Improving Advertisement Recognition and User Interface of Gameofwarrealtips.com

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Abstract

The purpose of this experiment was to determine which location of advertisement would be the most recognized on the Game of War Real Tips website and to improve the website's user interface by using both quantitative and qualitative data. To accomplish this, two experiments were created. The first experiment was designed to determine which location of advertisement would be recognized most by users. A screen would flash for 0.5 seconds and the subjects would mark where they believed they recognized an advertisement. A statistical analysis was completed to determine whether the location of the advertisement had an effect on the recognizability of the advertisement. The second experiment was designed to simulate the typical user experience on the website. Subjects were asked to complete a series of tasks: find the most recent post and open it, find the most popular post and open it, find and open the "Tip Archive", then open a post about "Troops"', search the website for articles on "defense", find and open the "Hero Gear Tool", find and open the "Troop Calculator", go back to the main page. A repeated measures model was used to analyze the data and provide feedback based on times and clicks of the experiment. Also, the percent of successful and failed steps were analyze to see which steps need to be made simpler. This feedback along with the quantitative responses from the test allowed for several recommendations to be made in order to increase the design and usability of the website. The two zones with the highest scores were at the top center of the website just below the banner, and a few inches below the top of the right sidebar. When looking at UX & UI, the two largest areas of feedback were that www.gameofwarrealtips.com needs to add a Home button on the menu bar, and increase the visibility of the most popular posts.

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Introduction

Game of War Real Tips Inc. has a 1 year old website that they use for educating mobile gamers who play Game of War. In general, Game of War Real Tips (GOWRT) wants to optimize their ad revenue stream, improve the User Interface (UI) of their website, www.gameofwarrealtips.com. The intent of the company is find a business model where its core functions –mentioned above—are optimized to be the most effective. This way the company can expand from producing educational content for one game into content for many other people mobile games. GOWRT does not want to expand its business prematurely and lose out on potential customers or higher revenues. Instead, GOWRT is looking to first optimize both the UI and advertising methods (placement, size, content) in order to optimize the revenue streams and user experience on the site. With that, GOWRT with be able to expand more efficiently and effectively than before.

Our team, comprised of Chad Kihm and Alex Meyer designed and performed experiments to assist GOWRT. At the completion of these experiments, the following are included in this project report:

1. **Experiments Tests and Results**: Experiments for advertising placement, impact, and attraction. Tests and results for user interface ease of use, attraction, and navigation.
2. **Economic Justification**: The ad revenue stream for the business as a whole was optimized and an economic justification of the work that was completed has been compiled based on the results of the experiments and statistical analysis.

In order to complete these tasks, the following objectives were considered:

- Design of experiments to determine the best combination of user interface, advertisement placement, impact, and attraction in order to increase revenue streams
- Statistical analysis, ANOVA analysis based on the results of our experiments in order to fully utilize the quantitative in conjunction with the qualitative data to interpret result
- Quantitative metrics from controlled advertisement experiments: percentage of advertisements that were correctly recognized from each zone
- Quantitative metrics from controlled user interface experiments: number of clicks per page and the time it takes to complete each navigation step
- Qualitative metrics from controlled experiments: ease of use, overall experience, satisfaction, learnability, and aesthetics

Background

Currently, GOWRT receives between seven to eight thousands visitors every day. That translates into just one potential ad revenue stream worth twelve to twenty thousand dollars per month. If the ads are placed in the correct locations, then the revenue could be even more substantial. GOWRT noticed a problem, that there is plenty of advice online for console and computer games, but none for mobile games. So, the leaders of the company –being gamers themselves—decided to put together a website for strategic tips on the mobile game called "Game of War: Fire Age". Game of War makes over $1.5 million a day from in app purchases and 30,000 new accounts are created each. There are now millions of people playing the game and GOWRT helps optimize all of their time and save them money by providing them with articles and tutorials that teach them how to make the tough decisions and understand the most convoluted aspects to the game. The founder of GOWRT played the game for hours each day and knew he could teach players how to fix the mistakes they were making.

Although much of the general public thinks that video game education isn't a big deal, a website named twitch where amateur gamers can watch expert gamers and learn how to play, just got bought by amazon for $1 billion. Thus, the market of people looking to be educated on games in general is willing to pay money to be taught on the most effective ways to play a game. The community of gamers is always looking for the latest strategies to play the game in order to become the best player they can be. A lot of players are obviously even willing to spend large amounts of money on the game in order to get certain extra benefits that help them become the most powerful player. Chad Kihm, the founder of GOWRT, recognized that some of the people he played with "in game" spent thousands of dollars a week to stay at the same power levels as

other top players in the game. This is when he recognized the opportunity that if he could capture the attention of some of those players who spend a substantial amount of money, then he could find a way to provide them with content they would pay for in order to continue being the best players.

Kihm has put together a team to help him expand his website and create more unique content that educates the Game of War players through: ebooks, youtube videos, and a mobile application. These are some of the ways other parallel companies in the market educate their audience. For example, websites like www.curse.com, www.gamespot.com, and www.ign.com. All of those companies have yet to reach into the mobile space, despite the huge amounts of money being spent on mobile games.

GOWRT has received tremendous reception with the community of players. The website itself has just hit a 3.5 million page views of all time and 2,600 comments. The company believes they have validated that the content they create is valuable with those numbers. Although, they recognize there are tons of other popular mobile games out there, by replicating the current model they have they can become the go-to source for expert advice on mobile games.

Literature Review

Below is a comprehensive list of references that we have researched. Each article or journal has been reviewed in order to better understand the problem we faced and how we used that knowledge in this project.

We are able to see the importance of branding, internet advertising and the economics behind it, and the ever changing media buying in general. In our project specifically, GOWRT is looking to create a brand that will increase customer retention and gain new users. This is the most important aspect of GOWRT because it aligns with its mission of helping users excel in Game of War, while at the same time earning money via advertisements in order to grow the business. There is a fine balance between focusing on the content and becoming overwhelmed with advertisements. This project explores the option of using the tachistoscope test (T-scope) which will help us determine the most profitable advertisement placement.

The T-scope test, developed at the end of the 19th century, has long been used in experiments to discover what is perceived by the subconscious brain or what is able to be quickly recognized in an image. [1] A tachistoscope is a machine that will display a picture for a specified amount of time, this timing is generally very quick, about half of a second. This machine is used to run tests that are able to teach the subject to recognize certain images that may be too fast to recognize or to increase reaction time. As mentioned earlier, it is also often times used to determine if something is memorable. It was first used by psychologists and physiologists to measure visual acuity. The device was used during World War II to train military personnel to quickly identify enemy aircraft. Within the military specifically, soldiers

are trained to recognize and distinguish between enemies and allies. The value of the T-scope test is very evident by its use in such a life or death situation. [15]

In addition to this, T-scopes are widely used in market research to compare between different advertisement impacts and memorability. This is precisely the use and value that we believe will help in our experiments to determine what advertisement combination will yield the highest visibility and recognition. Visibility means that the advertisements are on the screen of the webpage and recognition is if the advertisement is noticed within the first few seconds of the ad being on the screen.

In theory, by keeping the T-scope test time very short (.5 seconds) we are able to see what the user subconsciously recognizes. When users are visiting the website, it is assumed they are there to view the content and not the advertisements, therefore, we assume they are consciously focusing on the GoW content. The goal of the advertisements is not necessarily to be seen consciously right away, but instead that they are recognized in the subconscious causing the user to gravitate towards the ads later in the page viewing.

The tachistoscopic techniques under discussion analyze the individual elements that make up packages. This is made possible by the T-Scope's brief, precision-timed exposures, which isolate these elements.

The packaging technique, also "the elemental series" by Tony Siciliano breaks a package into three components:

- The first "elemental" viewing shows the packaging graphics/colors, but no product or brand information;
- The second "elemental" viewing adds the product information;
- The third "elemental" viewing adds brand information, to complete the package.

Each of these elements is probed on perception and imagery. There are also mass display measurements where the test package appears with competitive brands in an in-shelf display. These measurements indicate how well a package performs under real conditions.

The best way to demonstrate these techniques is to cite some actual case studies. A client wanted to improve the imagery of his fruit beverage brand by changing its geometric-design label to one with outdoor scenery, including trees, mountains and grass.

The elemental series showed the new illustration was unnatural - the trees in particular were too symmetrical and looked unreal; the illustration was cluttered by too many elements, and these elements were projecting dairy products more than a beverage. Minor revisions in the illustration, deleting confusing and cluttering elements, and replacing symmetrical designs with natural artwork, resulted in a label that achieved the client's imagery goals with no in-shelf perception loss. [2]

The amount of time an image is show in a T-scope test can be changed based on the goals of the study and the complexity of the images. In order to determine this time, there are studies that can be done to determine this time. A pilot study can be done with showing subjects the images at increasing times until subjects indicate it is enough time is given.

As far as what to include in these tests, we have to take a deeper look at internet advertising. Online advertising campaigns often consist of multiple ads, each with different creative content. The goal of these difference creative ads is to draw the attention of the online visitor. When the visitor clicks on the ad, the owner of the website or owner of the search engine makes money. So, it’s important to understand which visitors are clicking what ads, so the ads can be tailored to an individual and thus clicked more, resulting in more money.

The peer-reviewed article, Online Display Advertising: Modeling the Effects of Multiple Creatives and Individual Impression Histories by Michael Braun, considers how various creatives in a campaign differentially affect behavior given the targeted individual's ad impression history, as characterized by the timing and mix of previously seen ad creatives. An individual's ad impression history refers to which ads were visible on a webpage that they have visited. Specifically, this article examines the impact each ad impression has on visiting and conversion behavior at the advertised brand's website. Not only does this article measure the impact of ad impressions, but it analyzes what the behavior of the visitor was after they clicked from one webpage to the next. The goal of an ad is to have visitors click it, go to a new webpage, and buy something from that new webpage in order to generate more sales for their company. First, the article demonstrates the importance of accommodating differential ad effects across creatives in a given ad campaign. Second, the article show how an individual's unique history of ad impressions can affect how he or she responds to subsequent ad exposure.

For the sake of this project the following details from the article are essential for GOWRT to understand when they begin working with advertisements agencies: When comparing impression histories in which only a single ad is shown, to histories where two difference ads were shown, histories with more creative variety results in more visits and conversions regardless of which ad creative is shown next (a popular or unpopular creative). Additionally, after four weeks of week after week exposure to a single ad, that ad is significantly worn out by the fifth week; whereas the same exposure for two different ads, remain "fresh".

