BAUHAUS UNIVERSITY WEIMAR

MASTER THESIS

Comparison of Interactive and Non-Interactive advertisement in public display

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Declaration of Authorship

I, Hasibullah SAHIBZADA, declare that this thesis titled, "Comparison of Interactive and Non-Interactive advertisement in public display" and the work presented in it are my own. I confirm that:

- This work was done wholly or mainly while in candidature for a research degree at this University.
- Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated.
- Where I have consulted the published work of others, this is always clearly attributed.
- Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work.
- I have acknowledged all main sources of help.
- Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself.

Signed:

Date:

"Thanks to my solid academic training, today I can write hundreds of words on virtually any topic without possessing a shred of information, which is how I got a good job in journalism."

Dave Barry

BAUHAUS UNIVERSITY WEIMAR

Abstract

Faculty of HCI
Human Computer Interaction, M.Sc

M.Sc

Comparison of Interactive and Non-Interactive advertisement in public display

by Hasibullah SAHIBZADA

The Thesis Abstract is written here (and usually kept to just this page). The page is kept centered vertically so can expand into the blank space above the title too...

Acknowledgements

The acknowledgments and the people to thank go here, don't forget to include your project advisor...

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List of Abbreviations

LAH **L**ist **A**bbreviations **H**ere
WSF **W**hat (it) **S**tands **F**or

Physical Constants

Speed of Light $c_0 = 2.997\,924\,58 \times 10^8\,\mathrm{m\,s^{-1}}$ (exact)

List of Symbols

a	distance	m
P	power	W ($\mathrm{J\,s^{-1}}$)
ω	angular frequency	rad

For/Dedicated to/To my…

Chapter 1

Introduction

From very old ages as from 13th century advertising has played an important role to promote customers attention and be able to compete with one another, The first paper advertisement was published at 1704 in an American newspaper called Boston News Letter, which was about houses and lands to be sold [16] and after that lots of business started to do their advertisements in newspapers, posters and banners. The first television ad was shown at 1941 on an American TV [15], this ad brought attention to a wide area of application and big business industries toward advertisement as a result the budgets raised much higher for advertisements and later advertisement entered the World Wide Web or so to say online advertising, which has evolved now to multi-billion dollar industry. Now because of the emerging new technologies and advancements, advertisements are in our smart phone applications, smart TV sets, tablet PCs and many other smart devices. And from past decades display screens are replacing print advertisements because of the easy reusability of the screen and convenient usage of them and providing dynamic contents.

Above all, still most of the advertisements are boring, time consuming, not clear for a lot of viewers, people tend to ignore advertisements because of many different reasons. Posters, banners and digital screens, which have static and dynamic contents respectively, are still done in a very bias way with considering the contexts, user?s interests, locations and many other factors.

On the other hand, the use of technology with the advertisements could make the advertisement more attractive and interesting for viewers and open new ways and techniques to boost product purchases by customers, for example with the use of internet now more companies reserve spaces for their advertisement inside webpages by making flashy ads or playful interactive ads to attract users and redirect users to their webpages and so on. Even more interactive advertisements are now experienced in public spaces by allowing users to interact with their smartphone or do gestures or touch on large displays to perform easy tasks and get redirected to the shop or at least use them as a fun tool to remember about the product.

Additionally using body-sensing technologies, which are advancing day-by-day like Kinect Camera [17], could be used to allow passers-by to be engage without the use of other device, with which it would be easy for us to explore more possibilities of attraction methods, novel interactions and engagement techniques to provide to the users better experience and increase product purchase and interest.

1.1 Thesis Goal

Currently there are more dynamic and static displays compared to interactive displays. People are a lot familiar with non-interactive displays and most of the times expect series of pictures and videos from these screens and threat it as a mean of advertisement, but there is a missing link between passers-by and advertisement, if this missing link gets connected somehow then advertisement would be more fun for people.

First, this thesis researches on advertisement in general to find out what are the people interest and expectation from a public display and how could the existing be changed in a way that people would like it and pay attention.

Second, it researches on attraction attention level in public to find out which of the defined methods attracts passers-by attention toward the screen.

Third, it focuses on the missing link, that how to effectively connect people with advertisement so that people get attracted, motivated and get engaged with the screen.

Fourth, it conducts users studies and focus groups to make an advertisement from which two are interactive and one is auto-active advertisement. Two of interactive advertisements consist of body interaction and mobile interaction and the auto-active advertisement is the same like above but the different phases are triggered automatically.

Additionally, conduct a comparative study on advertisements that first it would compare the traditional advertisement with interactive advertisement and second would examine two different interactive advertisements (Smartphone Vs. gesture) with each other.

And finally it proposes new attraction attention, motivation and engagement techniques for passers-by and compares the new effects with the previous interactive advertisement techniques.

1.2 Methodology

1.2.1 Prototypes

1.2.2 Evaluations

1.2.3 Ethics

1.3 Summary of thesis contribution

1.4 Research context

1.5 Thesis outline

1.6 In Closing

You have reached the end of this mini-guide. You can now rename or overwrite this pdf file and begin writing your own **`Chapter1.tex`** and the rest of your thesis. The easy work of setting up the structure and framework has been taken care of for you. It's now your job to fill it out!

Good luck and have lots of fun!

Guide written by —
Sunil Patel: www.sunilpatel.co.uk
Vel: LaTeXTemplates.com

Chapter 2

Background

2.1 Advertisement

2.1.1 History of advertisement

2.1.2 Pervasive Advertising

2.1.3 K / L value

2.1.4 Metaphors

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Windows

Overlay

Posters

2.2 Public displays

2.2.1 History of public displays

2.2.2 Auto-active displays

2.2.3 Engagement with displays

Attention

Motivation

Interaction

There are many stages until users actually interact with the advertisement as shown above by Michells,D and Muller,J in the journal of HCI [2] Attention and motivation will eventually lead to interaction and these stages follow each other if the first step fail the rest would not happen. In this part of the study I want to focus more on the attraction attracting part of advertisement.

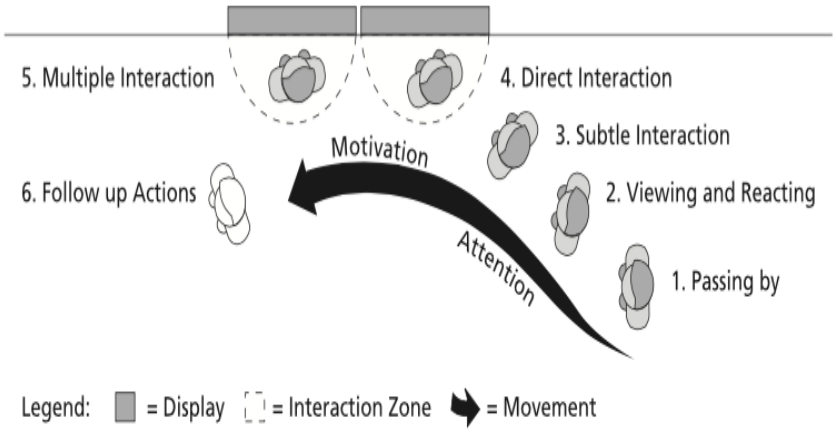


FIGURE 2.1: The Audience Funnel

2.2.4 Interaction modalities

Body

Mobile

2.2.5 Interaction models

2.2.6 Evaluation

2.2.7 Approaches to Research

2.2.8 Methods and tools

Chapter 3

Attraction attention

3.1 Introduction

This study is a comparative study to investigate how the attention toward the screen could be achieved by evaluating three different techniques shown on the Mensa screen and the old traditional advertisement, This would help to provide idea to design the attention step of the interactive advertisement and get passers-by feedbacks and ideas about these techniques.

3.2 Background and related works

At the early stages of digital advertisement, they were very interesting for people and people would stand for a while and have a look at the content, simply because it was something new with big screens, and now digital advertisements are increasing everyday and has become very common and it is same as Television ads without sound; therefor most people try to avoid seeing them because it is not interesting for them anymore or is not related to them, some how there is a missing link between people and advertisements. The rise of powerful computers and new technologies in the last decades, we have Interactive advertisements that integrate people involvement to make advertising more effective and usable.

Designers of Interactive advertisement have focused a lot on the Usability of the them which obviously should not be avoided but many other factors have not been studied deeply that is why it fails to accomplish their main purpose and are treated like simple posters and ignored. Interactive advertisement should be able to Attract and motivate users and finally allow users to interact in a better way. "*If they capture attention, many displays seem to fail to motivate passers-by to interact, who have other goals in mind. If, finally, the audience has noticed the dis- play and is motivated to interact, interactive displays seem to fail to deal appropriately with the public nature of interaction, where people may avoid interaction in order to maintain their social role and e.g., not look silly*"[1]

Every moment we spend alone, with friends in the crowd, in the concert or party our attention keeps tracks of us and make us aware

of the environment and we react differently for different stimuli, so "*Attention is the process that, at a given moment, enhances some information and inhibits other information. The enhancement enables us to select some information for further processing, and the inhibition enables us to set some information aside.*"[4]. Attention is influenced by two different processes (Top-Down & Bottom-Up). Top-Down process happens when the user has prior awareness (goal) about where to put his/her attention toward and Bottom-Up process happens when the user has no prior awareness and suddenly by an external stimuli move or change attention toward or to something. People walking on pathway or walking in a store or waiting in bus station does not have any knowledge or awareness about an Interactive advertisements located there, nor the researchers tend to speak about it for them, at this situation I believe that the attraction of attention should be a Bottom-Up process for the users to drag them to the screens.

The appearance of objects suddenly or moving objects on the screen or contrasting color can capture attention quicker. Yantis and Jonides (1984) demonstrated that the detection of a target in visual search was markedly enhanced when the target was presented as an abruptly[5]. And the type of contrast change on an object influence priority in visual search, "*Both the sudden appearance of an object and sudden changes in existing object features influence priority in visual search.*"[3]

Elaine M. Huang, Anna Koster, and Jan Borchers have researched and discussed on "*When Does the Public Really Look at Public Displays?*"[6], in this paper they argued that glancing and attention at large displays is complex and is dependent on many factors like Brevity of glances, Positioning of displays, Content format and dynamics, Catching the eye, Display size, this paper provided some recommendations for each of the mentioned factors.

3.3 Approaches

As discussed earlier the Interactive advertisement would need to first attract the passers-by, Therefor ror the initial attraction attention study, three different types of eye-catching techniques are made to observe which suites best for further research and which side of them should be improved and use them for the interactive advertisement. In this study the of the interactivity or the advertisement itself are not the core study, this study is only to see how many passers-by change their attention and glance toward the screen.

The definition of glance and ignored toward a screen is briefly given by John Hardy and their colleque [**?**] in which they categorized the attention level to three levels as glanced, ignored and watched, glance happens when the passer-by turn his/her head and stares the screen for less than 3 seconds, and ignore is when the person completely does not look or turn his/her head.

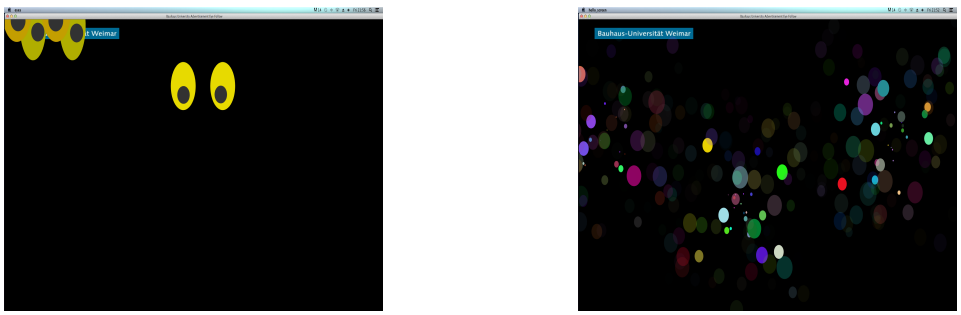
3.3.1 Prototypes

In the following examples the screen background color is set to black and is in full screen mode but with different contents.

