to observe the characters in detail. The difficulty of this trial lies in the similarities
between the two letters, for at a glance R and B are not very different, and it is not easy to tell
them apart while conducting a quick scan of the field. This trial required more attention to detail
than the previous trial, and so it stands to reason that it should have taken our subjects longer to
identify if the target was present or not.

Our findings agree with this theory as well, but our results also indicate something else;
compared to trial one, where there was not a large gap in the times for when the target was
present or not present, trial two tended to show a larger difference in times for these two factors.
Considering in the first trial, the subject was simply looking for one stimuli among a field, it
makes sense that it was quickly determined if the target was present or not, because the subjects
wouldn’t have to scan every character, whereas in the second trial much more attention would be
paid to the letters, and each character would have to be scanned before the subject could
determine the target’s presence or not. In terms of averages, this should mean that a run with the
target’s presence should take approximately half as long to do as opposed to a run without the
target. This conclusion is reached by assuming that among the field of 100 characters, the target
on average ends up in the middle of the field, meaning the subject would have to scan
approximately half, or 50, of the characters before reaching the target and determining its
presence. Conversely, if the target is not present, all 100 characters must be scanned before the
subject can be sure of its absence. Our results don’t necessarily correspond to this theory for each
subject, but that can be attributed to the low number of runs done in this trial, namely five with
the target and five without. Another possible explanation lies in the way the subject searches the
field, which is likely not letter by letter.

In the final trial, the target was a capital red R in a field of capital red B’s, capital blue R’s, and
capital blue B’s. This trial had three distraction criteria to try and maximize the level of
distraction the subject would face during the trial. The subject in this task must not only identify
the color of the letter, but then the actual letter itself. Not only this, but considering other R’s are
present in the trial makes identifying a letter difference a little more difficult for the brain, as
their presence distracts the brain and makes it harder to differentiate between a red R and blue R.
Considering these factors, in theory this trial should take the longest of the three, and our results
again correspond to the theory.

One important notion in this third trial is that a case can be made for this trial take less time than
the second trial. The basis of this argument stems from the fact that while additional distractors
such as blue R’s and B’s are present, they don’t necessarily distract the subject from finding the
red R. If the subject determines that all the blue letters can be skipped over, for example, then
they would not need to worry about checking them, and thus on average would only have
approximately 50 total letters to check, the red letters. If the target was not present, this should in
theory suggest that it would take roughly half the time to identify that this run did or did not have
the target compared to the times from trial two. However, this does not correlate with our results.
There could be a few likely reasons for this.
Firstly, the user is tasked with identifying R’s, and thus can get distracted by an R in their peripheral vision, only to determine that it was blue instead of red. This is also true of red B’s, just as in trial two. Another likely explanation is that when analyzing the letters, the brain must stop on a letter before consciously identifying that it is blue, and thus deciding not to check which character it is, which only cuts out a small fraction of the time. Finally, the brain is not likely to identify single characters at a time, but rather look at small clumps of letters to try and identify the red R, which can very likely lead to oversights. On a related note, this trial introduces many distractors, thus a subject will most likely check multiple times for the stimulus, multiplying the time for the run. This last fact manifests itself in our results, such as in the first subject’s third trial. This theory does have merit, but falls apart when analyzing how the human brain scans and identifies objects.

4.5. Conclusion (Ryan Czapka)

Overall, the lab that we conducted on visual perception gave us some real cognizance on how users can be positive or negatively influenced by the architecture of a website. In the design stages of a website, we set out to create a site that will communicate a message that is both clear and well understood by its visitors. In reality, this visual perception lab showed us that this concept can be much more complex.

Visual processing is when we take in something visually and process it to derive some kind of meaning. This processing of sensory data is done in parallel by the brain. The activation of different regions of the brain in parallel processing is what allows our visual perception to be both fast and efficient. One of the processes that this lab focused heavily on was called the Top-Down process. It is driven by prior knowledge that shapes our interpretation of the objects we see and how the task at hand influences where we look next. In this lab, the minds of our subjects tended to disregard information that wasn’t meaningful or useful at the moment. This is clearly demonstrated by the quick mean times in trial one as the subject only had to look for the one color that differentiated from the rest.