The way in which brands buy media could be at the brink of dramatic change. For decades, it has been built on a three-way relationship between brands, media owners and agencies, but these foundations could be starting to crumble with new platforms emerging that

allow brands to buy direct. The problem with agencies is they are a typical middle man who takes a cut of the revenues the brands receive from the media owners. [3]

MediaSense claims the role of an intermediary is being transformed by developments on the internet. And while the big agency groups are starting to set up trading desks to buy media for clients through automated auctions, brands can cut out the middleman and bid themselves. Many brand owners have been using online channels to buy media direct from media owners for some time. [3]

The importance and effectiveness of internet advertising in today's world was looked at in "The Economics of Internet Advertising." Goldfarb argues that internet advertisements are now the most important form of ads because of the lower cost and increased customer reach due to the large number of people that are on the internet daily. Internet ads are also the most advanced form of advertisements yet because they have the opportunity to create target advertisements based on a customers viewing and clicking habits on the internet. [13] This creates a much more efficient form of advertisement that is reaching out to people that may actually click on the advertisement because it interests them. The important factor in the internet advertising field is click rate and this ability to collect data on people to target advertise has increased this click rate and made internet advertisements the best form of advertisements.

Furthermore, a study done on brand innovativeness related to advertising flexibility gives more insight into how to select the right advertisements for your site. Employing an advertising tactic that is perceived by consumers atypical in category undermines its influence on brand attitudes. [14] This means that if your advertisements do not correlate do your brand identity, then you can be hurting your brand. Viewers want to see advertisements that are just as innovative as your product. With that your brand identity will be boosted by association.

Next we need to look at what it takes to drive users to a website. In order to build an attractive website to consumers, it's important to understand consumer information search behavior in connection with the internet. Search engine optimization (SEO) is becoming increasingly important to having a successful website that generates a lot of traffic. If people search the internet for a piece of information that relates to the content of your website, but your website does not show up in the first page of google results--even more so in the top 3 google results--than your website has very low chance of being successful. Consumers often only click the top search results and give those a lot of credibility and attention.

According to Peterson and Merino specific information search is characterized as "consisting of directed search, and focusing on goal-directed choices." Therefore, the content of a website needs to be organized into topics that reflect the most common or all the possible goals surrounding that content. So a website that teaches people how to fish would not have a bunch of articles titled, "How to Fish." Instead, the articles would have names like, "How to Fish in a Lake", "How to Fish in the Ocean", etc. Because consumer information search behavior reflects "goal-directed choices". [4]

On the other hand general information search is characterized as consisting of non-directed search and focusing on navigational choices. The point here is that the fishing website does also want to make sure that its SEO is optimized for "How to Fish" as well. But, when the visitor arrives on the homepage of the website they should be able to easily navigate to more specific goal-directed articles. If the website lacks simple navigation and it is difficult for the consumer to find articles that appeal to them, the website will not be successful. This point correlates directly to the user interface portion of this project where we run tests to ensure consumers can quickly find articles they are looking for.

The number of websites are increasing by millions every month. In 2001, there were an estimated 28 million websites, but in the next six years that number jumped to 1.4 billion [5]. Every day it is becoming increasingly more likely that someone will start a website similar to one that already exists. As more website appear on similar topics its hard for them to differentiate themselves. When it comes to web design, usability, and interface individual preferences are different. Existing website evaluations can produce neutral scores when two groups hold extreme opinion, meaning that the final score does not faithfully represent any group of respondents. [5] Even close friends have different preferences on some things, now imagine the billions of people on the internet and all of their different preferences. To combat this, human factors analyses are done in order to find out which design is most attractive to the most users. Although search engines emphasize the sophistication of their ranking algorithms to make sure that the search results satisfy users, many user still get search results that are not the sites they need. In that case, they usually randomly click on one of the results. In that case, their first impression of the site can directly affect their intention to continue browsing the website or closing it to look for alternatives.

First impressions have been shown to be powerful in a wide range of studies on personality character attribution [6]; website usability and perceptions [7]; and website credibility and acceptability [8,9]. One study showed that if a user has a very positive first impression, that person may disregard any possible negative issues he or she encounter later, and this encourages users to stay longer on the site [10].

Studies have shown that users take less than one second to judge a website's acceptability. If users are not satisfied, they start searching for a replacement immediately. In order to attract users to a website, web masters need to increase their search engine ranking, but

they also need to give visitors a good first impression. Different people have different preferences, so people can come away from the same site with vastly different first impressions. Therefore, it is important for web masters and designers to meet different users' needs. [5] Researchers have shown that there is a strong relationship between user perceptions of interface aesthetics and system usability: "beautiful is usable" [11]. Even though a large part of this project is related usability to ensure the consumer can find what they are looking for. It's important for Kihm to understand aesthetics actually contribute to usability, so the analyses will become less meaningful if he decides to change his design in the future.

Branding is an essential part in any business and from "Branding of Learning and Development: Evidence from Research," a branding strategy may be the most important aspect. [12] Branding will create an emotional connection between the customer to the product and increase the brand loyalty which will lead to customers giving "free advertising" through telling their friends about the product. In order to develop branding, it is important to first define the company's core values and philosophy. By doing this, you are giving the customer something to believe in and creating an attachment because of it. This deepens the connection from just being surface level enjoyment for the product, but a deeper appreciation for the brand. Company logo's do not have as big of an effect on branding as the core values of the company. The final important factor in branding is consistency. Not only consistency through communication, but also the design of the brand and aligning with core values. Again, branding is essential to create loyalty in the company and stay competitive in today's market.

All the literature mentioned above should give GOWRT a great context into how the tests in this project are significant. The tachistoscope is a good tool for measuring recognition, the

user interface test will assist with brand recognition and user retention, and the survey at the end will provide great insight into any design changes that should be made.

Design

The following sections contain material on how the experiment was created and what factors were considered for its creation.

Creating the Instructions

Initially, Kihm came to Meyer with the proposal to do a senior project on Game of War Real Tips. Both knew that a lot of Industrial Engineering (IE) applications could be applied to the website. At first, Kihm had three considerations he wanted to address:

1. He has plans to replicate his site for other popular mobile games and wanted to ensure the replication process is as efficient as possible. He wanted to ensure the most valuable type of content is being replicated for other games as well.
2. The website's view count was reaching an attractive point for advertisers and Kihm wanted to make sure that he was placing the highest paying ads in the most recognizable location.
3. Kihm wanted to make sure that with his content heavy website, readers would be able to find in a few simple clicks or less what they were looking for.

For a few weeks each consideration was mulled over and broken down into want it would take to test them. Consideration 2 and 3 were chosen because they had the most IE intensive aspects, and the team's advisor Dr. Reza Pouraghabagher had prior knowledge on how to conduct experiments for these two considerations. Conversely, consideration 1 was determine to be too be too large and out of place to fit into the project.

The team decided that a tachiscopic test might be the best for consideration 2. The T-scope test is used in experiments to discover what is perceived by the subconscious brain or what is

able to be quickly recognized (where does the brain jump to) in an image. A tachistoscope is a machine that will display a picture for a specified amount of time, this timing is generally very quick (~½ second). This machine is used to run tests that are able to teach the subject to recognize certain images that may be too fast to recognize or to increase reaction time. It is also often times used to determine if something is memorable. This test was a perfect fit to determine which ads people recognize when they immediately see the website or a new page on the website.

For consideration 3 we looked at the way a previous senior project was performed when doing user interface testing. "Improving User Interface for Medkohealth.com" by Arito, Bang, and Montiel proved to be a great started point what experiments we wanted to run to test the UI for Game of War Real Tips. We used the same type of tests:

- Step by step navigation instructions. (See Appendix G)
    - Pages visited
    - Number of clicks
    - Time to complete each step (unique to this project)
- A questionnaire at the end to get user feedback. (See Appendix G)
    - Rating questions
    - Short answer questions

Questionnaire

To receive qualitative data from the test subjects a series of questions were developed to further understand how test subjects felt towards the websites being tested. Some of the questions from the Medkohealth project were slightly modified so the wording matched this test, yet the questions are still formatted the same so that they receive the same feedback. The questions from Medkohealth were based on Jakob Nielsen's usability principles. There was a

similar goal for gameofwarrealtips.com, therefore, questions reflected the usability principles: overall experience, ease of website navigation, website aesthetics, ease to find what the majority of people will be looking for, returning to the website for future use (See Appendix B). A rating from 1 to 7 was selected to provide a larger range of options with one being the worst and seven being the best. Four open-ended questions were created as well to obtain additional information that could help with recommendations for the user interface and user design of gameofwarrealtips.com

Unofficial Pilot Test

In literature reviews regarding the T-Scope test, there were different fractions of a second that could be selected. At first, Kihm and Meyer were skeptical about whether or not subjects would be able to identify the ad in under a second. So, a very short test was given to 15 students in the library where they were each flashed a website screenshot with an ad at .25, .5, and 1 seconds. Fortunately, 10 of 15 subjects were able to recognize the correct location of an ad on a page in .5 seconds. Therefore, .5 seconds was used for the test.

Order of Advertisement Zones for Experimentation

A total of 30 students from Cal Poly between the ages 18-22 participated in the experiment with 15 females and 15 males. The order of the photos were randomized before experimentation. Therefore, it was not necessary to change the order for each subject.

Data Collection

Collecting data for the experiment was done two ways: automatically and manually. The Data Collection Template had a location for subjects to record the zone number they thought they saw an ad in, and a location for subjects to check off when they thought they completed a navigation step for test 2. Since the data was recorded by the subject, it is automatic. Although, during the test 2 the moderators had to take a more manual approach to gathering some of the

data by standing behind the subject and recording the pages clicked to complete the navigation instructions, and the time it took the subject to complete each step. The last we collected data was via a SurveyMonkey survey. The moderator directed each subject to a webpage where they would fill out the data, then the data was recorded by Survey Monkey for analysis at the end of the experiment.