As you can see in this figure 3.1 these eyes suddenly pop-up when a person passers-by the screen and follows the person by moving its eyeball. The idea behind this is to check if people would react if something abruptly appear on the screen and starts to follow people, This example has very limited movement it is only constraint with limited eye space, but big object with high contrast.

Another example in figure 3.1, shows different colored and sized firework animation, The application will show a random firework for each person on the scene, there are three blocks of fireworks for three persons, the movement of the person changes the location of the firework. In this example there is more object movement and color changes with high contrast.

Jorg Müller [7] has investigated that how passers-by notice the interactivity of the public display by showing different representations of body like Mirrored (1) "*user silhouettes*", (2) "*avatar-like*"representations and (3) "*real user Image*". In that paper they concluded that mirroring user image is much more effective to attract users and understand the interactivity of the display, but because of privacy policy and because of social attitude like may be someone does not like to be shown on the screen, only Mirrored silhouettes,which is the augmented colored representation of people, will be shown and investigate how much is the attraction toward the screen. Figure 3.2 shows three person's silhouette representation.



(A) (B)

FIGURE 3.1: A: Following eyes B: Fireworks animation

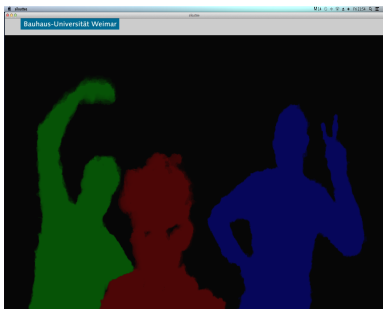


FIGURE 3.2: Three silhouette representation

3.3.2 Hypothesis

- **H1:** Silhouette representation method attracts more passer-bys than other two methods.

    1. Dependent Variable: Number of people glance per total passers-by.
    2. Independent Variable : Interactive / traditional Advertisement.

3.4 Study design

In the beginning the idea was to conduct a some experiment in the lab and investigate about the attention, like doing gaze tracking but it did not suited well for the real life displays, Therefor we came up to a decision to investigate the glance counts made for each individual methods and compare them among each other.

3.4.1 Participants

Participants were random from university students or employees, basically a broad target that mostly consisted of students and teachers, the participants were taken in consideration that passed in front of the display, The participants who passed from the backside of the screen were not taken in consideration. Non of the participants knew about the methods shown on the screen.

3.4.2 Location

The study was conducted in university Mensa, this location was an ideal location because many students, teachers and university employees go for having lunch and taking coffee breaks and the Mensa gets crowded. The Mensa 14 inch display was used for the study, which was installed near the stairs and already was used for advertisement purpose.

3.4.3 Procedures

The study was conducted for four continues days, and each day only one method was displayed on the screen for two hours at 14:00 oclock, The first day of the study was the passive mode of the screen, where traditional advertisement was displayed and the next three days the attraction attention methods were activated. One person was responsible for observing and noting the glances made by the passers-by and also noting interesting behaviour of people toward the screen. The other person was responsible to take interviews from the passers-by that glanced at the screen and get more feedbacks of the advertisement in general.

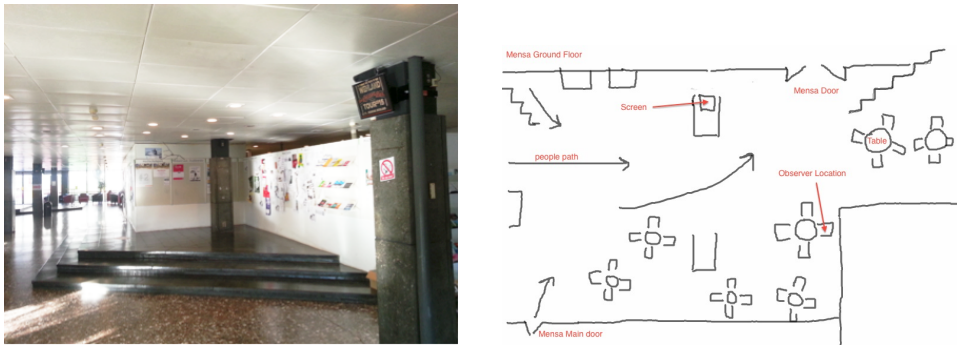
3.5 Data gathering

Three different attraction attention methods and one traditional advertisement of Kasseturm were evaluated each for two hour period from 14:00–16:00 in individual days in Bauhaus University Mensa. Two methods (Observation and Interviews) were used for data gathering during the four day long period.

3.5.1 Observation

Observation was used to count the number of glances the passers-by make at the screen while pass from the front of the screen. A small pilot study was conducted for the observer to find an appropriate location in the Mensa setup to be able to count people and glances without being noticed by passers-by.

The first day, which is a normal advertisement, does not require Kinect Camera, but in order to have same environment for all the days, The camera was installed on top of the monitor to look similar as the other interactive feature.

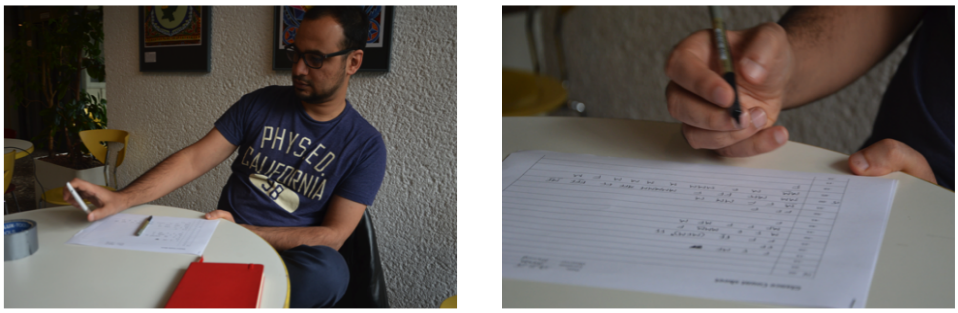


(A) (B)

FIGURE 3.3: A: Mensa ground floor. B: Kasseturm Advertising monitor.

As sheet was provided to the observer to note each 5 min time stamp for two hours, specific letters were defined to detect Male, Female, Unknown gender and at the same time who were in a group and individual and who glanced to the screen. See A.1

As stated before that observer was given one small pilot study to detect a good location and be able to count and note in the sheet, beside that he was told to write notes if he observes something interesting during the period.



(A) (B)

FIGURE 3.4: A: Hamid Sabri is getting prepared for observation. B: Observer is taking notes on the data sheet.

3.5.2 Interviews

During all four day of the observations, 16 interviews were taken from people inside Mensa to get general opinion about advertisement and people preferences what they like and what they avoid about advertisement. Responders were asked to sign the consent form because the interviews were tap recorded for later analyzing. Each interview took around 6 minute in average. All interviews were transcribed separately for further data analyzing. See A.2 for consent form and A.3 for the questionnaire.

3.6 Findings

To have accurate findings, they are categorized as bellow.

3.6.1 Observation findings

Observational data for glance count and people passed by the screen were gathered and results to the bellow findings.

TABLE 3.1: Cross tabulation of deployment and attention level

Method	Glanced (%)	ingnored (%)	Total
Traditional	9 (%7.6)	109 (%92.3)	118
Silhouette	22 (%15.82)	117 (%84.7)	139
Following eye	10 (%12.98)	67 (%87)	77
Firework	6 (%10.1)	53 (%89)	59

As can be seen a lot of from the table above Silhouette attention attraction technique received the highest number of glances 21 out of 138 compared to other techniques, Following eye technique was the second most attracted technique probably because of its contrasting color and funny.

To find the statistical significant difference between traditional screen and these three methods Chi-squared test was applied as bellow.

TABLE 3.2: Cross tabulation of Silhoutte and traditional attention level

Method	Glanced (%)	ingnored (%)	Total
Traditional	9	109	118
Following eye	10	67	77
Total	19	176	195

Performing the ch-squared test, χ^2 *(1, N=195)=1.522, p >.05 (p=.21)* suggests that there is no significant difference to attract passers-by between following-eye method and traditional screen

TABLE 3.3: Cross tabulation of Silhoutte and traditional attention level

Method	Glanced (%)	ingnored (%)	Total
Traditional	9	109	118
Firework	6	53	59
Total	15	162	177

After the ch-squared test,χ^2*(1, N=177)=0.328, p >.05 (p=.56)* suggests that there is no significant difference to attract passers-by between Firework method and traditional screen.

TABLE 3.4: Cross tabulation of Silhoutte and traditional attention level

Method	Glanced (%)	ingnored (%)	Total
Traditional	9	109	118
Silhouette	22	117	139
Total	31	226	257

After the ch-squared test, $\chi^2(1, N=257)=4.046, p < .05 (p=.04)$ suggests that Silhouette representation attracts more passers-by than traditional screen.

So the decision would be to use silhouette technique for further advertisement application.

3.6.2 Interview Findings

Interview transcripts were individually coded to generalize the responder?s opinions on the advertisements. I created two main sections from the interviews that what makes a Good Advertisement, and what makes a Bad Advertisement and related all responses to these sections a lot of codes were analyzed and grouped together to make sub sections and sub-sub-sections.

Good Advertisement

A lot of categories have been found after coding the interviews the chart in Appendix A, show all the categories and sub categories with the correspondent code from the interviews and even some codes were directly also placed as a category instance. The bellow list describes some of the important categories retrieved from the diagram.

1. **Content**
   Interactive advertisements attract more people than traditional advertisement. Responders like to have more Funny contents than any other restrict informational advertisement; ?just make it funny like make a joke or something but something in a very good one that is really difficult?, ?it should be very not very serious?, ?Yeah mostly I like funny things that the main concept is shown in different way like in funny things?, ?I like advertisement that are somehow have humor?.

   At the same time responders would like to see some useful, true, sensible facts and main idea of advertisement; ?an offer if it is clearly mentions that okay that you save this much or you get this or that, that is like a clear message?, ?you have to focus

on the main things that will happen in the event which will attract people will come.?

Furthermore contents of advertisement should be small and understandable; ?the advertisement should be clear too. ?, ?when you have too many numbers and too much to read then it is confusing? ?Add some pictures based on the advertisement what do you want to show. ?, ?Not many text in advertisement?,? Have a good design, not too crowded with information?, ?Well defined subject, and shorter contents, because we don?t like reading long things usually no body likes to read?.

Another important thing was Context Based contents, the users liked to see things related to their surroundings; ?if I am standing near a shopping center it should tell me that what kind of shops are there and what I could buy from there.? ?It should show movies of the actor I like?.

2. **Creativity**
   People like to see very new and creative things happening in advertisement; ?something that catches your attention in a way that you haven?t seen before?, ?like seeing something out of ordinary?. Introducing new ideas, artistic; ?as I am musician you know kind of creative person I like if it something special inside not it is just like for example if it is advertisement of milk ?, ?Which can be something un-expectable probably also ?, ?in general I would say yes as long it gets creative?

3. **Style**
   The style of advertisement plays key role in terms of color and size as stated by responders; ?may be should be more should be more colorful?, ?my eyes are attracted to so hard things unless there is something big enough things ?, ?Use the bright color. ?, ?You have to be clever in using colors okay because color mismatch does not attract the eyes?, ?when it is really just like an art like you have a picture you some impression or illusion?.

