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Floating Banner Blindness on Mobile Device: An Experimental Approach Using Neuroscientific Methods

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ABSTRACT

A neuroscience approach to human behavior sometimes give us insightful lessons differentiated from conventional approach does. Floating ad is a type of advertisements in which a user must click (touch) a close button in a state in which the content is hidden. There has been controversy over whether floating ads are effective ad formats. there are few research considering mobile environments. The purpose of this study is to discover cognitive and emotional response on floating advertisements on smartphones. We measure consumers' cognitive and emotional responses using eye tracking and EEG simultaneously. The experiment will be designed to happen under the most realistic conditions. The experiment will be conducted inside the closed room at laboratory. A news web page will be displayed on the iPhone 6S screen. We expect that this approach will provide information about psychological reactions that users do not consciously realize.

Keywords

Electroencephalography, Eye Tracking, Neuroscience, Online advertising, Mobile computing, Advertising avoidance.

INTRODUCTION

A neuroscience approach to human behavior sometimes gives us insightful lessons differentiated from conventional approach does. Although survey provides retrospective static information, it can disturb the cognitive processes of the subject by requiring a thoughtful response. In contrast, physiologic measures such as eye tracking and EEG have the advantage of not disturbed cognitive processes [1]. Unlike surveys based on subjects' rational judgments or refined thinking, for instance, EEG and eye tracking studies may be better at explaining unintended behavior [2].

The neuroscience approach in academia as well as industry is often found in the area of advertising and marketing. McClure, Li, Tomlin, Cypert, Montague and Montague [3] used fMRI to identify how brands influence human consumption process. In this study, they identified how Coke and Pepsi brands were accepted by consumers. Astolfi, Fallani, Cincotti, Mattia, Bianchi, Marcianni,

Salinari, Gaudiano, Scarano and Soranzo [4] used EEG to study the most effective timing of TV commercials. Ares, Giménez, Bruzzone, Vidal, Antúnez and Maiche [5] attempted to measure eye tracking for how consumers acquire information from food labels. Amore Pacific, a cosmetics company showed cosmetic photographs to women who often uses color cosmetics and observed the brain for women who often uses color cosmetics. Through comparison with overseas brands, we confirmed the awareness of the company and its brand and changed the marketing line.

Although neuroscience approaches to advertising are preferred to people because they have been able to predict how the content of advertisements will affect customer behavior, If people avoid advertising, the story is different. people's online advertising avoidance behavior is constantly reported[6], and attempts to overcome them and deliver advertising messages to people have continued.

Floating ad is a type of advertisements in which a user must click (touch) a close button in a state in which the content is hidden. Floating ads have similar nature of pop-up ads. Floating ads are widely used because they can bypass the browser's pop-up blocking technology. A floating banner ad has the advantage that it can induce higher user engagement due to the position of the ad inserted in the middle of the content.

There has been controversy over whether floating ads are effective ad formats. floating banner ads can hurt the user experience by interrupting the flow of natural movement or content consumption [6]. In the case of Google, Google defines Floating banner ads as rude advertisements. It lowers the search ranking of sites that publish floating banner ads. Although PC-based studies have shown that stimulating advertising is effective in delivering advertising messages [7, 8]. Because the effectiveness of floating banner ads has been emphasized on PC-based studies, advertisers seem to think that mobile will be the same as PC.

For the mobile environment, on the other hand, negative effects of floating banner ads seem to be more dominant [9]. Because using a smartphone with one hand, it may cause more touch errors when trying to touch a small touch target [10, 11]. Moreover, users prefer one hand

grip when using a smartphone unlike PC environment. One-hand grip makes smartphone touch more difficult [12]. It has high probability of unintended touch banners when user tries to remove a floating banner advertisement. In addition, in the PC environment, multitasking is possible because the user can display multiple windows in screen. However, in a smartphone environment, it has an interface that use whole screen. Therefore, in mobile environments, user may feel a fear of being disturbed cognitive flow when user unintentionally click (touch) close button on a floating banner ad. These experiences can form a negative experience and create an advertising avoidance behavior.