Split-Plot Testing

In order to determine from the data which advertising location would be the most recognized (Test 1), a split-plot test was used. The Split-Plot tested the effect of each individual factors (gender, ad location) as well as the interaction of these effects. This was used as opposed to a Two-Way Anova because a Split-Plot analysis does not require a completely randomized order of tests for each subject, instead we were able to test each subject using the same order of advertisement location tests, making our testing much more efficient.

Hypothesis Testing

To determine whether or not a user interface navigation step is straight-forward, hypothesis testing was done for each step comparing the average number of clicks subjects used and the most efficient number of clicks. The null hypothesis for each step was that the population mean was equal to the most efficient number of clicks. When the null hypothesis is rejected, a redesign is suggested to the company in order to make the user interface more intuitive.

Method

The following sections contain material that has been conducted during the experiment of this project.

Controlled Setup

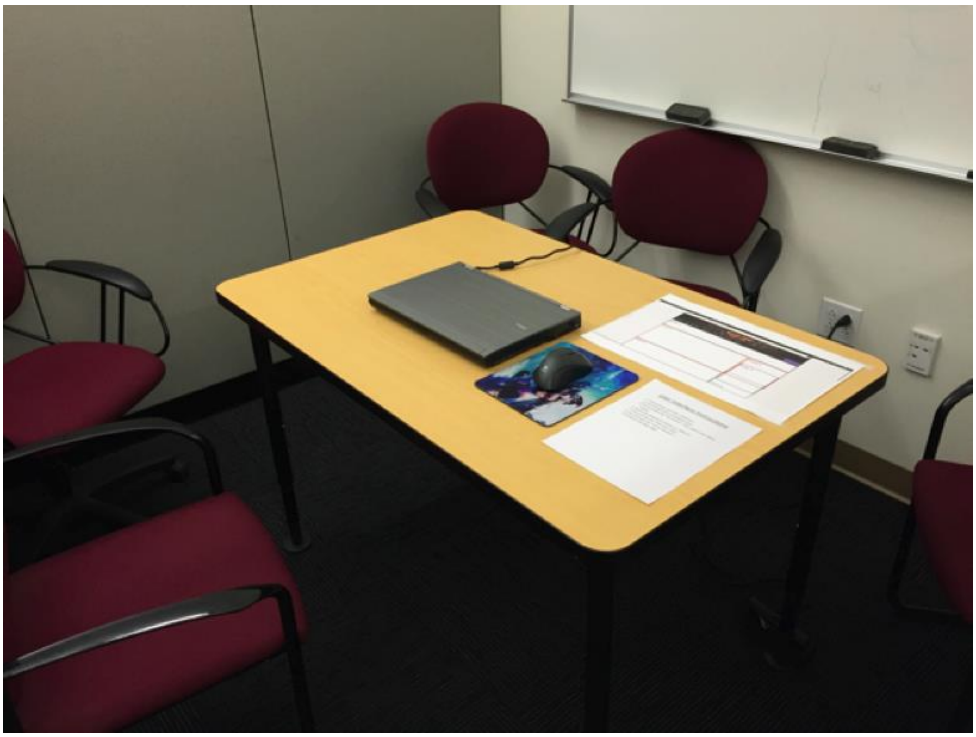


Figure 1: Workstation Set Up

One of the most important parts of this experimentation was being sure to keep the tests very consistent to avoid any unwanted factors into the analysis. This included keeping all procedures and training very consistent.

The experiment was conducted over 3 days within the hours of 11-3 at California Polytechnic State University where all experiments were completed all in the Ergonomics Lab, room number 192-237. The Ergonomics Lab is a controlled environment and we did experiments

at the same lab station. As seen in Figure 2 each workstation included: a laptop, mouse pad and mouse, Zone Template (See Appendix E) , User Interface Instructions (See Appendix G), and Zone Data Collection Sheet (See Appendix E).

The same facilitator was chosen each test to reduce variability in the delivery of the instructions. The instructions were read to the subject and were also shown on the screen to assist both visual and audible learners. Subjects were able to ask questions, but the facilitator would answer in a way to not give an advantage to any subject.

Procedure

To begin the experiments, subjects were asked to take a seat in the chair and read over the introduction to the experiment which outlined the length of the experiment and that the subject should expect two separate tests in addition to a questionnaire at the end. Next the subject was instructed to read over the Test 1 Instructions while the facilitator read them aloud. The subject was given time to ask any questions, and if there were no more questions the subject was able to complete a practice test which gave an example of test 1. The subject would then be asked if they were ready to begin the test. After completing test 2, subjects were read the instructions to Test 2 and were given the opportunity to ask questions before beginning the experiment. The subject would then complete test 2. After the test, subjects were asked to fill out a survey which consisted of 5 questions asking for various ratings on a 1-7 scale and 4 qualitative questions. The subjects were then finished.

Data Input

With two tests, including both qualitative and quantitative data collection, there were various sources of data that needed to be inputted as detailed below.

Test 1

For test 1, the zone that the subject indicated they believed to have seen an advertisement, was logged. This data was then compiled and the percent correct for each advertisement location (zone) was marked. The following table shows an example of the data:

		Zone Recognition					
Gender	Subject #	0	1	2	3	4	Overall
M	1	33%	56%	89%	11%	67%	**56%**
M	3	0%	33%	78%	11%	56%	**45%**
M	5	33%	0%	67%	0%	0%	**17%**
M	6	50%	56%	0%	44%	22%	**31%**
M	13	33%	0%	11%	11%	11%	**8%**
M	14	17%	89%	56%	22%	33%	**50%**
M	16	67%	11%	67%	11%	0%	**22%**

Figure 2: Test 1 Data Entry

Test 2

Test 2 included more data than test 1 because as the subject completed each test, the click path was logged and the time for each step was also logged. When entering this data, the time required to complete each step was inputted and the number of clicks required to complete each step was also inputted. The click paths, as mentioned, were required and can be seen in Appendix A.

Subject	1	2	3	4
Gender	M	F	M	F
Task 1	11	20	8	27
Task 2	20	22	58	43
Task 3	17	54	47	34
Task 4	28	18	49	17
Task 5	11	12	18	13
Task 6	13	14	19	28
Task 7	8	11	6	9
Steps To Complete				
Task (base clicks)				
Task 1 (1)	1	1	1	2
Task 2 (1)	1	1	3	2
Task 3 (2)	2	1	4	2
Task 4 (1)	1	2	2	2
Task 5 (1)	1	1		1
Task 6 (1)	1			
Task 7 (1)	1	1	1	1

Figure 3: Test 2 Data Entry

Post-Experiment Survey

The post-experiment survey was completed using Surveymonkey.com and all of the quantitative and qualitative questions, seen in Appendix B, were recorded directly in the website. The data was also able to be analyzed directly in the website.

Results

Test 1

The data was able to be analyzed using a split-plot method using the statistics software, JMP. The split plot DOE model had one between-subject factor (gender) and one within-subject factor (advertisement location on the screen). This analysis was accomplished by using the "Fit Model" function in JMP, and by adding in the effects and interactions required for the split plot analysis, allowing the data to match this type of analysis. The split plot tested the effect of Gender, Zone, and the interaction of Gender and Zone. Therefore, there were hypotheses for each of these effects. From output of the analysis (See Appendix C) it can be seen that the only effect that had a significant effect ($p < 0.0001$) was the effect of the Zone. Thus, the hypothesis that the population means of each of the zones are equal can be rejected. In order to determine which zone(s) was the most recognizable, a Student's t-test was run and applied. The results (See Appendix C) stated that the most recognizable location was zone 2, although zone 1 was not significantly different which means we cannot rule out the possibility that both zone 1 and zone 2 may be equally recognized. With that being said, both zone 2 can be said to be significantly different and more recognized than zones 3 and 4 where as zone 1 cannot.

Test 2

Gender significance was tested first to determine if it had a significant effect on test 2. After running t-tests it was determined that Gender did NOT have a significant effect, because of this, all 30 subjects were able to be analyzed together. Each step was analyzed (See Appendix D) with a combination of number of clicks, the success rate of each step, and the average time to

complete each step. The average number of clicks was compared against the ideal number of clicks for each step and a hypothesis test was run to determine if the average was significantly over the ideal. This should not be the final deciding factor however because the goal of the design of the user interface was for the user to be able to find what they are looking for in less than 3 steps, and by this definition, all of the steps pass. Our hope was that the success rate of each navigation step would be equal to or greater than 90%. The average time to complete each step was used to be sure no step took an excessive amount of time. After taking all of these factors into account, a recommendation for each step was made in regards to a possible redesign.

Step 1

In step 1, subjects started at the homepage and were asked to find the most recent post. Step 1 yielded the following results:

	Step 1
Clicks (Ideal)	1
Clicks (Average)	1.12
Time to Complete (Average Seconds)	13
Success Rate	83%

Analysis

The average number of clicks that it took to accomplish this step was 1.12 clicks, which after running a hypothesis test vs. the ideal number of clicks, was determined to be statistically significant but not with a very strong significance. After looking at the success rate of step 1, we see that it is slightly below 90% at 83%, and the average time to complete is only 13 seconds. Therefore, it's mildly recommended for Kihm to do a redesign, but it's not crucial

Step 2

In step 2, subjects were asked to find the most popular post. Step 2 yielded the following results:

	Step 2
Clicks (Ideal)	1
Clicks (Average)	1.62
Time to Complete (Average Seconds)	40
Success Rate	70%

Analysis

The average number of clicks that it took to accomplish this step was 1.62, which was determined to be strongly significant. After taking a look at the average time and success rate combined with the large number of clicks, a redesign is recommended in order to increase the ease of finding the most popular post.

Step 3

In step 3, subjects were asked to find the "Tip Archive" and then find a post regarding "troops". Step 3 yielded the following results:

	Step 3
Clicks (Ideal)	2
Clicks (Average)	2.23
Time to Complete (Average Seconds)	47
Success Rate	87%

Analysis

The average number of clicks that it took to accomplish this step was 2.23, which was determined to be statistically significant ($p = 0.0280$). However with an average time to complete and a success rate that was close to the ideal, a redesign is not crucial.

Step 4

In step 4, subjects were asked to search for a post on the topic of "defense". Step 4 yielded the following results:

	Step 4
Clicks (Ideal)	1
Clicks (Average)	1.23
Time to Complete (Average Seconds)	24
Success Rate	100%

Analysis

The average number of clicks that it took to accomplish this step was 1.23, which was considered statistically significant, but it was only due to subjects going back to the homepage before using the search function. As can be seen by the low average time to complete and a 100% success rate, this step is not recommended for a redesign.