4. **Location**
   Responders like to see advertisement while they are on the way, they don?t get annoyed if advertisements comes on their way and some probably take a look to them too, but heavily they do not like advertisement while they are at home or watching program in TV or Internet, ?I think the street is better?

5. **Interactivity**
   Some liked to have some sort of interactivity to experience like playing games; ?it is good like if you have a game, it would

better to have a preview of the game on the screen or just like something like even people could interact with it like get an experience of the game?, ?if the screen will also be interactive so you can interact with the with the something you are advertising.?

6. **Mean**
   Different means were mentioned like larger screen, sound, banners for good influential advertisement.

7. **Motivation**
   One of the responder pointed that the advertisement should motivate users in a natural way and should be from unbiased point of view; ?I prefer to buy in a natural way. The company should know who are using their product the power users who that have a lot of influence you know if you have good connections with the guitarists who have like actually like you know people listen to his opinion I think you have to reach out to the guitarist but once you know the guitarist is gaining something from that guitar maker then I don?t trust that company, It should be like completely unbiased, I think that is the kind of advertisement I listen to. ?.

   Others suggest that advertisement must motivate for healthy diet and sport; ?if it reminds me to do stuff like do more sport or eat healthier or anything that has a good purpose?

8. **Other categories**
   Many other categories were also extracted for a good advertisement like Goal of advertisement, Audience, Purpose and motivation, for more detail look at appendix A.

Bad Advertisement

The bellow categories were derived from the interviews that make an advertisement feel or look bad, and we should not avoid using in advertisements.

1. **Style**
   There exist different styles that advertisement makers follow but texts or photos are blinking; ?try not to use anything would be blinking okay because that is really annoying okay because even so if you are not looking at it is still effecting?. Using of mismatched colors in advertisement is certainly a bad idea; ?color mismatch does not attract the eyes?.

2. **Annoyance**
   Most of the responders felt annoyed by almost all advertisements because they contain some sort of similar features like

repetitions; ?it should not be like repeating itself over and over and over again?, ?I like advertisement apart from watching it again and again?, ?Hmm if I see the same advertisement again and again that is annoying.
? Other feature is destruction, which does not allow a person on focusing on something; ?Not just like something popping up in front of your face?, ?for example in middle of the serial or a movie that i am watching and an advertisement that is I don't like because it makes me destructed now I just can't focus on things for view minutes you have to leave what ever you were?

3. **Motivation**
   Advertisement in general motivate people in their own way to attract customers, which people make not like it, for example sudden appearance of something in the screen or what users do not like to see but they are forced to see; ?usually you are forced to see them because you are watching something or doing something and suddenly it comes and it disturbs you?, ?it is trying to convince me of something only for to consume or buy and then I mean I don?t? want?

4. **Content**
   Some advertisements exaggerate on their products or even say lie; ?it is like magnificent thing and nice pen okay and then it is just a pen, okay?, ?They are all lies?. Showing inappropriate content are heavily disliked; ?whenever I go and access the Internet okay? A lot of advertisement comes to my face and most of them are inappropriate.
   Stuffs like that I don't like them at all?, ?for example some perfume ad which would the a woman in a very degrading position or for example mocking someone believe or something just to catch the attention that is probably to offend people that is what would annoy me a lot. ?. The use of ugly and old people is also not welcomed.

5. **Duration**
   Long lasting advertisement are always boring and waste of time, most of the responders said that they would prefer short advertisements.

6. **Other categories**
   Many other categories are also extracted from the interviews like location, Confusing advertisement, Controversial ads, amount of ads and types of ads that were not liked by responders. For more information see Appendix B

3.7 Discussions

3.8 Conclusion

Chapter 4

Advertisement decision

4.1 Introduction

As a computer scientist, there had been no chance to create an advertisement but have always been interested in advertisements; Advertisements are always unique and attractive to watch, at least for the first time. Therefor there is a need to conduct a study with the people who have been working in advertisements for long time and have experience and professionalism in related domain. The people working for Bauhaus-Walk as tour guides understands much more about the topic than anyone else, because they run the program, know tourists, understand tourist?s Interests and many more.

Focus Group methodology has been selected to have more insight on the deciding an Interactive Advertisement for the Bauhaus-Walk program. Focus group is a small group usually between six up to ten participants joint together in comfortable place usually a quite room, to discuss on a specific topic domain and share ideas. As described by Jenny Cameron [9] ?Focus groups can be exhilarating and exciting, with people responding to the ideas and viewpoints expressed by others, and introducing you, the researcher, and other group members to new ways of thinking about an issue or topic ?.

Focus group was conducted to get more detailed information about Bauhaus-Walk program and its content. This was mainly meant to understand many aspects of Bauhaus-Walk and collect the required parameters for designing the interactive advertisement. Because of time limitation in each session two sessions were arranged in two different dates to cover all topics and discussions. This chapter describes the main theme and goal for focus group and reports all the processes that were taken to establish the focus group, how participants were invited and what was being discussed and more focused on each session. How the was gathered and what technique were used to analyze them. The document presents all the findings and outcomes in details and related discussions and conclusions.

4.2 Goal

To design the interactive application advertisement it was required to collect the bellow information from the Bauhaus-Walk members. So that we develop a very relevant advertisement that could speak by itself for Bauhaus-walk program and at the same time it should be entertaining and funny for the passers-by that want to play with advertisement and remember the experience for long time and as a result be motivated to take the tour. There we would need to understand many aspect of Bauhaus-walk as listed bellow in short.

1. Target Group
2. Existing Bauhaus-Walk advertisement mean.
3. Peak times in the year for Bauhaus-walk tour.
4. Tour routes.
5. Famous Locations included in the tour.
6. Important aspects of Bauhaus-Walk from their point of view.
7. Suitable Interactive advertisement Theme.
8. Content of advertisement.
9. Engagement techniques in advertisement.
10. Suitable Gesture and Mobile techniques.

4.3 Methods

4.3.1 Participants

The focus group in this study consists of six participants including the Moderator, which will be me (Hasibullah Sahibzada). They will be divided in sub groups based on their professionalism, position to be able to discuss among each other comfortably, if possible or will be considered as only one group for discussions. The participants were invited through Doodle [10], where a varieties of date slots are available to select, and can see other participants joining time and date. A short introduction of the focus group is described. The complete focus group session will last about 90 minutes

FIGURE 4.1: Focus group participants

4.3.2 Focus-Group Environment

The focus Group was held inside the DBL building ground floor, where we had enough space to make a group circle. Participants were offered coffee and biscuits at the beginning or end of the session.

FIGURE 4.2: DBL meeting room.

4.3.3 Warm Welcome and Introduction

Participants were warmly welcomed and asked to feel comfortable by having biscuits and coffee. I introduced myself and asked them to introduce themselves. This helped to understand each others professional background and interests.

Brief introduction on advertisement and interactive advertisements were given to participants to understand the possibilities of existing technologies and the use of them in advertisement field. Some interactive advertisements were introduced with their relative interaction techniques. The agenda and goal of thesis was also described to have a wide picture of what is going to be done till the end of this semester.

4.3.4 Discussion session

After introduction, discussion started on bellow mentioned questions. Because there was limited number of participants I could not divide them in to groups to discuss in detail and do comparative study among the groups. They were given sheet empty big papers to draw and write what come in their mind while discussing to be able to keep track of their thoughts and be easy to generalize the opinions. During the discussion Patrick Tobias Fischer was asked to write notes on the discussion.

4.3.5 Consent Form

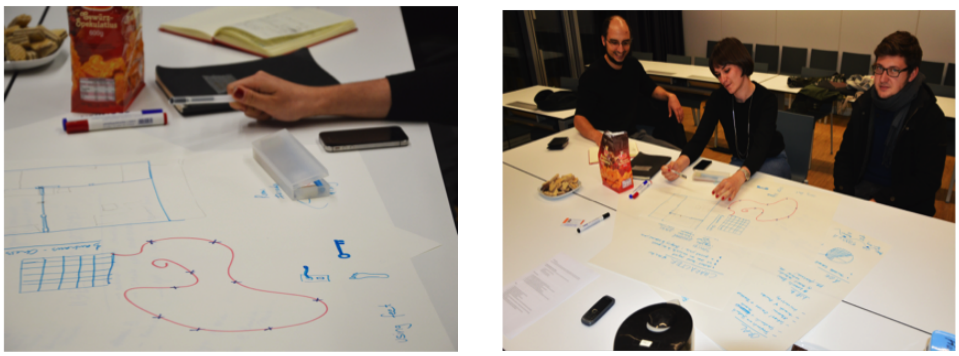
Each participant was asked to sign the consent form to make sure they agree to participate and video recorded.

4.3.6 Topic Questions

1. What kinds of advertisements for Bauhaus-Walk are there?
2. Who join the Bauhaus-Walk program in general?

3. What could be a suitable theme of Bauhaus-Walk for the Interactive advertisement?
4. What would be the content of the advertisement?
5. How to motivate passer-by to be engaged with the advertisement?
6. How to engage passers-by with the advertisement?
7. What kind of Gesture and Mobile Interactions should be used?
8. How to motivate passer-by to join the actual Bauhaus-Walk tour?
9. Is there anything else we need to discuss on Bauhaus-Walk Advertisement? Any new angle?

I was responsible to carry on the entire discussion and Patrick Tobias Fischer was doing the note taking during the discussion. He noted important information extracted from our discussions so that I could later look at them beside that the entire discussion was also video recorded for analyzing.



(A) (B)

FIGURE 4.3: A: Drawing information in to sketches B: Group discussion.

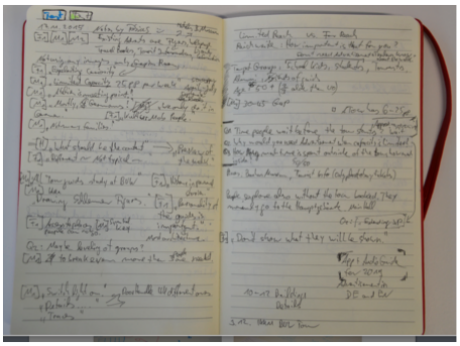


FIGURE 4.4: Observation notes

4.4 Session two

Based on the first focus group?s discussions and the participant?s nice ideas, which are mentioned in finding section, two different paper prototypes of advertisement were made to dig more in detail. The participants were given the prototypes to play with them and explore their own way of designing the advertisement and interaction.

First prototype was Bauhaus-Chess, This prototype was chosen because of the historical background of this amazing chess game that was developed by Josef Hartwig [11] long time before. The shape of the chess piece defines the movement direction of itself on the chessboard. The goal was to show the chess on the advertisement screen and show one piece at a moment and let users to move the chess in the right direction by some sort of gesture.

Second prototype was to show map on the screen and possible interactive famous places, the interaction idea was to map physical movement of a person to the virtual movement inside the advertisement and let them to explore the target places by reaching their silhouettes on them. Maximum three places were to be explored by one person.

The basic ideas were designed to help the participants to think more and come up with some more ideas and at the same time should be in the context of Bauhaus-Walk program.

1. Short introduction was given on Interactive Advertisement thesis.
2. Short motivational video of interactive advertisement was shown.
3. Two paper prototypes that are mentioned above (Bauhaus chess and Map) were introduced.
4. Possible interactions were shown to them.
5. Participants were asked to comment on prototypes and come up with new ideas and interactions.
6. They were asked to design their own prototype.
7. Integrate some fun ideas with prototypes.
8. What contents should be included in the prototypes.
9. How to gather and collect those contents.

4.4.1 Prototype and discussion pictures

(A)

(B)

FIGURE 4.5: A: Drawing information in to sketches B: Group discussion.

(A)

(B)

FIGURE 4.6: A: Drawing information in to sketches B: Group discussion.

