

# Impact of Advertisements on Webpage Design and User Engagement – A Review from HCI Perspective

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## Abstract

As the world of advertising is shifting from physical media and television to online and mobile mediums, it is essential that webpage designers plan for and incorporate advertisements into website design decisions. The design of a web page influences the engagement of visitors on the web page as well as the success of the website in terms of serving its content to its audience and in terms of advertisement revenue. Advertisement contents also have a direct impact on web page design, which eventually affects the engagement of the web visitors. In this paper, we review the impact and importance of advertisement on the web page design from Human-Computer Interaction (HCI) perspective. We explored trends in advertising, advertisement types, psychological aspects in web design, and pulled these concepts together to better understand the effect that online advertising has on web page design.

**Keywords:** *Online Advertisements, Webpage Design, User Engagement, Human-Computer Interaction.*

## 1. Introduction

Revenues from Internet advertising continue to grow each year and billions of dollars are being invested on Internet advertising [2]. The engagement of online users drives revenues for both website owners and advertising companies. When advertisements are profitable on a website, the two-way relationship between the advertiser and the website owner is successful.

Though the goals of advertising may vary from one company to the next, the main objective of advertisers is to gain exposure and strengthen their business. Website owners, on the other hand, seek revenues from advertisers to support themselves or to add an extra revenue source for sustainability. Interestingly, according to [11], the application of a certain advertising concept in one country might not be justified in a global context. But in any case, advertisers pay particular website owners for

real estate on their sites in a variety of ways. For example, they may pay per click, per sale, and/or a set price for a specific location [10]. As per [1], websites can capitalize on the traffic they generate by selling more expensive ad space. However, some balance is necessary otherwise too many visitors might leave the site for advertisements, and the website is no longer serving its main purpose as far as visitors are concerned. On the contrary, when too few visitors leave the site because of advertisements, the company may not generate enough revenue. This conundrum of online advertising is tricky to handle. If website designers consider and address these issues during the design phase, then they have a greater chance of succeeding in finding an appropriate balance between advertisements and webpage contents.

In this article, advertisement does not only refer to click count but also brand showcasing and conveying information to various demographics. We emphasize on investigating design principles that can be translated into design rules to serve the web page designers as a set of guidelines for incorporating advertisements.

## 2. Trends and Techniques in Online Advertisements

There are various innovative techniques in online advertisements. For example, in search advertisements, advertisers pay online companies to list and/or link their domain name to a specific search word or key phrase. Display-related advertisements include static ads, linked banners, and logo ads. Advertisers pay for space on one or more of the online company's pages to display static or linked banner or logo. Mobile advertisement is geared towards smartphones, feature phones, and tablets. One extreme example is amazon.com, which sells their tablets and kindle handheld devices with or without

advertisements (aka with and without special offers) based on the selected pricing for the device. Text messaging ads, search ads, audio/video ads, mobile application ads, and mobile search result ads are all various types of advertisement formats for handheld devices. Digital video advertising is applicable for the video content display portals where the advertisements appear before, during or after the main digital video content in a video player. Rich media advertising includes Flash or JavaScript based triggers for the users to view and interact with products or services between two content pages in one of the following forms - splash screens, pop-up ads, new tab windows, etc.

According to [2], in 2013 search advertising accounted for 43% of all advertising revenues totaling \$18.4 billion in revenues, display ads made up 30% of all advertising revenues, mobile advertising delivered through wireless devices climbed 110% from 2012 and generated \$7.1 billion which is 17% of all advertising revenues, digital video advertising made up 7% of all advertising and generated \$2.8 billion, and rich media advertisements generated \$1.3 billion which represented 3% of all advertising revenue.

In 1994, clickthrough metric was introduced for measuring advertisement performance on websites where the click referred to the web visitors' actions to advertisements [4]. Therefore, web designers were more focused on design tricks beyond banner advertising to make the web visitors click on the hidden advertisements. To an extreme extent, computer programs were created to automatically click ads to jack up the advertising revenues by means of fraudulent clicks. According to [12], in 2014, fraudulent clicks and associated traffic may have cost the advertising industry as much as \$11.6 billion.

Native advertising has become a new trend in web page design that refers to the content's coherence with other media on the platform. In native advertisements, websites feature advertisements that emulate the content and style of their own site. According to [12], spending in native advertisements will reach \$8.8 billion by 2018 because advertisers are seeing above average engagement with this format. However, study in [4] found that about 67% of people reading a regular article had more than 15 seconds of engagement with the webpage. On the native advertisement content, the visitors spending more than 15 seconds dropped to 33% because the visitors clicked on the ad. Similarly, when the site displayed normal content, 71% of visitors scrolled, whereas on the native advertisement site, only 24% of visitors scrolled down the page.