Step 5

In step 5, subjects were asked to find the “Hero Gear Tool”. Step 5 yielded the following results:

	Step 5
Clicks (Ideal)	1
Clicks (Average)	1.05
Time to Complete (Average Seconds)	16
Success Rate	73%

Analysis

The average number of clicks that it took to accomplish this step was 1.05, which was not considered statistically significant and the average time to complete was relatively quick. The problem lies in the success rate being much lower than the desired 90%, this was due to many subjects being confused between two pages with similar titles, which could possibly warrant a redesign.

Step 6

In step 6, subjects were asked to find the “Troop Calculator”. Step 6 yielded the following results:

	Step 6
Clicks (Ideal)	1
Clicks (Average)	1.15
Time to Complete (Average Seconds)	21
Success Rate	67%

Analysis

The average number of clicks that it took to accomplish this step was 1.15, which was determined not to be statistically significant and the time to complete was also very quick. However, as with Step 5, due to a low success rate, it may be recommended for a redesign.

Step 7

In step 7, subjects were asked to return to the homepage. Step 7 yielded the following results:

	Step 7
Clicks (Ideal)	1
Clicks (Average)	1.17
Time to Complete (Average Seconds)	12
Success Rate	100%

Analysis

The average number of clicks that it took to accomplish this step was 1.17, which was not significant and both the average time and success rate were great and therefore this step is not recommended for a redesign.

Survey Results

Rating Question 1

"Using the steps given, how easy was it for you to navigate through the website?"

The feedback on from this question was very positive with over 90% of subjects rating the ease of site navigation better than neutral. A few tweaks from the results of the free response questions will mostly likely increase the weighted average above 5.73.

Rating Question 2

"How satisfied are you with the overall experience of the website?"

This question received poor feedback with only 70% of subjects rating the overall experience of the website above neutral. Although the weighted average is a respectable 5.37, meaning the range of experience each user had was very different. This is probably due to the

variety of subjects who participated in the experiment and how nearly all of them have never played Game of War.

Rating Question 3

"How easy was it for you to find the correct post or page you were instructed to?"

This question received similar feedback to step one with 86.67% of subjects choosing a rating of 5 and higher. It's important that this question receive positive feedback because it most directly correlates to the user interface measurement that is most important to GOWRT ie. whether or not the subject can find the posts and pages they intend to. The weighted average is 5.57.

Rating Question 4

"If you play/played this game, what is the likelihood of you re-using this website?"

The group believes Kihm will be particularly interested in these results since Game of War's current marketing budget is $40 million per year, meaning tons of new players will be flooding to play and it's important GOWRT is an attractive site to new players. With a weighted average of 5.60 Kihm can be confident he is on the right track, but improvements can still be made.

Rating Question 5

"In your opinion how aesthetically pleasing was the site?"

The range of ratings on this particular question fluctuated a lot. Every single rating level (1-7) was market at least twice. The group is unsure of what suggestions to make to achieve a bell curve result, but the group does think it's noteworthy that 50% of subjects selected a rating 6 to achieve a weighted average of 5.10.

Free Response Question 1

"What problem(s) did you face when navigating the website?"

There was only one popular response from this question that is beneficial to GOWRT. Out of thirty people, eight of them said they have difficulty finding the most popular post (MPP). The MPP could only be found by scrolling down below the fold of the website to locate a widget that clearly shows the MPP. This navigation step was one of the harder ones to find because the subject had to scroll beyond the fold to find it. It's interesting to note how much of an effect that had. Furthermore, it was on the sidebar, which is quite narrow in respect to the size of the website. It may have been the combination of those two factors: being below the fold, and on the sidebar, that caused the problem. Because on step 3 where subjects had to scroll below the fold to find a troops post, was not mentioned as an issue from any subject on this free response question.

Free Response Question 2

"What improvements could be made to navigate the site more easily?"

The most popular suggestion by subjects on this question was to make the homepage more intuitive to find. Five out of the thirty subjects claimed that clicking the banner to go to the homepage was too difficult. This is interesting feedback because a quick look at three of the most popular gaming websites: curse.com, ign.com, and gamespot.com, will reveal that none of them have home buttons on their menu bar. In fact, for all them the only way to return to the homepage is to backspace on your browser or click the banner of the website. Therefore, this is very important finding for GOWRT. If this sample size is indicative of the population mean, they can improve the user experience for 16.67% of their users by adding a home button.

Free Response Question 3

"What is the website lacking?"

There was a tie between two responses on this question, but they both don't have too much weight behind them because they each only got 3 of 30 votes. First, subjects felt like they didn't know enough about the game to make recommendations on what the website is lacking. There's no useful information that comes from this. It may even be positive because subjects see it as a pretty standard site, and the only way they could truly make it better is if they knew the game. Second, website organization was inconvenient for 3 of 30 subjects. No further detail was given beyond suggesting the website have a better structure.

Free Response Question 4

"Was there any navigation step that was particularly difficult?"

The highest response at 13 of 30 was that no navigation was particularly difficult. Yet, the second highest response was 10 of 30, where subjects claimed step 2 was particularly difficult. This reaffirms the results from free response question 2. Since it was addressed above, there is no need to address it again.

Limitations and Considerations

This project was able to accomplish every guideline but one, finding subjects to test who actually play Game of War. Ideally, the group would have liked to run the experiments on people who have played Game of War, but who have never gone to the website Game of War Real Tips. The company believes that 99% or more of his audience are players who have been playing Game of War for some period of time and who have decided to search the internet for tips on better ways to play. Instead, all subjects were college students of ages 18-23 who were unfamiliar with the game in question.

Economic Analysis

The consulting improvements suggested to GOWRT are directly beneficial to the company now and in the future. The estimated costs for hiring a consultant at a small and medium size business is approximately $80/hr for each team member. For this project, the total hours spent by both team members was a combined 220 hours, making the total cost of consulting to be $16,030. In order to implement the suggestions made, the company could use their developer. In fact, it wouldn't take the developer more than 30 minutes to directly implement the suggestions on the site. The time of the developer is equivalent to $60/hr, leaving the total cost of discovering and implementing these changes to be $16,030. In the future, it will become a habit for GOWRT to use the team's suggestions, thus not costing them any extra time at all. The current revenue of the company is approximately $3,450 resulting in a break even time of 4.6 months (see Figures N-1 and N-2), but the company mentioned to the group that they will have more revenue streams coming in the next 1-2 months and that he wanted those included in the economic analysis. The near future revenue is projected to be $9,250 resulting in a break even time of 1.7 months (see Figures N-3 and N-4). These break even calculations do not factor in revenue coming in from additional subscribers. The company was OK with neglecting this factor because they have not made any projections at this point. Therefore, the current and future break even times would be even shorter.

Furthermore, there are three ways that gameofwarrealtips.com can modify their website as a result of the data. In fact, they have implemented one of the ways. First, the company removed the adsense ads from Zone 4 and below. After reviewing their google analytics profile, they noticed an interesting correlation, that all ads below Zone 4 were only bringing in 20% of the overall revenue from adsense ads, thus confirming our hypothesis that highly recognized ad

locations generate more revenue. Second, in the near future GOWRT will receive their first ad campaign deal and get paid per ad impression, with a bonus per click. As a result, the group suggests that the company places the ads in zones 1, 2, and 3. Third, in the near future when GOWRT receives their first contract for a sponsored post, they will get paid by the estimated impressions that post will receive. The more impressions it receives, the higher the client must pay. The group recommends the sponsored is made into an in-house advertisement and placed in the most recognizable zones.

Lastly, over the past month, GOWRT had a total of 121,257 visit the site, while only 15.73% (Figure N-5) of users went past the first two pages of the site. With the user interface suggestions made in the report, this figure should rise and contribute to the repayment of the cost required to perform the study.

Conclusion

As the internet developed into the most popular platform of content consumption, website user interface and user design (UX & UI), and website advertising became extremely popular. Researchers and website owners quickly realized how important UX & UI were to sustain and grow the traffic on their websites. With traffic rapidly increasing and more of the population performing searches online, websites became an attractive location for advertisers to reach a larger audience. The more impressions and activity that advertisements receive on a website leads to more revenue for the website owner. Therefore, the owner of GOWRT, Chad Kihm, must optimize the UX & UI for his site to gain the most customers. In addition, he must ensure advertisements are being recognized. This was the foundation of this project.

The group discovered some important facts for GOWRT when testing the website. In regards to advertisement recognition, the group used a T-Test to measure which ad locations subjects recognized most often. The two zones with the highest scores were zone 1 at the top center of the website just below the banner, and zone 3 a few inches below the top of the right sidebar. When looking at UX & UI, Hypothesis testing was used to analyze the number of clicks required to complete a task on the site. In addition to this, the two largest areas of feedback were that www.gameofwarealtips.com needs to add a Home button the menu bar, and increase the visibility of the most popular posts.

Recommendations

From the data breakdown we can see that the most popular ad locations are, in order from greatest to least: 2 (42%), 1 (34%), 4 (28%), 3 (12%). The popularity of each location is intuitively understandable, the most popular are at the top of the page where people typically start first when they first visit a website. Our assumption was that the popularity would be in the order of 1, 2, 3, 4 because that is what the literature reviews suggested. In contrast, our results do not align with what is assumed to be common knowledge, that people normally start at the top left of the page, then scan across and down the right side. Although, we have ideas as to why our results differ. It could be for a few reasons. The design of our experiment and the ad location zones that are bunched up and overlapping on the right side of the page, may have caused subjects to pay closer attention to the right sidebar ads. Also, it is possible that the subjects had difficulty discerning the difference between the ad location zones 2, 3, and 4. They might have thought ads in zone 3 were in zone 2, which is a potential reason that 3 was scored so low.

The recommendation to gameofwarrealtips.com is to place their highest paying ads in zones 1 and 2, and the next highest paying ads should go in zone 4 and then 3. In these zones, those ads should get the highest visibility and recognition which will result in the most amount of clicks. Since clicks are what generate profit, the most profit will be achieved by placing the highest paying ads in those zones.

From test 2, there were a couple of steps that were recommended to have a redesign in order to make some of the most common tasks more streamlined and allow for a better user experience. Steps 2, 5, and 6 could warrant a redesign based on the cumulative results of test 2.