4.5 Data Gathering

The entire session will be voice or video recorded, so that I do not forget some of the important parts from the discussion. Along with that photos and sketches and notes will be collected too.

4.6 Conducting the Focus Group

Taking all the situations mentioned I as a moderator would follow the bellow rules.

- Listen sensitively for participants.
- Be neutral.

- Manage the entire study flow.
- Follow up the topic questions.

4.7 Analyzing

The design of this focus group was done in a way that could be very easy to be analyzed and generalized in very little amount of time.

- Participants were asked to draw sketches and write on the given big sheets of paper on the topics they were discussing.
- They could make summary of their discussion on the paper so that they and we fully understand the topics.
- Tobias Patrick was taking notes to cover up everything we discussed.
- All the sessions were video recorded for full detailed analyzing.

All of the above resources were analyzed by going through each of the sketches they drew and each notes that were written and all the videos were seen many times to check if some ideas were not clear in the sketches or notes and to have a final image of the discussions.

4.8 First Session Findings

4.8.1 Reason of Bauhaus-Walk and advertisement

Bauhaus-Walk is a project that is run by university students to show more about Weimar and Bauhaus culture to the world by giving small tours to group of maximum 30 people. The tour shows studying conditions of the university and students, living style of people and giving excursion to historical places.

Guides are from different backgrounds like architecture, urbanism and design and each of them could show various aspect of Bauhaus by their own stories and inter-relate the stories with the facts and then connect them to the places in Weimar. Most important for the guides are not just the buildings but also the small details inside the building that most people do not focus, guides want to be the voice of those unspoken stories for the tourists.

Current existing advertisements for Bauhaus Walk is through different mean as listed bellow.

1. Web Bauhaus Walk is advertised briefly in the Bauhaus University Weimar [12] webpage and in Weimar tourist information page [13]

2. Print Bauhaus Walk program are advertised in flyers and leaflets at different locations, like they could be found in tourist information center, Bauhaus Museum, calendar of Weimar and in travel leaflets.

3. Books Bauhaus Encyclopedia has mentioned this program too.

4. Oral Mostly the people who have already taken the program once publicize it and they let their friends, relatives and family know about it.

As stated above Bauhaus-Walk already has many ways of advertising and at the same time an the making of interactive advertisement was proposed by me there are many reasons that why Bauhaus-Walk would need advertisement as stated bellow.

- Extend the current situation.
- Create new audience
- Get more people on regular basis.

4.8.2 Target group

Most of the people who join the tour are from elder people ranged between 45-65 years old and others are adults and children. Adults mostly learn about the program trough web and the elders learn from the tourist information centers and books. Most of the participants are German and do not understand English language.

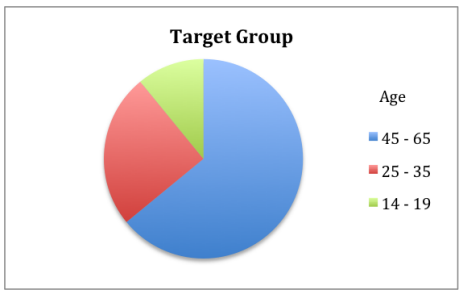


FIGURE 4.7: Target Group

4.8.3 Peak Tour times

In Average 5000 people take the tour each year. April, May, September and October are the peak months that people take the tour because of the weather condition to be good the amount of people per tour is about 25 people, but in winter there are very few people joining the tour and the amount of people per tour is up to five to six.

4.8.4 Possible advertisement location

1. Tourist Information. This is a good place to put Bauhaus-Walk advertisement because
   - Random visitors from different places and cities come here and want to know about Weimar in general.
   - Heavy traffic of people.
   - This is the only place to get Bauhaus-Walk tickets in advance.
2. Bauhaus Museum. This could be another good place, but people have to pay to enter to this museum, so there will be limited people but who
   - Are very interested in Bauhaus.
   - Likely to go on tours.
3. University main building. Main university building is a more open place for all visitors; there are many factors as stated bellow.
   - People from different background.
   - People from different age, more youngsters like students.
   - Interested people in Bauhaus.
   - It is close to starting point of Bauhaus-Walk tour.

4.8.5 Content of advertisement

Participants pointed on very important thing about the content of advertisement from which the advertisement got clearer and clearer and could be categorized in to many different aspects of Bauhaus-Walk.

1. Objects. There are objects that are introduced during the tour for the tourists; A good idea would be to show those objects on various locations on the map that they belong to.
2. Stories. ?Probably our walk is to sum it up, consists of stories we are actually telling stories, not just talking about history, not just about facts but our own personal stories and stories that were told by former students, so we are kind of raping the history in to personal stories, and we want to say that hay, we are students from different faculties and we want to tell the stories by different ways, and that is not a bad thing, because based on historical fact that there has not been the same Bauhaus in Weimar, there has been so many different teachers and students and they all had a different idea that what Bauhaus could be

and I think we still kind of incorporate that the fact that no Bauhaus tour would be the exactly the same like the others before. ?

3. Histories.
4. Facts.
5. Places

4.8.6 Interaction of advertisement

Based on the examples that were shown at the introduction for the participants, they like hand gesture and some other and came to the bellow possible techniques.

1. Hand gesture Interaction. The bellow two kinds of interactions were discussed each containing different contents.

   - Hovering:
     By showing the Bauhaus map on the screen with the most important elements on it, the users should be able to look at the items by moving their hands on top of it. The items could change its status when hovering for example if there is a light object shown by hovering it should turn on or something like that. There could be famous places shown on the map that Bauhaus-Walk tour focuses most, and by hovering the hand some more information like a picture or a related to that places should be shown.
   - Performing a specific gesture:
     There are many objects that have specific characteristics and thso details are described in the tour, so the idea was to bring those object in action and allow users to perform those actions, one idea was to show a 3D environment and the user should be able to perform a gesture like opening door handle, lighting up a lamp, opening a lock by a key or play with Bauhaus SCHACHSPIEL chessboard to navigate the correct movement of the chess piece on to the screen, or other different gestures for specific tasks.

2. Body Interaction Bauhaus-Walk is known from its name that it is all about walking to different historical places therefor there was the idea of giving short virtual walk on the screen by moving the user?s body in front of the screen and exploring some sights.

Note: See appendix C for sketches.

4.9 SecondSession Findings

The second session was held after a week and half, with only two participants other participants could not come because they were busy with their studies.

4.9.1 Prototype discussion

Participants understood both prototypes along with their mobile interactions concept, and liked both prototypes in terms of interaction and idea. And commented as bellow. I categorized their comments in two positive and negative sections as bellow.

Chess-Game

- Positive points:
  - The idea is very nice, because many of the visitors are above the age of 40 and they may be familiar with this game.
  - Easily understandable by looking at the shape, because shape defines the movement.
  - Suites best for Bauhaus Museum because, there is the original chess board of Bauhaus but people are not allowed to touch the game, by bringing this type of interaction, people will have a live experience with the chess board and play around with it and understand it.
- Negative points:
  - Very difficult to understand by people who have not played chess before or have not seen this special type of chess.
  - Players could make a lot of mistakes while moving the chess piece.
  - The idea does not really fit to the Bauhaus-Walk program.
  - It does not fit the places that are being shown in the tour.

Map-Game

- Positive points:
  - Map game idea fits a lot to Bauhaus-Walk tour.
  - Portraits the idea of walking by body interaction.
  - Easy interaction just by moving body and navigate inside the screen.

  - Understandable concept by moving on to different places and exploring them.

- Negative points
  - Possible moving difficulties in a given space.

Based on the discussions, the Map-Game was accepted for further discussion and Chess-Game was exploded for further discussion because of the crucial negative points.

4.9.2 New ideas

- Content of the game should be very clear and accurate and they should show the places where we provide tour. We do not have many places to show and there may be maximum three places.
- Integrating some fun factor to the game and interaction like by showing a famous character face on top of the silhouette head position. And giving a kind of funny movement.
- Giving opportunity for multiusers to play interactive game, like for example if there are two people standing in front of the screen, the tasks will be divided among them by locking one?s silhouette or interaction and allowing the other to perform the task.
- Defining the task by the defined character or by color of the body or by random.
- Showing funny map, which was made many years back of Weimar city.
- Popping up interactive objects (houses) on the screen so the users understand that they are interactive.

4.10 Conclusion

The conduct of the two sessions of focus group was very helpful in a way that it was held very intensive that helped to understand in general the whole about Bauhaus-Walk program tour and especially about the tour guides that what they think about Bauhaus-Walk and what are the most important things that could be discussed and advertised for Bauhaus-Walk. All the relevant mentioned questions for the design and interaction of advertisement were answered and discussed. As a result of this focus group I would purpose one interactive advertisement prototype that should be able to cover all the aspects of advertisement and concept of Bauhaus-Walk that was discussed in this focus group and the findings from attraction attention and last from findings from people?s interviews.

Chapter 5

Advertisement Low fidelity prototype

5.1 Introduction

During the last focus-group discussions and all gathered data from attraction attention study and interviews, the first paper prototype of interactive advertisement was decided to be created. This document describes the advertisement application requirements, lists all functionalities along with its use cases and defines the target group that this application is going to be made for.

Paper prototype for Bauhaus-Walk [14] shows two different interactions (body and mobile) and tries to give an overall general picture of how the advertisement would look like after development, but to test this paper prototype, this document purposes a test design for complete evaluation of all important functionalities.

5.2 Requirement gathering

The bellow mentions Bauhaus-Walk advertisement?s all functional and non-functional requirements and what system requirement would be required at the time of development.

5.2.1 Functional Requirements

1. Detect multi User.
2. Assign a character to the user.
3. Assign a task to the user.
4. Respond to each user interaction.
5. Show advertisement text.
6. End the interaction.

5.2.2 Non-functional Requirements

1. Performance
   This is a very important requirement that should be wisely done. Response time should be very fast in both gesture and mobile interaction so the user could see the reaction quickly on the screen.

2. Scalability
   The interaction is scalable for multi-users at the same time for body interaction and mobile interaction.

3. Availability
   Kinect camera should be functional during the experiment for people detection, Access point should be running so that it could provide network access to users.

4. Usability
   The advertisement interaction both mobile and body should meet all criteria of usability.

5.3 Personas

The bellow personas are made based on focus group findings that most of people taking tour are elder people, which builds up our primary type of persona and secondary type persona would be young age girl as described bellow.

put the persona table here

5.4 Use case diagrams

put good use case diagrams

5.5 Design study

Bauhaus-Walk interactive advertisement consist of two elements, first is the screen that the users see the reaction and advertisement content, and the second is the means of interaction which are body and mobile, to design the test first of all the paper prototype should be capable to show both of these elements to be applicable to the real scenario later.

Actual advertisement screen paper prototype would be made along with its all interactive objects and as well as mobile paper prototype for user interaction would also be printed we would not need any paper prototype for gesture interaction. I as an experimenter would

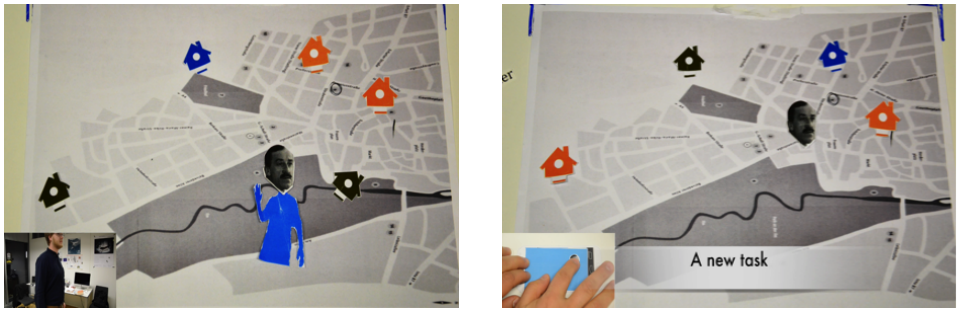
simulate all user actions on the display even actions like movement of silhouette or character face

(A) (B)

FIGURE 5.1: A: Screen paper prototype. B: Mobile paper prototype.