Even more so, the Top-Down process was demonstrated in trials two and three. The mind expected to see some sort of pattern but since there was nothing to stand out as meaningful, the eyes are forced to scan vigorously for the target letter. Trial three proved to be most difficult in terms of visual processing because the mind got caught in seeing more of what the subject wasn’t looking for and less of what they were due to the amount of distractors.

This lab allowed us to better understand how the visual search process works. By doing so, we are able to make a better design that directs the visitor’s eye to the most relevant and important information on a website. This makes it easier for them to remember and understand what our website is trying to communicate.

4.6. Relation to Centre County Library Website (Curtis Robb)
Our perceptual analysis experiment concluded with a couple key points; firstly, the presence of a lot of distractors in a person’s visual field is very likely to negatively influence their ability to find a specific item they are looking for. In the case of the Centre County Library site, there are few enough items on a given page that there aren’t a whole lot of distractors present, however, the lack of specific borders around some items can serve to hinder a person’s ability to identify what is relevant versus periphery content. We will go into this point in more depth, with an example solution, later.

Another conclusion of this analysis is that objects of similar color or shape can cause a person’s mind to have difficulty recognizing when a stimulus changes or is different. This presents itself mostly in the sidebar of links, but overall this factor can be seen throughout the entirety of the website. This mainly stems from the color scheme used for text and links. For example, in the sidebar, the soft grey color of the text on the white background doesn’t lend itself to a novice associating the words with a link, the effects of which can be seen in our results for task 1 of our task analysis experiment; subject 2 in that experiment took almost 2 minutes to reach their destination, and through observation and surveying them after, we concluded that it was a result of them not knowing initially that these words were actually links.

This perceptual analysis experiment, at its heart, was looking at how the aesthetics of a website can affect its usability. Of all of the subjects used in these experiments, including ourselves, a large majority agree that overall the website is aesthetically pleasing; it looks nice, appropriate, and professional, and is very easy on the eyes. However, to a computer novice, this might be a disadvantage, as they may not be savvy enough with technology to realize how to use the website initially, which may serve to hinder traffic through the site, as well as make people not want to use the site as much.

It is important when designing a website to identify who the most likely users of your service and its website are. When polled in our class of college students, only a handful out of about 40 students said that they use libraries to rent resources or books, and even fewer claimed to have used a library’s website. Conversely, however, a common user base of libraries may be elderly people, most of which, on average, are likely to be less computer savvy and may not know how to navigate through a website if it isn’t clear and spelled out for them, so to speak. Ultimately, without knowledge of a specific group dynamic you’d like to cater your service to, it is very difficult to balance aesthetics with usability, which seems to be a large factor in this website’s function.

5. Comparative Analysis (Ryan Czapka)

Libraries serve people each and every day by providing them access to the world’s knowledge. Luckily, a library has the means to do this outside of its physical boundaries. A way that they are able to do this is by providing a website. A website can offer help by presenting convenience and satisfaction to its users. Unfortunately, none of this is possible unless that website is well designed. When our group looked at the website for the Centre County library system, we not
only wanted to provide an analysis of its usability but to show some examples of our feedback in use by similar websites. To do this, we focused our attention on a couple areas of critique that involved aesthetics, organization, and functionality.

The one thing to be aware of when designing a web page is who exactly is going to be using it. Based on a survey done in May 2013 by the Pew Research Center’s Internet Project, we knew that 98% of those ages 18-29 use the internet. In addition, 56% of those ages 65 and older also use the internet. Based on the percentages of internet usage, we figured that a diverse age group would be visiting the library webpage aside from those who may still go to the actual library.