Approach

When first approaching this project the scope was too big. All the tests we have now were included and as well as documentation on a replicable business model for GOWRT to expand into other games. The group quickly realized that the business model aspect would be far too much work, as well as not in line with the other two tests the group had. The main driver behind it was that it had some good IE applications. After that was scraped the group did many literature reviews on the purpose of a tachistoscope test. It turned out to be the perfect test for measuring recognition. Finally, the group reviewed a previous senior project on Medkohealth that helped gauge which tests were needed for user interface.

Impact

By understanding which ad location is most recognized, the highest paying ads can be placed in those locations. Therefore, the revenue of that website can be maximized. By understanding which user interface aspects can be redesigned for better user engagement, GOWRT can increase their customer retention and brand quality. As GOWRT expands into offering content for multiple other mobile games on the same format of website, it's essential that all user design elements are the best they can be. Combining both factors will make GOWRT a far more successful company in the future. Potentially, allowing them to impact the mobile gaming industry in a big way.

Appendix

Appendix A: Flowcharts of Routes to Complete Test 2

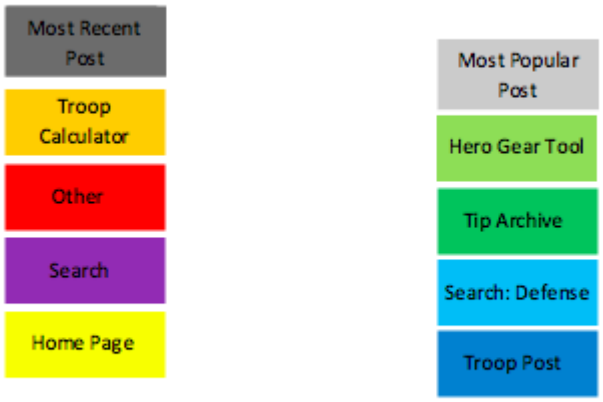
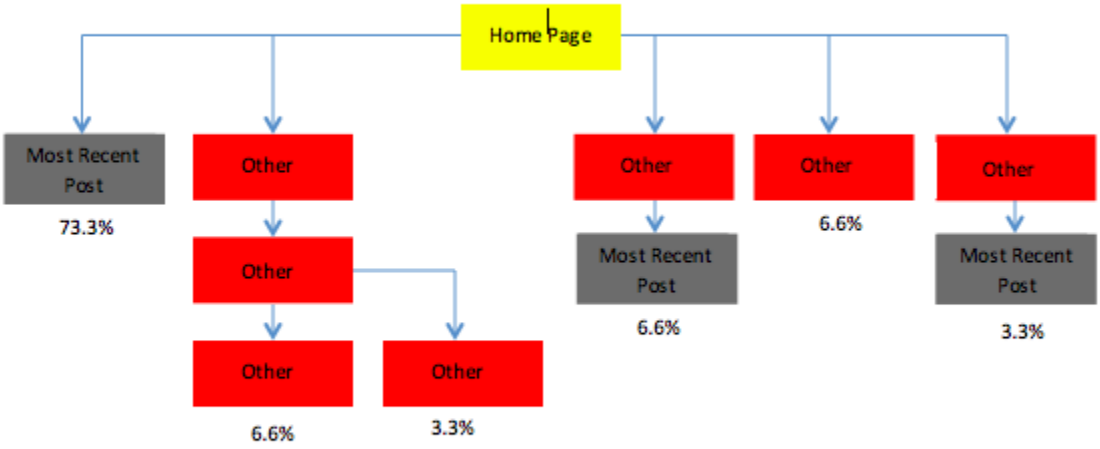
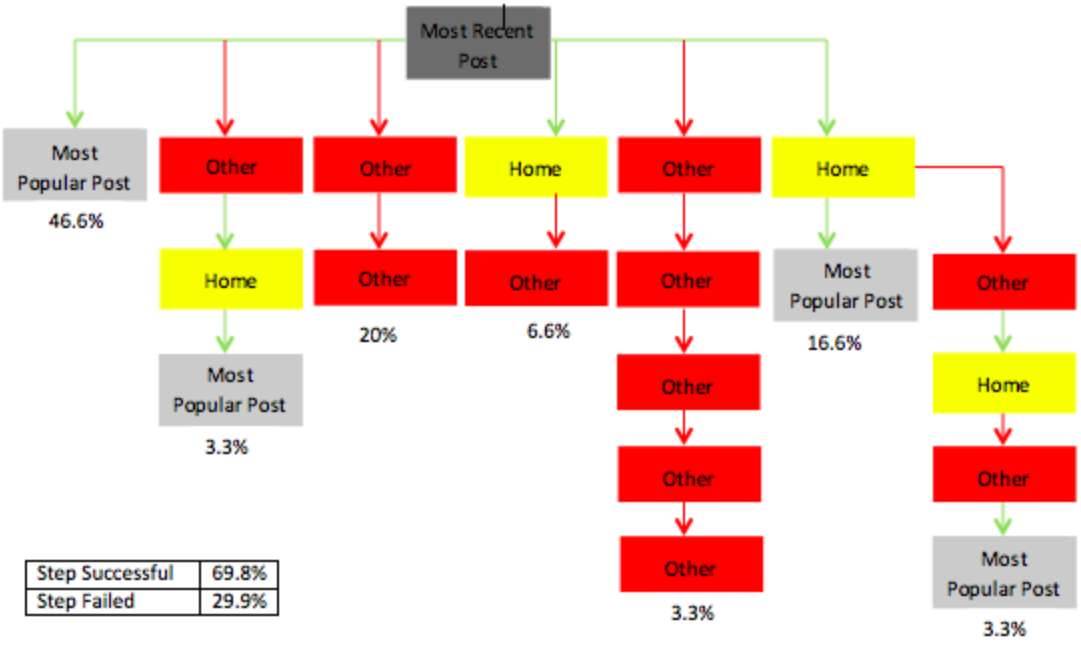