In the PC environment, many researchers have already done a lot of research on online advertising and advertising response. However, there are few research considering mobile environments. The purpose of this study is to discover cognitive and emotional response on floating advertisements on smartphones. This part can be better explained by the neuroscientific approach. We measure consumers' cognitive and emotional responses using eye tracking and EEG simultaneously.

The remainder of this paper consists of the following sections. The second section presents the expected result of our observation, the third section discuss prior theories, In the fourth section, we explain research methodology. And The fifth and final sections discuss the implications of the results for management practices and future research and the limitations of the study.

EXPECTED RESULT OF OBSERVATION

We expect that when people see floating banner ads in a mobile environment, cognitive responses and emotional responses will appear at the same time. Our expectation for observation is as follows.

First, when user see a floating banner advertising on mobile devices, people will feel the fear of disturbance and annoyance

Second, when user see a floating banner advertising on mobile devices, people will only look at the close button rather than the content of the floating banner ad.

THEORETICAL BACKGROUND

Advertising Intrusiveness

The definition of Advertising Intrusiveness is that advertising interferes with the user's information processing [13]. The highly intrusive advertisement forces the advertisement message to appear on the user's screen regardless of the user's intention. Li, Edwards and Lee [14]'s study found that pop-up and banner ads are intrusive to users. In Goldfarb and Tucker [15]'s study, a highly visible advertisement was presented in the nature of intrusive advertising. Examples of intrusive advertising include pop-up, pop-under, in-stream video, takeover,

interstitial, nonuser-initiated background music, full page banner ad, interactive, and floating ads. In a study by Chan [16], consumers express aversion to obtrusive advertising.

On the other hand, Cho, Lee and Tharp [6] found that consumers did not have negative feelings about forced exposure. Users reported higher effects about forced exposure ads compared than non-forced exposure ads.

Ha [13] founds that the intrusiveness of advertisements had the greatest influence on perceived advertising clutter. Advertising clutter caused by the intrusiveness of the ad can intensify the tendency of avoiding the ad as well as the negative advertising attitude of the audience [17], and negative advertising attitudes affect brand perceptions [18], and it causes ad avoidance [19].

Advertising Avoidance

Speck and Elliott Speck and Elliott [20] classified advertising avoidance behavior into three behaviors. The first is cognitive avoidance. An example of cognitive avoidance is the act of ignoring the ad while doing other work while the TV is on. The second is physical avoidance. An example of physical avoidance is to leave the room where the TV is turned on. The third is mechanical avoidance. An example of mechanical avoidance is the act of switching the channel to filter the advertisement.

Dreze and Zufryden [7]'s study found that consumers are actively avoiding online banner advertising. They defined this phenomenon as banner blindness. Balkenius and Morén [21] suggested that users do not pay attention to useless ads while browsing the web. Lapa [22]'s research shows that the Internet user learns very quickly from the structure of the web page. The results of this study show that the effectiveness of advertising is greatly reduced after consumers learn the structure of the site.

When a physical avoidance or mechanical avoidance occurs, a sleeper effect may occur regardless of the acceptance attitude of the advertisement after the advertisement is already exposed. However, in the case of cognitive avoidance, it is avoiding the form which is not exposed to the content of the advertisement.

Floating banner ads temporarily discontinue consumers' web pages. This prevents consumer preprocessing and retrieval cues [23]. These experiences can form a negative experience and create an advertising avoidance behavior. Burns and Lutz [24] studied consumers' emotional responses according to online advertising formats. Pop-Up ads and Floating ads received the highest score in the annoyance factor.

Smartphone vs PC

People now spend more time on their phone than on their computers. The smartphone environment has following differences from PC environment.

User uses computer while sitting on a desk. However, mobile phones can be used while conducting multiple task with one hand grip [9].

Unlike PC environment, smart screen is small [25]. Therefore, the application is displayed in full screen. Users feel more concentrated in full-screen situation [26].

Compared to a PC that mainly uses a keyboard and a mouse, a smartphone environment uses a finger as an input device. With one-hand using with smartphone, It may cause more touch errors when trying to touch a small touch target [10, 11].

Because of these differences, in a smartphone environment, the probability of incorrect input is high. In other words, there is a high probability that the user will click on the advertisement link while intending to cause the floating advertisement to disappear. And unintended access due to incorrect input will break the concentration of smartphone users.