While keeping this research in mind, we first took a look at the aesthetics of the Centre County library website. The main page was placed on top of a dark blue background which allowed our attention to focus directly to the relevant information of the webpage. From there our group noticed that the white background allowed the light grey font color to almost blend together. While this may not have made a difference to younger eyes, we couldn’t help but think of what a struggle it must be for the senior users to read the menu titles. This acknowledgement opened up a door to further research. When choosing the right colors for a webpage for both low vision and color-blind users there should be a sufficient contrast between foreground (text/graphics) and the background. According to the WCAG 2.0 section 1.4.3 (Web Content Accessibility Guidelines), there should be a luminosity ratio standard of 1 to 4.5 for main text and 1 to 3 for large-scale text (18 pixels+, or 14 pixels+ bold). Since we know that some of our target audience will be low vision users, that ratio can be extended to a luminosity ratio of 1 to 7. We wanted to provide a test for different values of Grey on White based on the WCAG Ratio to see if they passed or failed since these are the colors being used by the Centre County library website.

<table>
<thead>
<tr>
<th>Grey Level</th>
<th>WCAG Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>#000000 (Black)</td>
<td>21 : 1 (pass)</td>
</tr>
<tr>
<td>#333333</td>
<td>12.63 : 1 (pass)</td>
</tr>
<tr>
<td>#666666</td>
<td>5.74 : 1 (pass)</td>
</tr>
<tr>
<td>#777777</td>
<td>4.48 : 1 (fail)</td>
</tr>
<tr>
<td>#777777 (large)</td>
<td>OK for large text</td>
</tr>
<tr>
<td>#999999</td>
<td>2.85 : 1 (fail)</td>
</tr>
<tr>
<td>#CCCCCC</td>
<td>1.61 : 1 (fail)</td>
</tr>
</tbody>
</table>

Figure 10. A table of different grey values on a white background with their associated pass/fail ratios included.

The Grey level #999999, which closely resembles the text of the library website, failed the test with a 2.85:1 ratio. Although it failed, only a few minor adjustments need to be made to bring the color value to a passable level.
Figure 11. The New York Public Library went with a maximum color contrast of a very dark grey and white to make the titles of its menus readable to all its users.

There are a number of websites that can be used as tools to test the contrast ratio for main text and background colors. The one our group chose to work with was “Juicy Studio Color Contrast Ratio Analyzer.” The link will be provided at the end of this section.*

The next thing we focused our attention to was the organization of menus and links on the main page of the library website. The one thing we learned from the Task Analysis was that website visitors are task oriented so we wanted to ensure that they could easily complete the tasks they wanted to do. Unfortunately, we did not find the menus and links of top tasks organized in such a way that it did not force our visitors to do extra thinking. For example, we knew that since this is a library website, one of the main tasks would be to search for books remotely. On the main page of the Centre County site there is a search box that is not clearly defined on what its purpose is. Is it there for the user to search for books, or the website, or even the internet? To reinforce this point we took a look at the Daniel Boone Regional Library’s website which serves multiple library locations. Right on their front page, the user notices a search box that is not only defined as a search catalog, but also provides explanations on how to use the search. It is also worth noting that the site reduces clutter by organizing various pages into one drop down menu. Their “About” menu includes contact information as well as locations and hours and their “Community” menu includes links to individual libraries within their system.

Figure 12. A screenshot showing the search box located on the homepage of the Daniel Boone Regional Library.

Figure 13a & 13b. These are screenshots showing similar information located on different links organized under one main heading, making it easier for users to navigate around the page.

Again, our group wanted to focus on how to make the Centre County Library website easier to use by those who visit it. Upon providing the research for recommendation changes, we also included information and screenshots from similar library websites that already had these
necessary changes in place. Good designers differentiate what they want, need and can do from what their users want, need and can do and that's precisely what our group wanted to achieve while performing this overall analysis.