Figure A-1: Flowchart of Routes Taken to Complete Step 1



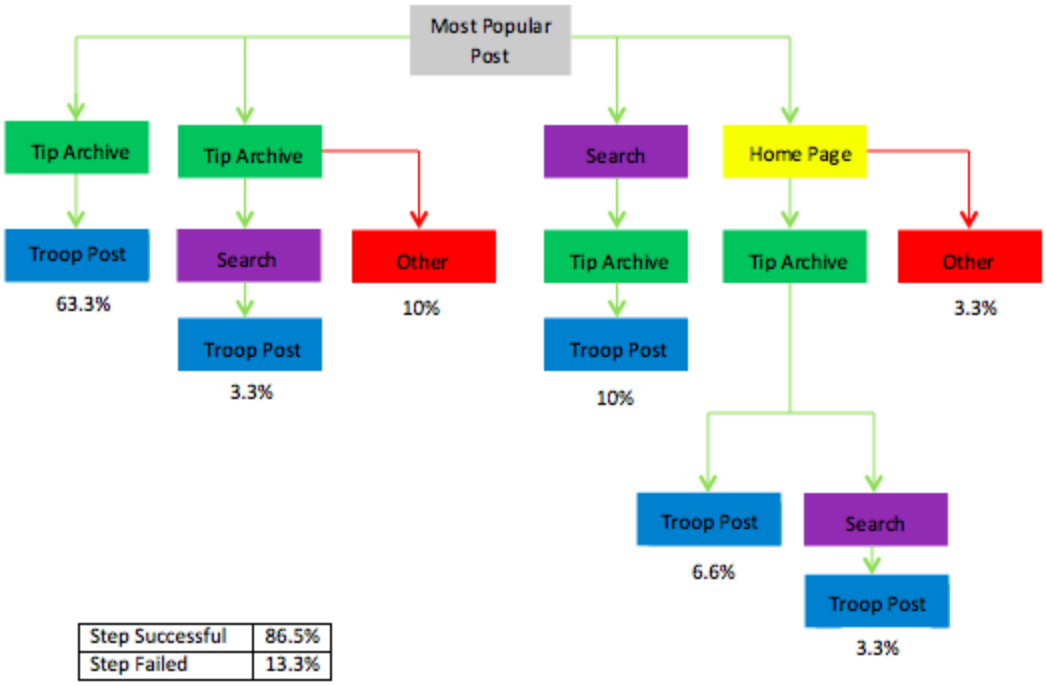
Step Successful	83.2%
Step Failed	16.5%

Figure A-2: Flowchart of Routes Taken to Complete Step 2



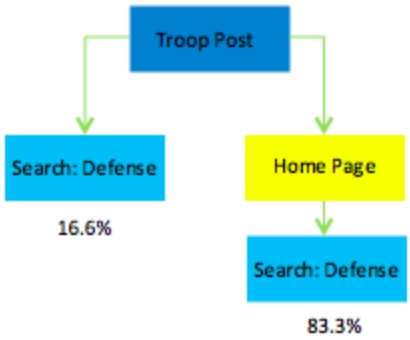
Step Successful	69.8%
Step Failed	29.9%

Figure A-3: Flowchart of Routes Taken to Complete Step 3



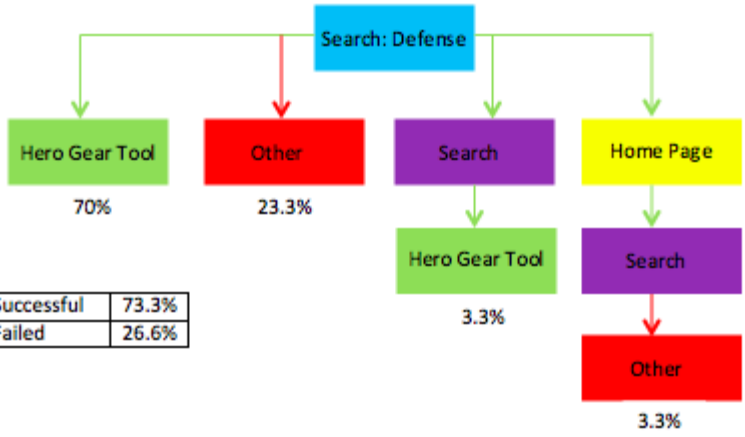
Step Successful	86.5%
Step Failed	13.3%

Figure A-4: Flowchart of Routes Taken to Complete Step 4



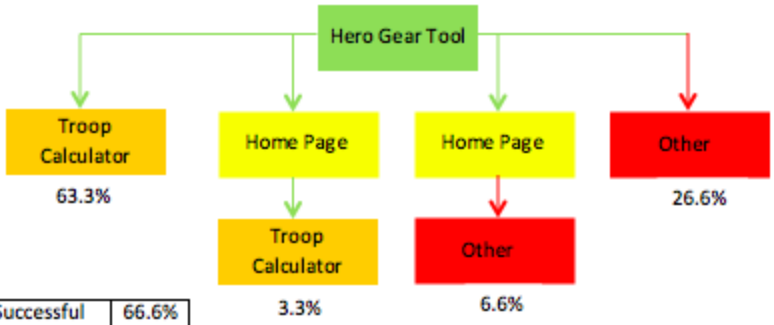
Step Successful	99.9%
Step Failed	0%

Figure A-5: Flowchart of Routes Taken to Complete Step 5



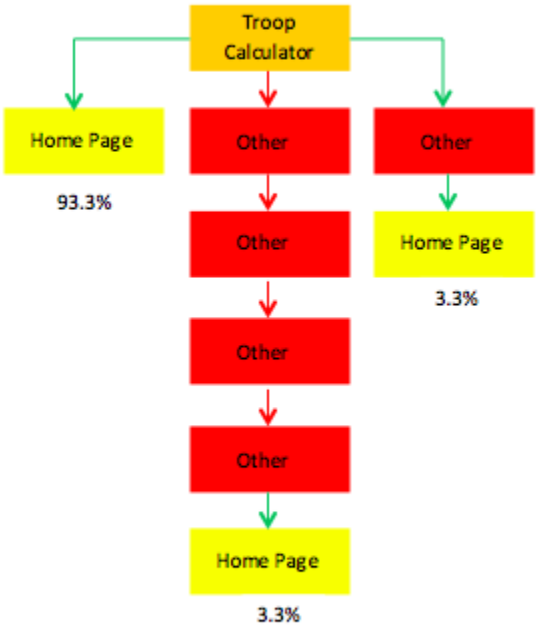
Step Successful	73.3%
Step Failed	26.6%

Figure A-6: Flowchart of Routes Taken to Complete Step 6



Step Successful	66.6%
Step Failed	33.2%

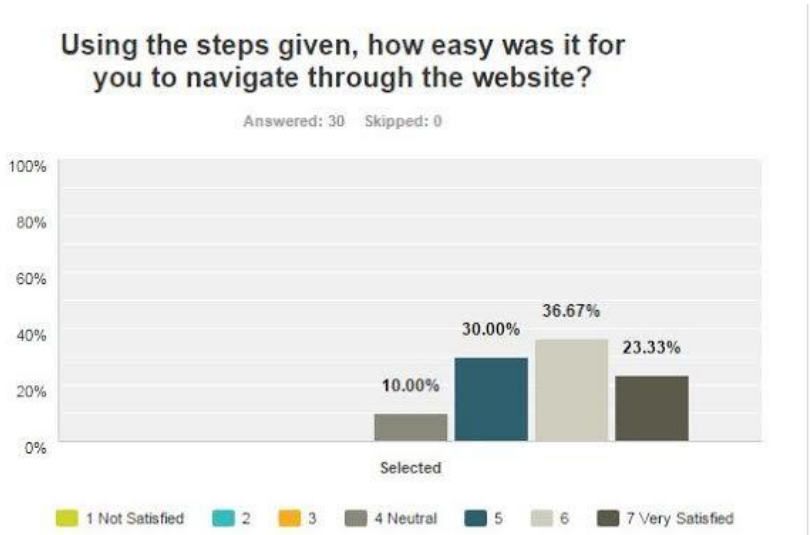
Figure A-7: Flowchart of Routes Taken to Complete Step 7



Step Successful	99.9%
Step Failed	0

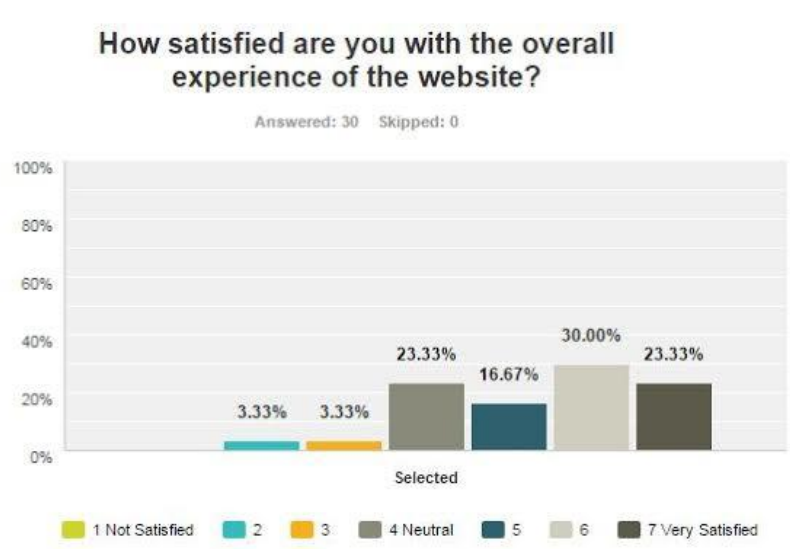
Appendix B: Quantitative Survey Responses

Figure B-1: Rating Question 1



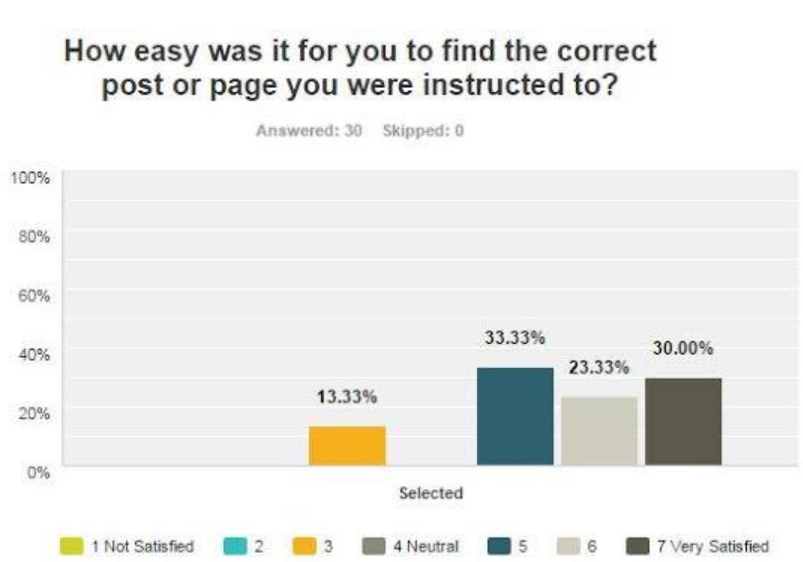
	1 Not Satisfied	2	3	4 Neutral	5	6	7 Very Satisfied	Total	Weighted Average
Selected	0.00% 0	0.00% 0	0.00% 0	10.00% 3	30.00% 9	36.67% 11	23.33% 7	30	5.73

Figure B-2: Rating Question 2



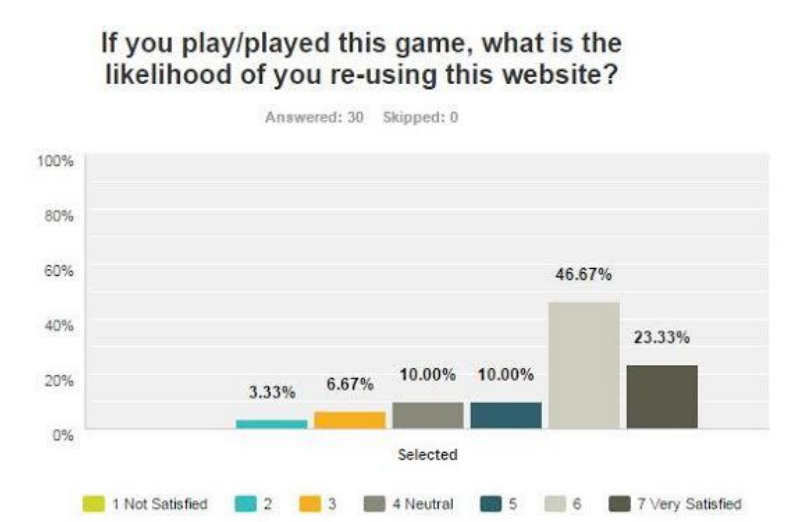
	1 Not Satisfied	2	3	4 Neutral	5	6	7 Very Satisfied	Total	Weighted Average
Selected	0.00% 0	3.33% 1	3.33% 1	23.33% 7	16.67% 5	30.00% 9	23.33% 7	30	5.37

Figure B-3: Rating Question 3



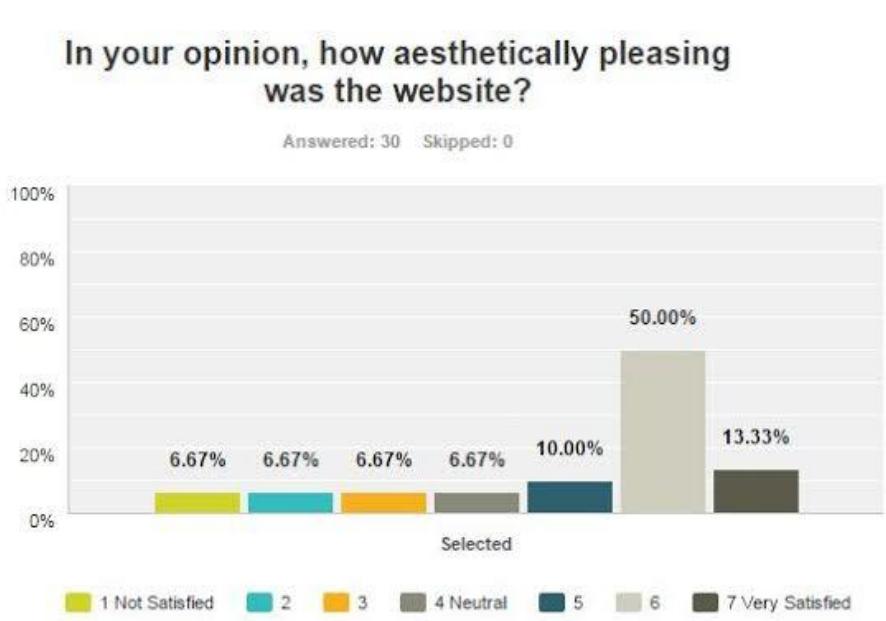
	1 Not Satisfied	2	3	4 Neutral	5	6	7 Very Satisfied	Total	Weighted Average
Selected	0.00% 0	0.00% 0	13.33% 4	0.00% 0	33.33% 10	23.33% 7	30.00% 9	30	5.57