5.5.1 Procedures

The test subjects will be given basically one task by the interactive advertisement screen and by user body movement their location on the paper screen would be changed and checked for possible interactive object so that the content could be changed and for mobile interaction the subjects will be instructed to think-aloud while interacting with mobile interface so that examiner be able to change content on paper screen.



(A) (B)

FIGURE 5.2: A: Body interaction. B: Mobile Interaction.

5.5.2 Subjects

Five participants will be will be invited to experience with the paper prototype.

5.5.3 Evaluation

The evaluation purpose is to find possible issues as listed bellow with interactive advertisement.

1. Confusing events
2. Unclear events or interactions.
3. Misconception of a function.
4. Task confusion.
5. Understandability of advertisement goal and contents.

5.5.4 Hypothesis

Hypothesis are divided for each individual interactions like mobile and body.

Body Interaction

- H1: Users understand and react to the Call-to-Action approach.
- H2: Users recognizes the character assigned to them.
- H3: Users understands the tasks assigned to them.
- H4: Users can explore locations by moving their body in physical space.
- H5: Application raises alerts to specific user actions.
- H6: Application motivates participants to continue playing.

5.5.5 Mobile Interaction

- H1: Users understand the Access Information shown on the board.
- H2: Users open the controller website by scanning QR-Code.
- H3: Webpage application produces alerts with in correct user input.
- H4: Users rotate the mobile phone to start game.
- H5: Users understand the task.
- H6: Users can navigate the character by moving the face in mobile.
- H7: Screen application produces alerts for incorrect location.

5.6 Data gathering

The process of data gathering was as bellow, the methods are designed in a way to fully answer the research questions and the defined hypothesis.

5.6.1 Video recording

Each participant was video recorded for both body and mobile interactions for later observation and analyzing purpose.

5.6.2 Direct observation

Participants were observed during the interaction and also asked about what they thought at that moment while interacting. When participants could not perform a task then they were asked exploratory questions on how would they do the task naturally.

5.6.3 Think aloud

Participants were asked to read their mind while interacting with the prototypes. This helped to understand what they thought about a specific interaction at that moment.

5.6.4 Interviews

After both paper prototype interactions were finished, a brief interview was taken to further learn about the interactions they did and get other user comments and feedbacks for the prototypes.

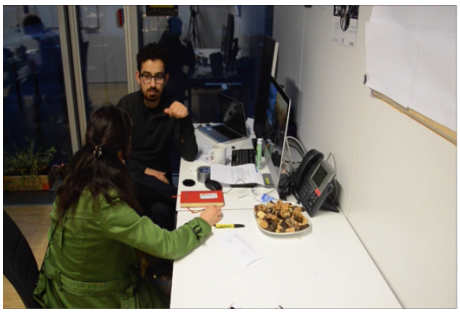


FIGURE 5.3: Participant during interview

5.7 Data Analyzing

The important part for analyzing the data is shaped based on the defined hypothesis at the beginning; the bellow procedure was followed to best answer our open questions and to be able to evaluate both paper prototypes.

5.7.1 Usability issues chart

5.7.2 Body Interactions usability chart

put the body usability chart

This chart was created to list all the possible, mistakes, misunderstandings and confusions for each of the interactions carried by participants, these lists were categorized under usability problem. This error chart was made during video observations, flow of the tasks were observed and also the words they used during interaction from which confusion, frustration and misunderstandings events were recorded.

Looking through all the usability problem chart of each participant the bellow single chart is being created, each category is separately listed with the possible problems.

Mobile usability chart

The bellow chart lists all the possible issues with mobile interaction.

put the mobile usability chart

5.8 Hypothesis decisions

The hypothesis those were defined in the design study, from which some of them are accepted and rejected based on the above findings.

5.8.1 Body Interaction

- H1: Users understand and react to the Call-to-Action approach.
  [Accepted]
  All of the participants understood call-to-action and reacted to it quickly as soon they read it.

- H2: Users recognizes the character assigned to them.
  [Rejected]

  All the participants did not understand the character which was assigned to them, This happens when the participants do not have background to the related history that should know the character, It would be better to use someone who is very famous and is known to most of the population and different cultures, using very specific character is a bad idea. Users gets confused. At one occasion even an architect student who must know that face, but unfortunately did not recognized him.

- H3: Users understands the tasks assigned to them.
  [Rejected]

Most users did not understand the task in the sense of the defined character, but they did understand that they should walk and explore locations.

- H4: Users can explore locations by moving their body in physical space.
  [Accepted]
  As soon they understand that the silhouette is them and projected on the screen, then they did the task by moving them selves physically, except one participant who did not understand until the observer gave him hint to move his self physically in right or left.

- H5: Application raises alerts to specific user actions.
  [Rejected]
  The application did not raised error for user?s specific interactions like if the user was out of the screen or very close to the screen. Most of the participants raised their hand up, or turned around, there was no alerts for the participants.

- H6: Application motivates participants to continue playing.
  [Rejected]
  When the users explored the first location, they were excited and tried to see the other places, but all the locations action was predictable by the participants and nothing new was happening, participants expected more from their interactions to be more excited to play the whole game. They did finish the game because they were told so.

5.8.2 Mobile Interaction

- H1: Users understand the Access Information shown on the board.
  [Accepted]
  The participants were not shown the phone prototype at first, they were only shown the display and were asked to react based on the messages or what ever the users comprehend, after reading the Access information they asked for the phone prototype and then the phone prototype was shown to them to interact.

- H2: Users open the controller website by scanning QR-Code.
  [Accepted]
  Four of the participants understood the use of QR-code and from which two of them scanned it and other two typed the IP address, and one participant did not understood the use of QR-code.

- H3: Webpage application produces alerts with in correct user input.

[Rejected]
The webpage did not produce error at many occasions while filling the form like, what happens when cancel button is pressed, or when the game finishes the application does not alert user to replay or leave webpage.

- H4: Users rotate the mobile phone to start game.
  [Rejected]
  Only two of the participants rotated the phone but the rest of the participants tapped on the icon and tried to rotate the icon in the screen instead rotating the whole phone.

- H5: Users understand the task.
  [Rejected]
  This happened because all of the participants did not recognized the face and did not know where are his locations.

- H6: Users can navigate the character by moving the face in mobile.
  [Rejected]
  Four of the participants touched and tapped the face shown on the mobile phone many times, they expected that something will happen after they touch the character like a dropdown list would appear to edit it, but one of the users drag it and saw the reaction on the screen.

- H7: Screen application produces alerts for incorrect location.
  [Accepted]
  The incorrect locations that were explored by the participants were given an alert message.

5.8.3 Interview analyzing

The interviews were transcribed and color-coded for more accurate interpreting participant?s expectation and reaction upon the paper prototypes. See appendix B.

5.9 Conclusions

Evaluation of low-fidelity prototype of advertisement was very helpful to understand possible design problems and interactions that could have been a headache if had identified at high-fidelity version.

First, the body interaction was easily understood by most of the participants, this type of interaction is more natural and can be done by any kind of participant without having any technical expertise. Two most important interactions in this technique was the call-to-action which approached participants to come near to the screen and other was to explore the locations using their body position in

physical space. This low-fidelity usability testing suggests bringing changes for the next high-fidelity version of the advertisement. The changes would be to remove the character assigning for individuals, improving alert messages for different user actions, improving task description and integrating features to increase interest rate for participants to be engaged with the advertisement.

Second, participants also appreciated the mobile interaction, but they were not so convinced for the usage because of many issues like logging in web application first, then navigating the face character. There was no clear instructions for how to navigate the character, and what will happen if there are many participants playing at the same time, where all of the participant would have the same face and they would get confused that which one is being controlled by their controller and lastly, it was unclear that what happens in web application when the interaction is over. This usability testing helped us to identify the mention usability problems and would bring changes for the new high fidelity version that would solve the current issues.

Third, The advertisement text, which was shown at the end of interaction, did not brought user?s attention, it would be better to make a short video for the next prototype that could bring users attention to see the advertisement. After the video advertisement gets over the attraction phase starts again.

Finally, all hypotheses that were accepted or reject will be taken in to account from which new decisions for the high fidelity version will be taken, this version will overcome all the issues discovered until this stage. Participant?s recommendations and feedbacks have also much value and would be considered in the development phase.

Chapter 6

Advertisement High Fidelity prototype

6.1 Introduction

This usability testing is to understand whether both mobile and body interactive advertisement would function in the public or not, what are other difficulties, confusions, common mistakes, and behavior toward the applications. As the application would be in public crowd and not just one person would pass by the screen we are also interested that how the application deal with many users while interacting and observe multi user behavior in front of the screen.

6.2 Interactive Advertisement

Description of both mobile and body interactive advertisement

6.2.1 Mobile

Features

Flow chart

6.2.2 Body

Features

Flow chart

6.3 Research questions

In this part of the study the bellow research questions should be answered after the study is conducted.

6.3.1 Body and Mobile interactions

1. How fast do users understand Call-to-Action?
2. How fast participants react to the Call-to-Action?

3. How easy participants understand the interaction task?
4. How long participants take to finish the interaction or visit all target locations?
5. What are the major usability flaws that prevent users from advertisement interactions?
6. What is the difference between Mobile and body performance.

6.3.2 Video advertisement

1. Do participants understand about the content of advertisement?
2. How many elements of display can participants recall after their first interaction?

6.4 Test Design

Within-Subject Design was chosen, in this test 11 participants were asked to experience with both Body and Mobile Interactions, The interaction sequences were vary for participants in order to counterbalance to be able to limit the effects of learning transfer.

TABLE 6.1: Sequence of the task

Participants	Interaction sequence
P1	Body, Mobile
P2	Mobile, Body
P3	Body, Mobile
P4	Mobile, Body
P5	Body, Mobile
P6	Mobile, Body
P7	Body, Mobile
P8	Mobile, Body
P9	Body, Mobile
P10	Mobile, Body
P11	Body, Mobile

6.4.1 Participants

12 participants were invited for the usability testing; from which five participants were female and seven were male, most of the participants were from computer science background and were familiar with mobile and Kinect camera, one participant was not familiar with QR-code.

6.4.2 Task

Participants were not told about any specific task, they were told to explore the system by their own and understand what to do, To avoid different outcomes participants were told to continue interaction until they encounter the very first stage of the application. So the tasks for participants were to start from initial stage of the interaction (body /mobile) and continue until reach again the initial stage.

As for body interaction no extra device was required to accomplish the task, but for mobile interaction a mobile phone was required, Participants were not told that the use of mobile is required unless participants used their own phone or asked for it from us.

Call to action understandability

To determine this, the participants will be asked to approach the screen and perform what is relevant as soon as possible, The participants will not be told that the screen would ask them to do something, The participants should understand the task by the call-to-action method used in both interaction methods. The duration from approaching to screen and triggering the game would be considered as time taken to understand call-to-action.

Body interaction application can count how long does it take for the user to trigger the game, but for mobile interaction there is no pre-counting for each individuals because mobile users and Kinect camera are two separate technologies that is very hard to know which user hold the phone, therefor we used manual timer and asked the participant to think-aloud anything he understood about the task.

Task understandability

Participants should think aloud that what they will do after reading the task.

Task completion time

Task completion time is measured from the time game starts until the game ends.