*Juicy Studio link: http://juicystudio.com/services/luminositycontrastratio.php

6. Recommendations (Alec Redman)

Most importantly in this report, is that we’d like to recommend changes to Centre County Library’s website that we believe can improve its usability. We recognize that the organization has limited resources dedicated to maintaining their website, which is why we are focusing on simple, low-cost, and easy to implement changes. All of our recommendations are based on knowledge gained through performing our analyses, as well as knowledge gained through course-work and readings in IST 331.

6.1 Recommendation 1

The first change we would recommend implementing has to do with the search bar that allows users to search for books, videos, and audiobooks that the library has in stock. The basis for this recommendation comes from data collected during our task analysis of having users find information about a certain book using this search feature. Firstly, we do think having the search bar in its current location has a positive impact on its usability. Finding information about books, videos, and audiobooks that the library has in stock is a useful tool, so putting the search bar front and center on the homepage is a good idea. We believe that the problem with the search bar lies in the results given when performing a search. In our task analysis experiment, we timed users on how long it took for them to locate information about a certain book, and compared them to an estimated time based on the Keystroke Level Model. We found that when searching, it took users a significantly longer amount of time to complete the task than estimated by the Keystroke Level Model. When conducting the experiment, we asked the participants what the most difficult part of the task was. All four participants explained that finding the correct item amongst the search results page was the most difficult. We attribute this to the amount of irrelevant results present that are only loosely based on the search. For example, when searching for “Harry Potter”, the first two results are “Harry Kitten and Tucker Mouse”, and “Harry Lipkin,
private eye”. For reference, a display of the results page for the search “Harry Potter” can be seen below in figure 14.

<table>
<thead>
<tr>
<th>Title</th>
<th>Pub date</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Harry Potter and the Sorcerer’s Stone</td>
<td>1999</td>
<td>Rowling, J. K.</td>
</tr>
<tr>
<td>5. Harry Potter and the Prisoner of Azkaban</td>
<td>2004</td>
<td>Rowling, J. K.</td>
</tr>
</tbody>
</table>

Figure 14. A screenshot of the results page when performing a search for “Harry Potter”.

We believe that removing only loosely similar results from the results page of searches will allow users to more easily locate information on books, videos, and audiobooks. This change can be implemented by only displaying results that closely match the users precise search. For example, for the above search it would be a good idea to only display results that begin with the exact string “Harry Potter”. Additionally, it would be a good idea to display the results in order of their match to the user’s search. In the current system, it appears that results are listed in alphabetical order. Alphabetical order of the results has no relevance to the user when searching for something, so it doesn’t make sense to place the results in such a manner. Implementing these changes would narrow the results of a search down to more relevant items, and place them in order based on their relevance. With less items to distract the user, they would be able to more quickly find the information they are looking for and the usability of the search bar would be improved.

6.2 Recommendation 2

The second change we recommend implementing also arises from data collected in our task analysis, as well as knowledge gained through performing a perception analysis. In our study, we tasked participants with finding information about what events were taking place, if any at all, on November 20th, 2013. Using the Keystroke Level Model, the estimated time of completing the task was very short, as it only requires a few mouse moves and button clicks. However, we found that the participants took a much longer time to complete the task. After conducting the experiment, we asked the participants what the most difficult part of the task was. All four participants explained that they initially had a hard time finding where to locate the information. We believe this difficulty lies in the fact that the link to find this information is located in a hard to find spot, and in small print. The information about events is located under a link labeled “Calendar”, in 12 point font, halfway down the homepage on the left-hand side. For reference, a display of this link on the homepage can be seen below in figure 15.
Figure 15. A screenshot of the homepage. The link to the calendar, where users can find information about events at the library can be seen in the bottom left-hand corner.