Figure B-4: Rating Question 4



	1 Not Satisfied	2	3	4 Neutral	5	6	7 Very Satisfied	Total	Weighted Average
Selected	0.00% 0	3.33% 1	6.67% 2	10.00% 3	10.00% 3	46.67% 14	23.33% 7	30	5.60

Figure B-5: Rating Question 5



	1 Not Satisfied	2	3	4 Neutral	5	6	7 Very Satisfied	Total	Weighted Average
Selected	6.67% 2	6.67% 2	6.67% 2	6.67% 2	10.00% 3	50.00% 15	13.33% 4	30	5.10

Appendix C: Significance Testing for Test 1

Figure C-1: Test of Gender, Zones, and Interaction

Effect Tests

Source	Nparm	DF	Sum of Squares	F Ratio	Prob > F
Subject[Gender]	28	28	23019.733	1.7689	0.0244*
Gender	1	1	902.008	1.9408	0.1673
Zone	3	3	14223.825	10.2015	<.0001*
Zone*Gender	3	3	2638.558	1.8924	0.1371

Figure C-2: t-test comparison of Zones in Test 1

LSMeans Differences Student's t

α= 0.050 t= 1.98861

LSMean[i]	Mean[i]-Mean[j] Std Err Dif Lower CL Dif Upper CL Dif	LSMean[j] 1	2	3	4
1		0	-8.1	21.6	6.4
		0	5.56633	5.56633	5.56633
		0	-19.169	10.5307	-4.6693
		0	2.96926	32.6693	17.4693
2		8.1	0	29.7	14.5
		5.56633	0	5.56633	5.56633
		-2.9693	0	18.6307	3.43074
		19.1693	0	40.7693	25.5693
3		-21.6	-29.7	0	-15.2
		5.56633	5.56633	0	5.56633
		-32.669	-40.769	0	-26.269
		-10.531	-18.631	0	-4.1307
4		-6.4	-14.5	15.2	0
		5.56633	5.56633	5.56633	0
		-17.469	-25.569	4.13074	0
		4.66926	-3.4307	26.2693	0

Level		Least Sq Mean
2	A	42.166667
1	A B	34.066667
4	B	27.666667
3	C	12.466667

Levels not connected by same letter are significantly differe

Appendix D: Significance Testing for Test 2

Figure D-1: t-test Comparison vs. Most Efficient Number of Clicks for Tasks 1-4

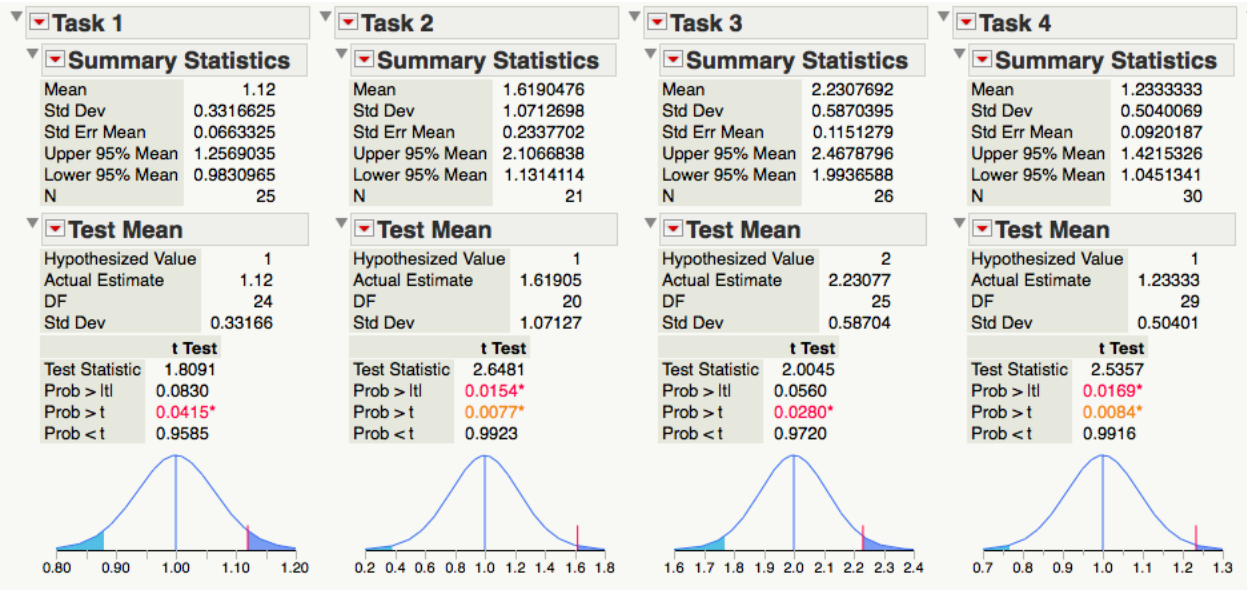


Figure D-2: t-test Comparison vs. Most Efficient Number of Clicks for Tasks 5-7

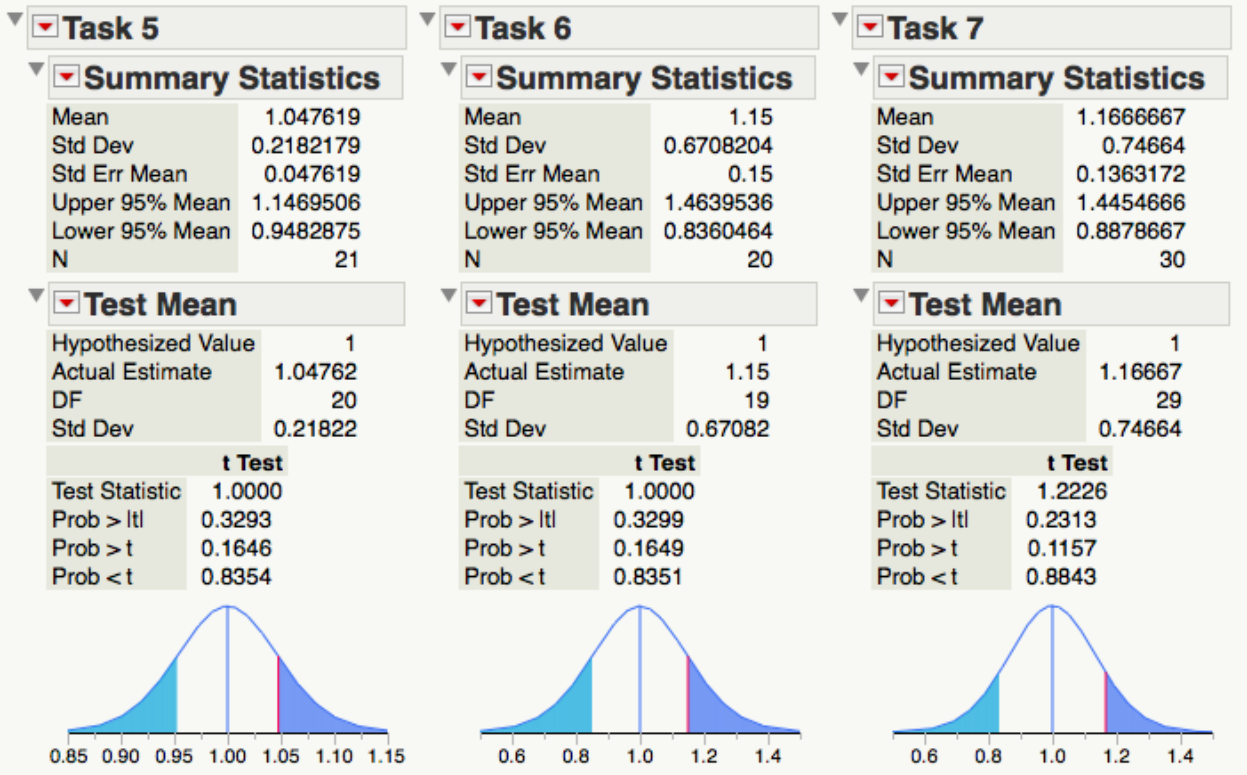


Figure D-3: Test 2 Summary Table

	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
Clicks (Ideal)	1	1	3	1	1	1	1
Clicks (Average)	1.12	1.62	2.23	1.23	1.05	1.15	1.17
Time to Complete (Average Seconds)	13	40	47	24	16	21	12
Success Rate	83%	70%	87%	100%	73%	67%	100%