3.4 Pavlov's Conditioning Theory

According to Pavlov's classical conditioning theory[27], Pavlov's model has four elements. There are two stimuli and two reactions. One is untrained reactions and stimuli. This is called unconditioned response(UR) and unconditioned stimulus(US). When a stimulus is mated with an unconditioned stimulus and causes a new experience, this stimulus is called a conditional stimulus and the response learned by this conditional stimulus is called a conditional response. In other words, the user learns the relationship between the two events and prepares for a future event. The more uncomfortable the user experiences the unfocused touch, the more the connection is made to the emotions that the user feels when user sees the floating banner ad.

Conditional stimuli formed through conditioning process can make other stimuli conditional stimuli. This process is called higher order conditioning. Through the process of forming a higher conditioning, we expect cognitive advertisement avoidance in response to the stimulus of seeing floating banner advertisement..

RESEARCH INSTRUMENTS AND PROCEDURE

Eye-Tracking

When studying the user's focus, the analysis of eye movements can be used in various fields of research (eg, web design, scene recognition, print advertising, etc.) [28-31].

Researchers can measure consumer's attention to advertising stimuli and analyze which elements in visual advertising attract consumers' visual attention in order. Eye fixation can be used as a good indicator of user attention.

Eye Tracker can be classified into fixed Eye Tracker equipment and mobile Eye Tracker equipment. Mobile eye tracking equipment is in the form of goggles. Therefore, it can overcome the disadvantages of the existing Eye Tracker which requires a fixed computer screen and fixes the head. With this mobile eye tracking device, eye tracking research becomes possible in smartphone environment. For this research, Tobii Pro Glasses 2 eye tracker will be used for the purpose of data acquisition and analysis.

Electroencephalography

Electroencephalography (EEG) is a method to analyze the changes in the frequency of the brainwave [32]. EEG is a relatively common method used in marketing and advertising research to examine the relationship between brain activity and consumer cognitive (eg, attention and memory) and emotional (eg, arousal and pleasure) changes [33].



Figure 1. Tobii Glasses Eye Tracker with Emotiv Epoc+ EEG Headset[34]

We will use the Emotiv Epoc headset. This device uses 14 sensors to measure changes in brain waves. By analyzing the measurement results, we can measure the emotion of the user. This device can sync with Tobii Eyetracker. A lot of studies using Eye Tracker and EEG have been conducted recently [35, 36]. We expect to be able to simultaneously analyze the flow of emotions at and after the first detection of a floating banner ad by analyzing interlinked data.

Experiment Design

The experiment will be designed to happen under the most realistic conditions. The experiment will be conducted inside the closed room at laboratory. A news web page will be displayed on the iPhone 6S screen.

The participants will be composed of university students. Most of Korean university students have used smartphones more than 2 years. So, we expect them already have formed conditional processes of floating banner ads.

Participants will wear the Tobii Pro Glasses 2 eye tracker and Emotiv Epoc headset and receive the iPhone 6S device for the experiment. Participants will be asked to

access the experiment page using their smartphone web browser.

We expect that this approach will provide information about psychological reactions that users do not consciously realize.

THE CURRENT STAGE

It is important that you write for the general audience. It is also important that your work is presented in a professional fashion, which is what this guideline is intended to help you with. By adhering to the guideline, you also help the workshop organizers tremendously in reducing our workload and ensuring impressive presentation of your workshop paper. We thank you very much for your cooperation and look forward to receiving your nice looking, camera-ready version!

EXPECTED CONTRIBUTION

Theoretical Implication

The theoretical contributions of this study are expected to be as follows.

First, we conduct online advertising research using Eye-Tracking and EEG simultaneously. We expect to be able to investigate the behavior of the user more closely through multiple measurements.

Second, research on the mobile environment has often been carried out on the PC screen because of equipment restrictions.

Practical Implication

This study is expected to provide advertisers with strong implications for the use of intrusive advertising in the mobile environment. Use of invasive advertising in a mobile environment can lead to cognitive avoidance of advertising as well as negative emotions to the user. That is, the advertiser cannot deliver the advertisement message and can only make the user feel bad.

LIMITATION

There is a possibility that generalization problem will occur only for the experiment group. Second, there may be various factors in the ad acceptance and ad avoidance behavior [48].

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