Content of Advertisement

To check if the users understand the content of advertisement while interacting and while advertisement was shown, participants will be given paper and pen to write down words that they could recall from entire session.

Usability issues

Each participant was given five minutes to interact with advertisement after one another and questions were asked regarding the issues they faced. The usability issues are all observed by the moderator at the scene and later while watching the recorded videos. To understand better each interaction is separately listed as bellow.

Any thing, which was confusing and unclear for the participants, committed errors and misunderstood events, which were done by participants, will also be counted as a usability issue. ?

6.5 Data Gathering

A very focused

6.5.1 Performance data

The bellow is the performance measures data that will be gathered after successful conduction of the test.

1. Duration of Call-to-Action understandability.
2. Duration of the reaction to Call-to-Action
3. Task completion time.
4. Count of usability issues.
5. Count of assistances that were asked by participants.

Each individual?s performance with both mobile and body interactions will be shown in bar chart, this data could also be used to check for efficiency of the interactions techniques too.

Mean time value for Call-to-Action understandability, game triggering, task completion and whole interaction time will be computed for each interaction techniques. Along the mean time the confidence interval is also taken in consideration.

6.5.2 Preference data

The preference data, which is the measures of participant opinion or thought process, like the think-aloud each participant performed, or the answers for the interviews and their feedbacks.

6.5.3 Think aloud quotes

Think-Aloud quotes are noted during the video observation, these quotes are important to check at which point in time users understand about the interaction and tasks. It also helps to analyze their reaction and feedbacks toward the tasks being done.

6.5.4 Interview transcripts

All the interviews are transcribed and color-coding technique is applied to analyze and comprehend different aspects and categories from the defined questions.

6.6 Findings

6.6.1 Mobile Interaction performance

The bellow chart shows four different aspects when the mobile interaction happened per participants. The x-axis shows duration in seconds and y-axis shows each participants and the bar consists of four parts as bellow.

- Understand Call-to-Action,
- Trigger Game time
- Understand Task time
- Game time.

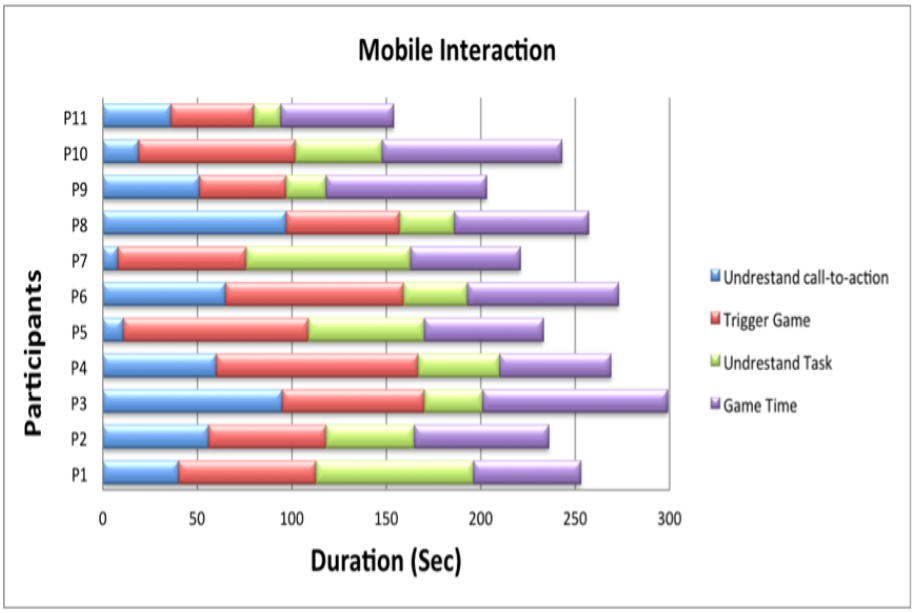


FIGURE 6.1: Each participant's Interaction aspects performance are shown.

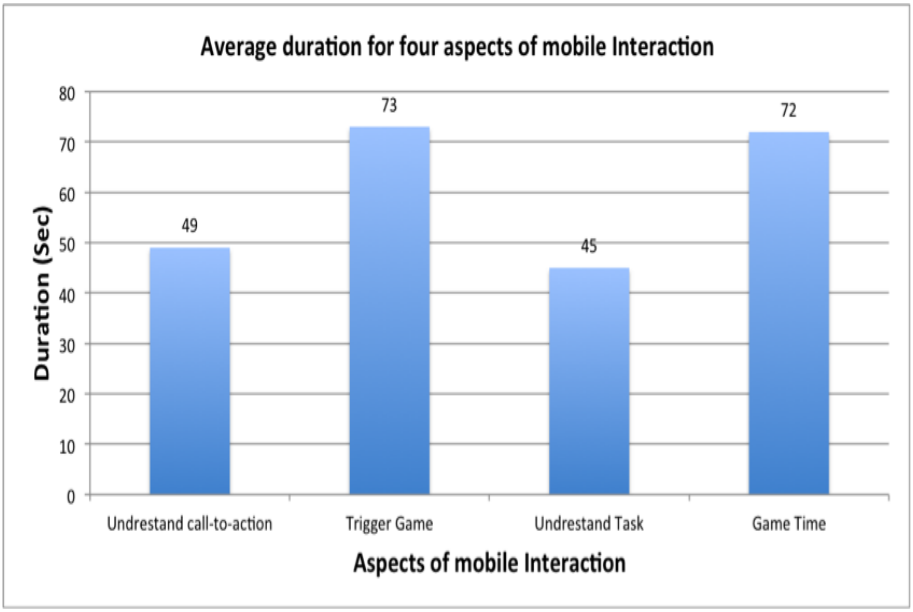
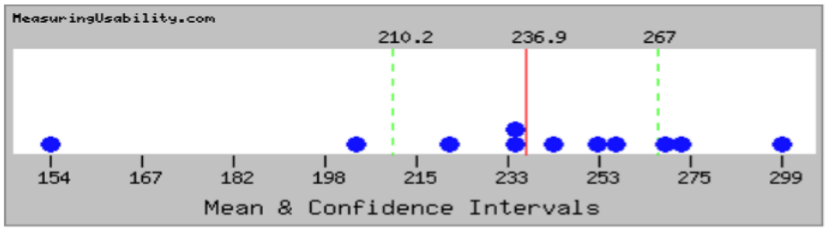


FIGURE 6.2: chart that shows each aspect with respect to duration.

As can be seen above participants took longer time approximately 240 seconds for whole interaction time. Participants took 49 seconds in average to understand how access the system (Call-to-Action), After participants understood what to do it took 73 seconds in average from taking their phone, opening the web page, logging and starting the game, it took 45 seconds in average to figure out how to do the task and 72 seconds to complete the task.



Results

95% Confidence Interval:	(210.2, 267)	Geometric Mean	236.89
		Median:	243
Arithmetic Mean	240.09	Observations	11
Arithmetic StDev	38.82		

FIGURE 6.3: Confidence interval for Mobile interaction all phases duration

above chart is generated in an online tool [1] with a confidence interval up to 95% for complete interaction time for all 11 participants; the confidence interval is between (210.2, 267) the chart shows the Arithmetic standard deviation to be up to 38.82 seconds, Arithmetic Mean to be 240 seconds

6.6.2 Body Interaction performance

This also shows four different aspects of the body interaction for each of the participants in the bellow chart, the whole interaction time is around 100 sec in maximum. And other aspects vary among the participants.

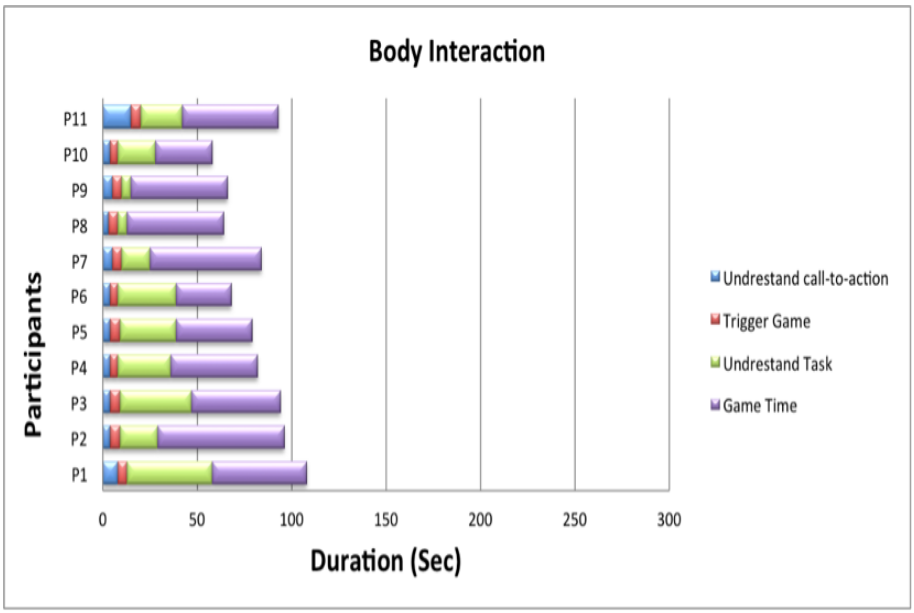


FIGURE 6.4: Each participant's interaction aspects are shown.

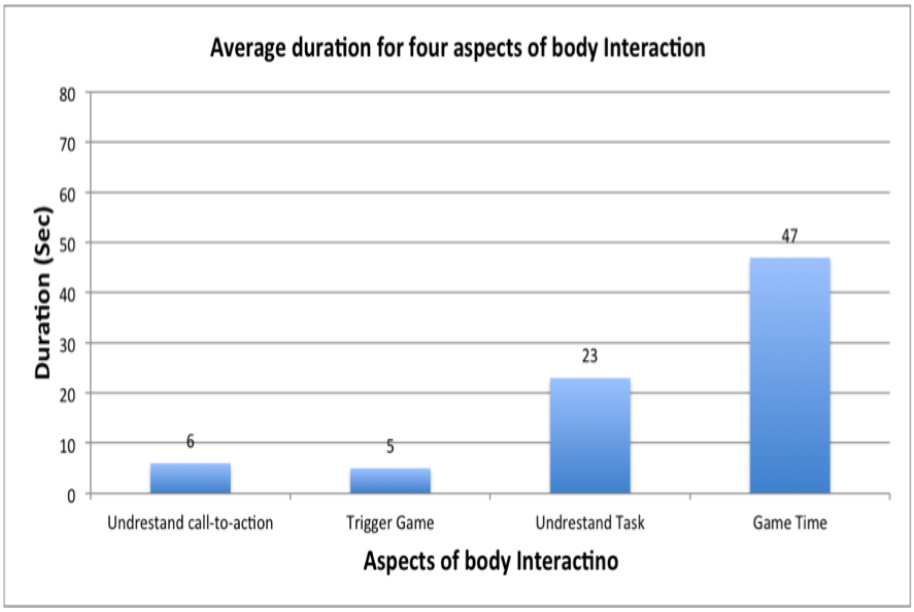


FIGURE 6.5: chart that shows each aspect with respect to duration..

As can be seen above most of the participants finished the whole interaction in approximately 81 seconds, which is much better than

mobile interaction. It took 6 seconds to understand Call-To-Action, 5 seconds to trigger and start the game, 23 seconds to understand the task and 47 seconds to complete the tasks.