Since a large focus of Centre County Library is on providing programs and events for the community, we believe it is important for users to be aware of such information when viewing their website. For this reason, we believe that a link to the calendar of events should be present at the top of the homepage, similar to the search bar. Since the difficulty in locating this information for our participants lied in finding the link, placing the link at the top of the page would substantially decrease the amount of time to complete the task. Perhaps more importantly, it may also allow users who otherwise wouldn’t have noticed the link to find it. Additionally, we believe that placing the calendar link separate from the other links located near it would make it more noticeable. In performing our perception analysis, we found that having similar looking links in the area can distract users from noticing the target link. Therefore, it would make sense to place an important link such as the calendar link by itself.

Additionally, regarding the functionality of the calendar, another change we feel would best serve people interested in activities at these libraries would be to place all upcoming events into the dates on the calendar as well, as opposed to simply seeing the events for days that have already passed. It is much easier for a person to understand when events are taking place if they are all visible from looking at the calendar, as opposed to having to take an extra step and clicking on a specific day to find the events for that day. This can help in at least two ways; firstly, it can make it easier for people to see which events are recurring and which are individual, special events, and secondly, it increases the likelihood of somebody discovering an event they previously had no knowledge of, which may increase the amount of people who participate in said events.
6.3 Recommendation 3

Another change we would recommend to Centre County Library’s website would be for the site to display a stronger distinction between its different branches. Currently, each branch has its own page within the centrecountylibrary.org domain, which can be accessed via links at the top of each page. For reference, a display of these links can be seen below in figure 16.

Figure 16. A screenshot of the top portion of the homepage. The links to pages for individual branches can be seen at the bottom of the figure.

For users that aren’t aware that Centre County Library is comprised of branches in different locations, the website can be rather confusing. While the links to the pages for the individual branches are locating front and center of the homepage, it’s not clear to a new user what they represent. Being unaware of this, a user could get misinformation about a location they’re looking for. For this reason, we suggest that the website make a stronger distinction as to what these links are for. A simple implementation of this could be adding text such as “For the Bellefonte branch of Centre County Library, click this link”. We believe that implementing this change would provide the user with useful information about the organization that could in turn improve the website’s usability.

6.4 Recommendation 4

The final recommendation we would like to offer for Centre County Library’s website is to make a simple change that could improve the aesthetics of the site, and allow its information to be perceived more easily. Currently, all of the contents on the homepage are located on a white background, which provides a lack of distinction between different items. When learning about perception, we were introduced to the Gestalt Principles of Visual Grouping. One of the conclusions of these principles state that objects surrounded by a box appear more like a group, and will likely be looked at together (Ritter, F. E., Baxter, G. D., & Churchill, E. F., 2013). Based on this, we believe it would be a good idea to place information that is meant to be looked at together surrounded by borders. We produced a simple mockup of a portion of the homepage by
placing borders around information that belongs as part of group. A display of this mockup is shown in figure 17.

Figure 17. A display of a mockup for the website’s homepage in which borders were placed around information that belongs as part of a group.

7. Conclusion (Kirsten McGroary)

In conclusion, team six of clubs has made the recommendations to keep the Centre County Library and Historical Museum’s website menus and links geared towards high functionality. In other words, we believe the website should focus on making the tasks performed most often easy to do so. The menus should be easy for the users to find, and provide links to the most important information on the website. We would also like to see the Centre County Library use visuals to their advantage. Show pictures on the website of all the services that the library has to offer, pictures from the events that the library holds, and pictures of the different libraries located in Centre County. We also recommend that the tasks on the website should not be tedious. The amount of time it takes to find something on the website could be decreased if the pop-out effect was used better, and if the menus contained the most important information.

We used task analysis, perception analysis, and comparative analysis in order to improve the usability of the Centre County Library and Historical Museum website. Interface design can have a large effect on the usability of a website. Team six of clubs concluded that for some websites, sacrificed aesthetics may be better for functionality, or vice versa. Also, when it comes
to the design of a website there are no universal rules. The designer has to keep in mind what the user will be using the website for while designing, in our case searching for a book in a particular library, or an event that is occurring at a particular library.

8. References