Appendix E: Data Collection

Figure E-1: Test 1 Data Collection Sheet

Zone Answer Sheet

Pratice Picture #	1	2	3
Zone #			

Picture #	1	2	3	4	5	6	7	8	9	10
Zone #										

Picture #	11	12	13	14	15	16	17	18	19	20
Zone #										

Picture #	21	22	23	24	25	26	27	28	29	30
Zone #										

Picture #	31	32	33	34	35	36	37	38	39	40
Zone #										

Picture #	41	42
Zone #		

Figure E-2: Zone Template

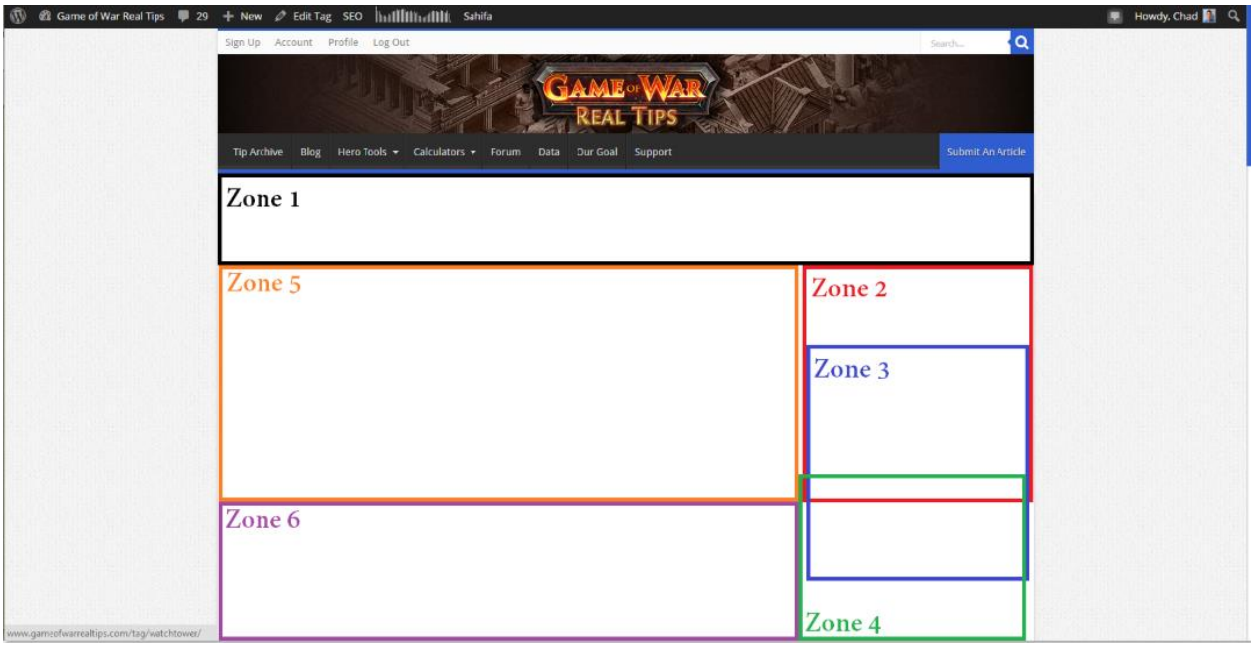


Figure E-3: Test 2 Data Collection Sheet

Name:				
Date:				
Time:				
Number	Task	Click Path	Number of Clicks	Time to Complete
1	Find the most recent post			
2	Find the most popular post			
3	Find and open the "Tip Archive", then open a post about "Troops"'			
4	Search the website for articles on "defense"			
5	Find and open the "Hero Gear Tool"			
6	Find and open the "Troop Calculator"			
7	Go back to the Main Page			
		Total	0	0:00:00

Appendix F: Financials

Figure F-1: Current Revenue Table

Revenue Stream	Revenue
Adsense revenue per month	$200.00
Subscription revenue per month	$3,000.00
Affiliate revenue per month	$150.00

Figure F-2: Current Breakeven Table

Break Even Analysis	Cost
Total Cost	$16,030
Total revenue per month	$3,450
Months until breakeven	4.6

Figure F-3: Additional Near Future Revenue Potential (next 1-2months)

Revenue Stream	Revenue
Ad Campaign	$4,200
Sponsored Post	$600
Selling Reduced Cost Gold Packs	$1,000

Figure F-4: Near Future Break Even Table

If GOWRT acquired the additional revenue sources soon, it would take 1.7 months to break even instead of 4.6 months.

Break Even Analysis	Cost
Total Cost	$16,030

Total revenue per month	$9,250
Months until breakeven	1.7

Figure F-5: Site Logistics Table

Site Analysis	
Visits Feb 10 – March 10	121,257
User left after 2nd interaction	197.2k
% retained after two pages	.1573

Figure F-6: Total Cost Table

Source	Cost
Consulting	$80/hr
Cost of Consulting	$16,000
Front End Developer	$60/hr
Cost of Front End Developer	$30
Total Cost	$16,030

Appendix G: Instructions

Figure G-1: Pre-Test Clarification

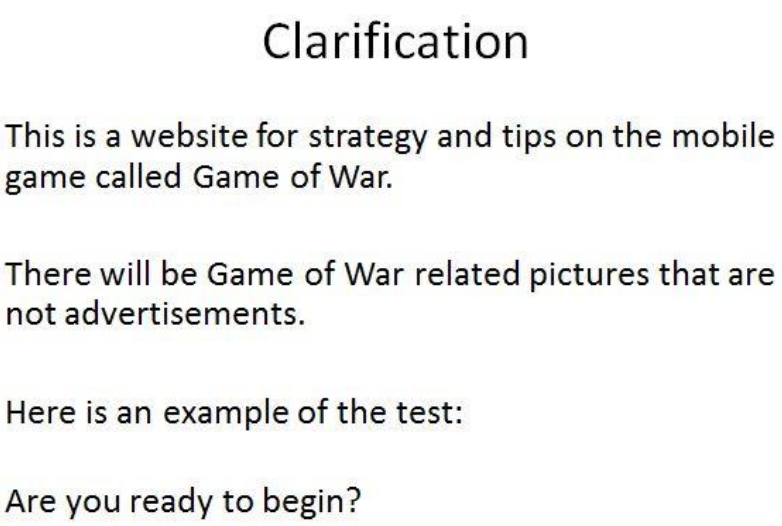


Figure G-2: Pre-Test Instructions

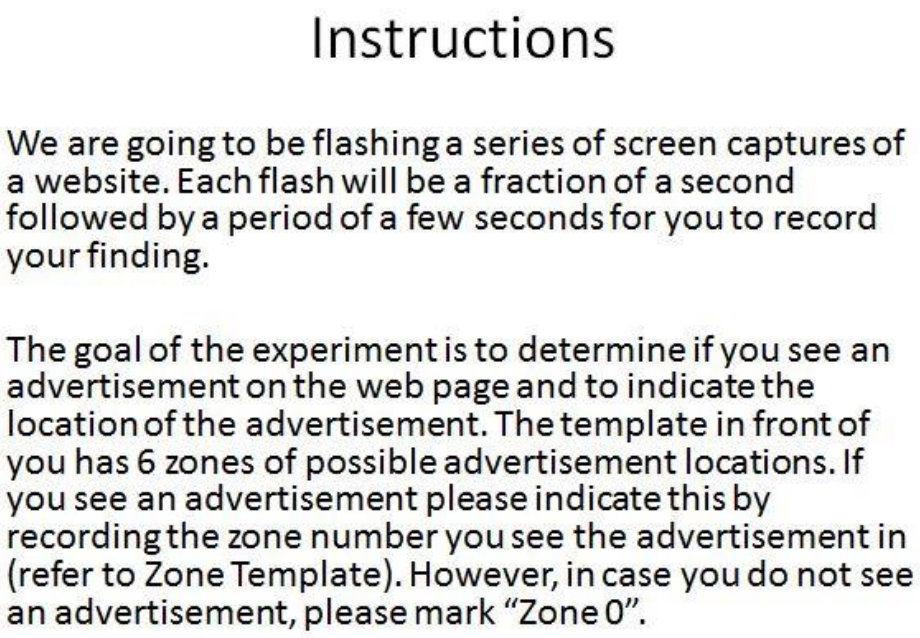


Figure G-3: Pre-Test Introduction

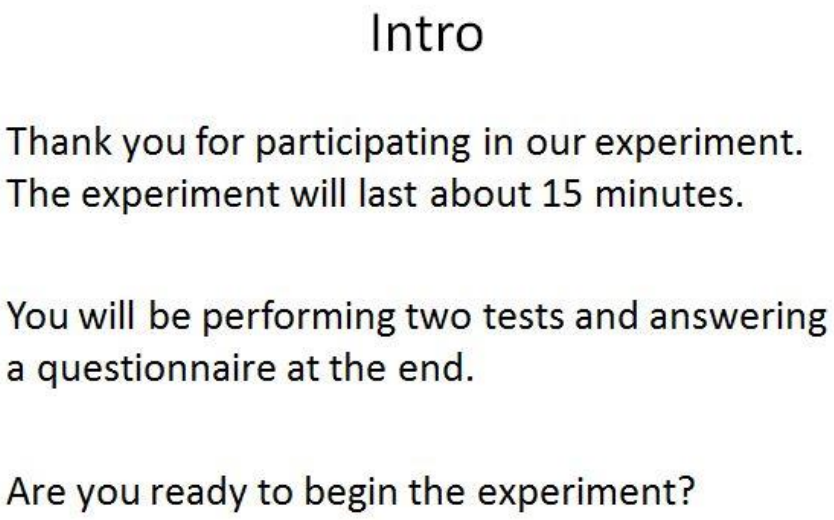
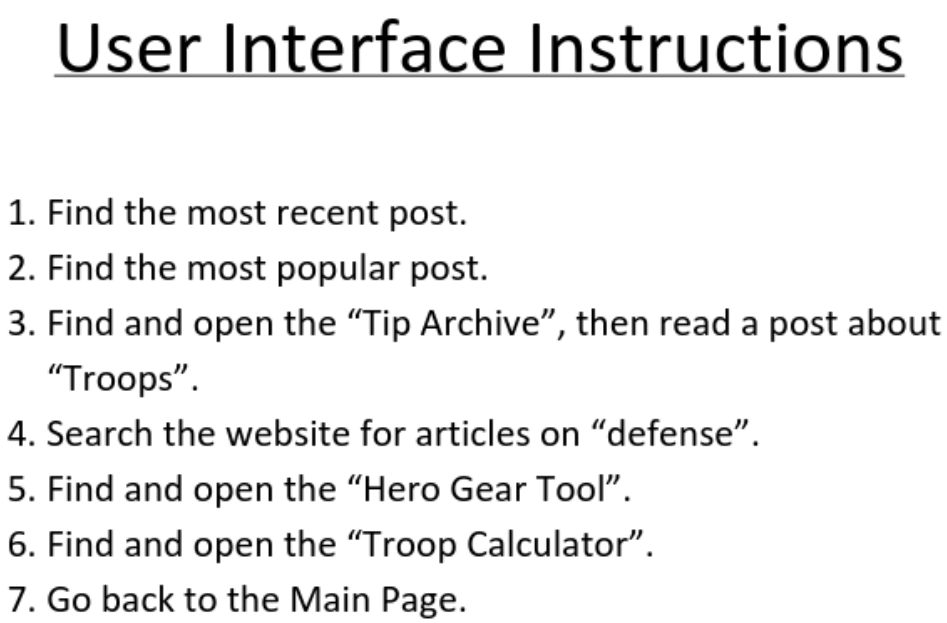


Figure G-4: Test 2 Instructions



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