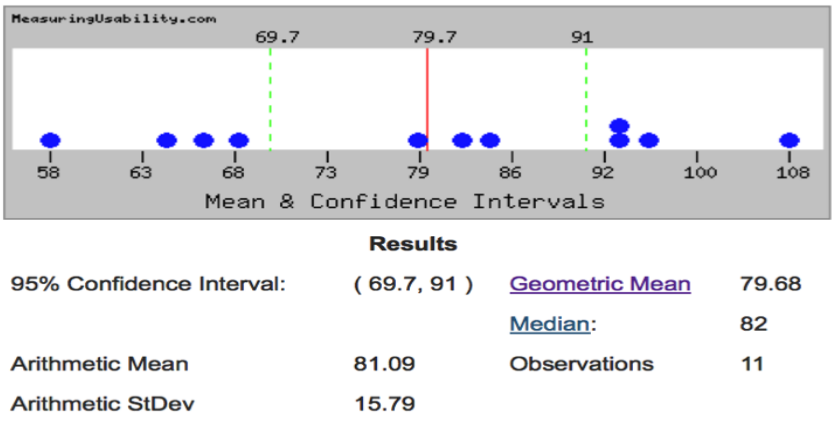


FIGURE 6.6: Confidence interval for body interaction all phases duration

The above confidence interval for body interaction is generated using the web tool [1] for whole body interaction time. In which with the confidence interval of 95% is between (69.7 ? 91) seconds, with the standard deviation of 15.79 seconds.

6.6.3 Body Vs. Mobile performance

As can be seen bellow body interaction seems to be much better than mobile interaction in terms of performance. The whole interaction time of body is less than the half of the time of mobile interaction.

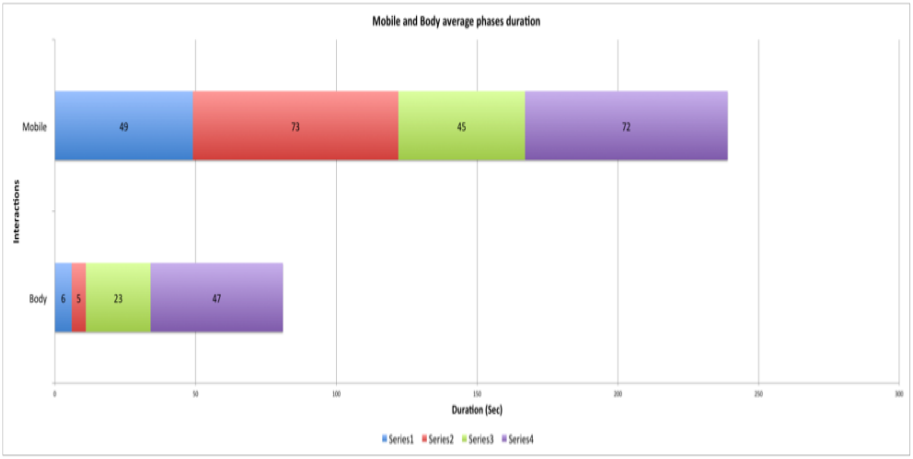


FIGURE 6.7: Comparison of body and mobile interaction performance

81 second is the mean value of the all participants with body interaction and 240 seconds is the mean value of the same participants

with mobile interaction. The bellow chart shows other comparison of aspects as described.

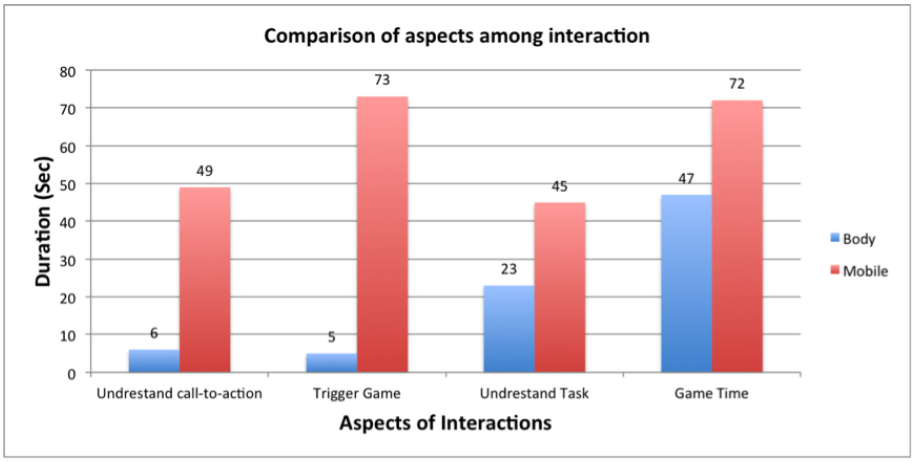


FIGURE 6.8: Comparison of the aspects of interaction among body and mobile

As can be seen in the chart mobile interaction took much longer than body interaction for each phase or aspects, participants understood very clearly and quickly reacted to the call-to-action ?To play, come near ? this is very easy and understandable by any person because of the action is very usual and easy compared to using mobile phone which is not expected at that moment and the users should read and see the information text to understand that requires more cognitive load than simple action of body interaction.

6.6.4 Usability issues

The bellow usability issues are gathered from participant while observing them during the interactions.

Mobile Interaction

1. Call-to-Action

   (a) At the first glance and moment most participants did not try to read the text on the screen, despite they were expecting other way to get quick information, but after many try with their body they had to read the information text. This could be because of many issues like (amount of text, text size and used icons).

   (b) The text information was being covered by the silhouette, if participants were far the text was readable but when participants would get near to the screen to scan the QR-code or read the IP address, the silhouette drawn by the Kinect camera would occlude part of the information text,

which resulted that participants should move a side to scan while facing toward the screen.

(c) Participants did not understand about the phone icon or the browser animation on top of it until they figured by themselves.

(d) IP address was complicated and took time to type in phone.

(e) The size of QR code was small.

2. Use of mobile phone.

(a) Participants did not expect at the beginning that they would use their own phone for the interactions; many times participants asked, ?Should I use my phone??

(b) Most participants did not read the instruction to tilt their phone and even if they accidently had tilted the phone, it would have not effected because by default the tilt-sensor of the phones were off because of power saving settings.

(c) There was no instruction to turn-on the tilt-sensor in mobile phone.

3. Login page

(a) Some of the participants were confused with the word Login, Participants thought that they would have to provide some sort of username and password to the system, and one participant reacted to this strictly and refused to login to the webpage using his phone.

4. Task description

(a) The task description was shown after the participants login to the system despite of whether the phone is tilted or not, Most participants missed to read the task description because they were busy with their phone to tilt it and by that time the description on the screen was gone.

5. Controller

(a) Not enough information for controller learnability even though there was a small instruction at the login page.

(b) Many participants complained when the cursor was repositioning itself in the center of the screen after positioning it to another place.

Body Interaction

1. Call-To-Action

   (a) Participants could not see themselves, after participants approach near to the screen, the silhouette was projected on the top of the screen or sometimes when participants were very close their silhouette was projected on top out of the screen image.

2. Controller

   (a) Participants tried themselves to find a way to interact, by moving their body; there was no instruction on how to control their silhouette.

3. Alert image

   (a) Alert image that shows a Hands-Up person lead to confusion at the moment where users were much closer to the system.

Advertisement video

1. The slides were switching fast.

6.7 Advertisement goal

6.7.1 Did users understand about advertisement?

The criteria for recalling the advertisement was that participants should recall ?Bauhaus-Walk? word and explain what does it do or if the interaction technique gave them an idea what could be the advertisement about, At best users can recall the date, timing and location of the tour program.

1. **Ad goal description**
   Therefor to find out this, when all participants experienced with the very first interaction technique mobile or body, they were immediately asked about the goal of advertisement, we wanted to know if the participants would understand about the advertisement at their very first try. All of the participants were speaking in English language and the advertisement interaction and the entire participants well responded as they finished the interaction. 9 participants accurately described the goal of the advertisement and 2 participants generally described about the goal, the reason behind that was advertisement video, which was shown in German language, later the video was changed to English for the rest of participants and they responded precisely.

2. **Ad-related elements recalled**
   After the participants described the goal, they were given a

piece of sheet to draw and write any element related to the interaction and advertisement with in five minutes. All the sketches drawn and keywords written by the participants were manually analyzed and counted

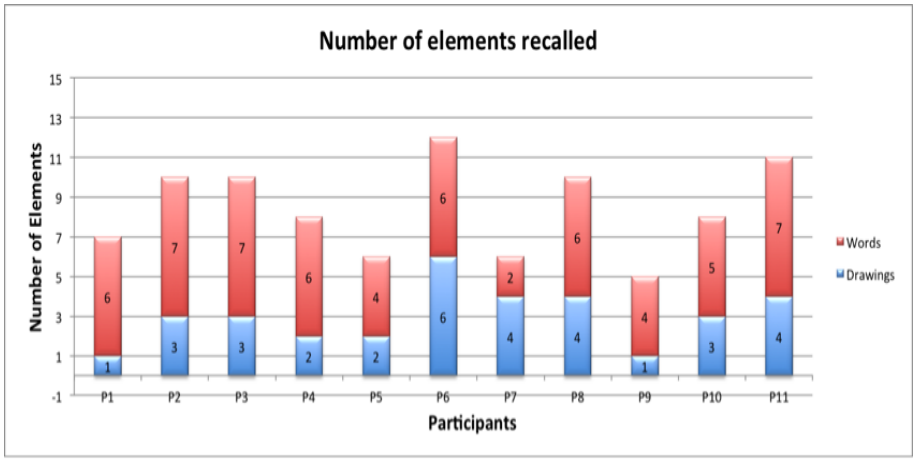


FIGURE 6.9: Number of words and drawings of the advertisement elements

6.7.2 Word cloud (Wordle)

All the keywords written in the papers by participants were collected in one text file and using an online tool [5] the bellow word cloud was generated.

FIGURE 6.10: Word cloud representation of the keywords

As can be seen, most key words that has high frequency are the ones actually related to the advertisement it seems most location

names that participants interacted with are recalled a lot like Bauhaus University, Haus-am-horn and others, The program name ?Bauhaus-Walk? is also in high frequency, and even the day of the event is mentioned too.

6.7.3 Key factors for advertisement understanding

1. **Game environmen**
   The game environment designed for the interactions had a major impact for understanding the advertisement goal, for example one of the participants replied ?I saw a map and different places, so I guess touristic places that I can visit in Weimar.? Beside the map the blinking points on the map, which more people are familiar that shows interest regions of a city, one participants replied ?I think it was about tourist places in the city, at first I saw the map, and there were points on the top? by analyzing their reply the already linked the points with the touristic places.

2. **Interaction technique**
   The interaction technique especially with the body interaction where walking is involved, participants got clue about the advertisement indirectly only by walking and linked walking as visiting locations, like one of the participants replied ?Discovering Weimar. The Bauhaus-Walk. It was the advertisement about those locations that the people can visit in the tour. ? It is very fascinating to read that answer from which the whole goal of the advertisement can be derived.

3. **Advertisement video**
   The advertisement video had an impact on the participants to be able to recall the advertisement, one of the participants replied that ?I saw many pictures coming about Bauhaus and the program times and day?, despite that the users understood a little about the advertisement they also complained about the video for being fast, ?the advertisement was moving fast, so I could not read them properly.? Or another replied, ?I guess it was so fast.?

6.7.4 Interview Findings

All the interviews transcripts were coded for better analyzing and finding appropriate connections to categories and these categories are shown as a big diagram attached to appendix B. Each category is discussed separately

Mobile Categories

Many important categories were created from the responder?s codes; these categories reflect the functionality, nature, issues and complications of mobile interaction technique. Most of them points out negative concerns and some positive feedbacks too about the interactions, which is discussed bellow.

1. **Comfortable**
   Mobile interaction is more comfortable in the context of public environment, users do not feel shy to work with their phone, they have more privacy as one user said ?I think for people moving in public could be more embarrassing if you just use your phone the people passing by will not pay attention?. Users can also work with the display from a far location rather than standing in front as one participant said, ?you can comfortably set far away see the screen and start interacting?.

2. **Activity**
   This method has less Activity, participants do not have to move their body to reach certain points in the map, instead they can use their phone and stand or sit steady and with the tip of their finger can easily explore locations, as one of the user said ?I could go with the tip of my finger and it helped me all the places I visited?.

3. **Dependency**
   On the other hand, this interaction is dependent to many things like obviously a mobile phone, if the user does not have a mobile phone the interaction cannot happen, a participant asked, ?How would I have played if I have not brought my mobile phone?? Another dependency is the WIFI connection, one participant pointed out ?And then the fact that I had to be connected to a WIFI, that was because I did not understand do we have to be in the same Internet (Network)??

4. **Complicated**
   The process seemed also complicated like first entering the IP-Address or scanning the QR-code, then looking at the instructions and logging with a name, then tilting the phone and finally interacting with the controller elements like the button and cursor, most of the participants complained about this stating like, ?Because it is a headache for me to take out my phone and use all this login, and waste my time.? another commented like ?for exploring you have to push that red button, that was a bit confusing.?

5. **Annoying**
   One of the annoying things pointed out by the participant was

the QR-Code was being covered by the person silhouette standing in front of the display the user said ?QR-Code was small and when I was coming near the screen to scan the code, my body was covering it?.

6. **Clarity**
   There were many instructions like Access-information, mobile instruction and task instruction, but these instruction was also not clear to them as one of the participant mentioned, ?that controller was also not clear, because I though the red areas is the touch area that I can scroll and the red button was a click? another participant replied like ?there were very few descriptions, I guess the word login was miss-phrased, it was not really a login it was just chose a name?. Another participant was not sure if to use mobile phone or the screen has touch capability as he replied ?at first I saw the map, and there were points on the top first I tried to touch?.

Body Categories

Body interaction was more appreciated by the participants; from the interview transcripts the bellow positive and negative opinions were derived and categorized.

1. **Enjoyment**
   Participants had the sense of enjoyment and fun, as one of participants said, ?I liked the second one because it seemed more involving and I think it was more fun?, another user said ?I liked this interaction; it was more good and fun.? ,

2. **Easy**
   Users found the interaction to be very easy, simple and smooth, a user said, ?The body movement was good it was smooth? another user said, ?It was much easier than the previous one, it was much better, umm it was not confusing?. The call-to-Action seemed much easier, one user said, ?I saw saying me to come near, and when I came the game started, that was very easy to use?, and the interaction with the game elements was also easy to understand, one participants said ?it was easy to come near to the screen and first I did not understand how to play the game but when I saw my avatar that is moving with me then I realized and did the tasks?

3. **Immersion**
   Some participants said they were some how immersed with the game, like one said, ?I felt that I was really part of it?, another said, ?With the body you look your own avatar in the map and you feel that you are in the map.?

4. **Engaging**
   The body technique seemed also very engaging and users wanted to play more and more, one said, ?It is so engaging and it is like that it needs you?, another said, ?it is like you want to put the footsteps exactly on the street? , ?it seemed more involving?.

5. **Issues**
   On the other hand, body interaction had also some issues, like one of the participants pointed out that the interaction would be difficult if it is in crowded area, one said, ?If two people interact then they can crash at each other ?. Participants complained about physical space ?I felt was the space there was not enough space in here?. Bad tracking of the body and unexpected locations were triggered by fast movement like, one participants said, ?I guess the application was tracking me really bad?, ?when I was moving to some areas fast suddenly that point was being triggered.?

6. **Embarrassing**
   Some participants said that they would not try at public because it could be shame or embarrassment for their selves, ?moving in public could be more embarrassing?

7. **Confusion**
   The projection of silhouette on the advertisement also made some participants confused and that was also distractive, like one said, ?I saw my silhouette at the last time I was playing, because I was curious that why is it there?.

Advertisement

1. **Interface**
   The interface was appreciated by all the participants, as one said, ?I really liked the map?, another user said, ?the footsteps were cute?.

2. **Non-controllability**
   The flow of the interaction was also observed by the users, which they found annoying like, one participants noticed that ?I do not want to be forced to see all the places and then see the advertisement?, the video advertisement was also not in the control a user said, ?There was nothing to answer, it gave me the impression that okay; this was an advertisement someone did it and I could not change the flow of it.?

3. **Distraction**
   The projection of silhouette after the interaction body or mobile technique was a distraction factor, because participants would not notice the video advertisement but would notice themselves.

4. **Speed**
   The pictures for the locations and the advertisement video were fast, a user said, ?The description of the places were very fast, when I was trying to read it, it disappeared.?,

6.8 Discussion

Discuss on tiredness When something gets more time then participants lose interest

6.9 Conclusion

Chapter 7

Advertisement application

7.1 Introduction

7.2 Requirement gathering

7.3 Software

7.4 Mobile

7.5 Body

7.6 Auto active

7.7 Hardware

7.8 Application logic

Chapter 8

Interactive and non Interactive on site study

8.1 Introduction

The On-sight study is going to be executed in Weimar tourist Information Center at (Weimar Markt 10) which is one of important location for many tourists who visit Weimar. This location was chosen by Bauhaus-Spaziergang program that are providing tours for new visitors in Weimar. Bauhaus-Spaziergang does advertisement as brochure at this location. The location is reserved for our new interactive advertisement starting from 1st February for three coming weeks.

Two different Interactions and one non-Interactive Advertisement are made. The first one is body interaction where passers-by can interact using their body movement in the physical space and influence advertisement element in the screen. The second is mobile interaction where users by opening the advertisement web application in their smartphone, can interact with advertisement and the third is a non-interactive advertisement where the interface and elements are completely similar but are not influence by people around, they change based on time-based random sequence.

8.2 Interactive Advertisement

8.3 Auto Interactive Advertisement

?

8.4 Problem Statement

1. For which of the three conditions (body, mobile and non-interactive advertisements) passers-by

   (a) Are more attracted toward.

   (b) Perform of Honeypot and Landing effects.

(c) Are engaged with the screen.

(d) Spend extra time for watching the remaining advertisement after interaction.

2. Find out potential conversion rate toward the Bauhaus-Walk program.

3. How many people understand advertisement?

4. Get general opinion about the advertisement techniques.

5. Comparison of Mobile and body interaction techniques.

8.5 Design study

8.6 Data gathering

I would like to gather as much data as I can from different aspects on-sight so that I could be on safe side and if any possible question would arise after the experiment the gathered data should be able to answer that too. Based on the above-mentioned possible questions, I would perform the bellow data-gathering techniques.

1. On-Site Observation: Two different timings during the day, mornings and evenings each for two hours will be observed. The goal of observation is to count number of glances and do note taking of landing, honeypot effects and other interesting behaviors.

2. System Logs The Interactive advertisement application can generate logs for both mobile and body.

   (a) Mobile Interaction.
   - Time user joins.
   - Interaction completion time.
   - Number of elements (locations) explored.
   - Whole duration the user was.
   - If the user has seen advertisement or not.

   (b) Body Interaction.
   - Time user joins.
   - Interaction completion time.
   - Number of elements (locations) explored.
   - Whole duration the user was.
   - If the user has seen advertisement or not.

Chapter 9

Advertisement enhancement

9.1 Introduction

9.2 Introduction

9.3 Attraction attention

9.4 Motivation

9.5 Interaction

9.6 Design study

9.7 Data gathering

9.8 Findings and results

9.9 Discussions

?

Chapter 10

Conclusion

10.1 Introduction

10.2 Attention attraction study

10.3 nteraction

10.4 Motivation

10.5 Future work

Bibliography

[1] J. Müller, Florian Alt, Albrecht Schmidt, Daniel Michelis, *2010 Requirements and Design Space for Interactive Public Displays*, (October 25-29, 2010, Firenze, Italy).

[2] Michelis and J. Müller. *The audience funnel:Observations of gesture based interaction with multiple large displays in a city center*. 2011.

[3] James T. Enns, Erin L. Austen, Vincent Di Lollo, And Robert Rauschenberger and Steven Yantis *New Objects Dominate Luminance Transients in Setting Attentional Priority*. (Journal of Experimental Psychology: Human Perception and Performance 2001. Vol. 27. No. 6, 1287-1302)

[4] Standford, Attention, Chapter 3, `http://www-psych.stanford.edu/ashas/Cognition20Textbook/chapter3.pdf` ,last accessed 1:46 PM january 2016 Page 103,

[5] John jonides, Steven Yanti, *Uniqueness of abrupt visual onset in capturing attention.*, (perception & Psychophysics 1988, 43 (4), 346-354)

[6] Elaine M. Huang, Anna Koster, and Jan Borchers. *Overcoming Assumptions and Uncovering Practices: When Does the Public Really Look at Public Displays?*, (J. Indulska et al. (Eds.): Pervasive 2008, LNCS 5013, pp. 228?243, 2008. Springer-Verlag Berlin Heidelberg 2008)

[7] J. Müller, R. Walter, G. Bailly, M. Nischt, and F. Alt. *Looking Glass: A Field Study on Noticing Interactivity of a Shop Window.*, In Proceedings of the 2012 ACM Conference on Human Factors in Computing Systems (Austin, TX, USA), CHI'12, pages 297–306, New York, NY, USA, 2012. ACM.

[8] H. Brignull and Y. Rogers. *Enticing People to Interact with Large Public Displays in Public Spaces*. In M. Rauterberg, M. Menozzi, and J. Wesson, editors, Proceedings of the IFIP TC13 International Conference on Human- Computer Interaction (Zürich, Switzerland), Interact'03. IOS Press, 2003.

[9] Jenny Cameron, *Focusing on the Focus Group*. School of Environmental Planning, Griffith University Australia.2005

Appendix A

Appendix

Write your Appendix content here.

A.1 Glance count sheet

Glance Count sheet

Date: .....
Location: .....
Observer: .....

Hour: minute	
:00	
:05	
:10	
:15	
:20	
:25	
:30	
:35	
:40	
:45	
:50	
:55	
:00	
:05	
:10	
:15	
:20	
:25	
:30	
:35	
:40	
:45	
:50	
:55	

Findings:

	Male	Female
Glances		
Ignored		
Total		

Symbols:

(F) ==== Female (FFMMM) === Group (M) === Glanced Male
(M) ==== Male (F) === Glanced Female (FFMMM) === Glanced Group

A.2 Consent Form

Date: / /

Bauhaus-Universität Weimar

Human Computer Interaction

Questionnaire Consent Form

This is a study of attention attraction toward screen, conducted by **Hasibullah Sahibzada** because of his thesis research on Interactive Advertisement Vs. Traditional Advertisement. The purpose of this study is to help improve advertisement using existing technology. You are being requested to **answer** the questions in the interview and at the same time being **audio recorded** to assist us in the study.
The identities of all people who participate will remain anonymous and will be kept confidential. Identifiable data will be stored securely in a password protected computer account. Your participation is entirely voluntary and you may quite at any time from the study.

Contact Information About the Project

If you have any concerns about your rights as a research subject, you may contact directly Hasibullah Sahibzada at Hasibullah.sahibzada@uni-weimar.de or at phone # 015216967648.

Signature: ----------

A.3 Interview Questionnaire

Questionnaire

1 Do you like advertisements on the displays?

2: Which kind of Advertisement do you like / dislike?

3: What is that makes advertisement annoying or Interested for you?

4: What do you know about Interactive Advertisement?

5: What is your expectation about Interactive Advertisement?

6: What attracted you toward the screen?

7: What do you think about this type of technique?

8: Do you have any recommendations?

Note: **This is an open-ended questionnaire the sequence and questions are no entirely exact**.