New advertising model based on viewability conditions, known as "viewable impressions", has been recently introduced [12]. With this model, advertisers are only charged if the ad appears on the screen for a minimum duration. For example, in order for an ad to count as a

viewable impression, 50 percent of the pixels have to appear on the screen for a minimum of one second. Therefore, the rate advertisers pay reflects the total amount of time the web visitor spends with the advertisement. Our preliminary study has revealed that there are also some fundamental problems with this approach. For example, tracking visit time on a web page does not take into consideration the physical away time of the web visitor from the computer or when a visitor switches to a different tab or application.

### 3. Considering Advertisements in Webpage Design

Advertisements have an impact on the look and feel of the site, and hence it affects the user engagement and interaction with a particular website. In order to avoid interference with the flow of content on a website, designers should allocate advertisement slots on websites that are both specific and strategic [1]. When advertisements are not considered in the design phase of a website, placement of advertisements may look out of place, unorganized, and awkward. Layout and spacing, color, and flow of content are all important considerations that impact advertisements on a website. Even though the advertisements in the sidebars or header of the website are widely seen, the present trend on news or media sites, e.g. in BBC or CNN, is to have advertisements evenly dispersed throughout the page instead of placing all the ads in one location. Color is another important advertisement design consideration. The designer of a website cannot control the color of the ads. The designer can, however, control the color of the website. Thus, a website that contains lots of colors may look awkward with a banner ad that is also very colorful. It is likely that the banner ads will be bright and colorful because they are created with the intention of grabbing the user's attention. Since advertisements influence the users' eye movement patterns and the flow of information on a website, web designers may either keep the advertisement away from the flow of content on the site, or closer to the content in order to maximize advertisement revenues. The New York Times, for example, often avoids placing advertisements in the page header area and the main content area of their site in order to have minimal impact on their visitors [1]. However, for websites that heavily depend on advertisement to generate revenue, we have seen trends such as header advertisements, advertisements above content, advertisements on secondary pages, and common banner sizes. Header advertisement can be found near a website's logo, above a navigation menu, below a navigation menu, or in other locations at the top of a web page. This is a desired advertisement type for advertisers

because their brand's name is one of the first things that visitors see upon landing on the web page. Advertisement above content differs from header advertisements in that they are located above any and all content on the website. Even though these ads do not interfere with a visitor's ability to flow through the web page, these ads push the web content down, so that less content is visible initially which might negatively affect user engagement with the website. Advertisements placed on secondary pages keep the homepage user-friendly for site visitors. If the users click on stories or other pages within the website, then advertisement is shown on the secondary pages. Finally, common banner sizes are becoming a standard or at least standard in size. According to [1], the Interactive Advertising Bureau has established standard sizes to be used for online ads.

#### 4. Psychological Design Elements for Web Design

A user's first impression of a website is developed almost immediately upon arriving on a web page. According to [9], people are able to form a "stable first impression" within the first 50 milliseconds (ms). This first impression influences the short term and long term behaviors of a user, including whether or not a user will stay on the web page or navigate to different websites.

When designing a user interface on a web page, designers should consider principles of cognitive psychology, i.e., principles that explain human tendencies or behaviors. It is also important for designers to consider principles of experience, which includes visibility, affordance, and feedback [3]. Principle of visibility states that it should be obvious what a control or object is used for. Principle of affordance refers to how a control or an object may be used so that a user's prior knowledge or understanding of that object does not deviate. Finally, the principle of feedback states that it should be obvious when a control has been used, i.e., there should be some functionality that indicates a state change of an object to the user. In short, these principles refer to the expected or common functionalities of a website expected by the respective web visitors.

Researchers in [9] reported that a user's aesthetic impressions are formed by the perception of physical stimuli, such as shape, color, and complexity, in addition to the knowledge and experiences held by the user. These stimuli and user experience lead to visual complexity (VC) and prototypicality (PT) as described below.

Visual complexity is related to a users' interpretation of visual stimuli and the feelings of pleasure or displeasure associated with that stimuli. Authors in [9] form their hypothesis on the desired level of VC based on Berlyne's

theory, which predicts that a moderate level of visual complexity is considered pleasurable, whereas a high level of complex stimuli is unpleasant. The importance of understanding VC is that it directly affects human behavior, and the decision of a website visitor to stay or leave the web page. For example, designers should avoid visual complexity when naming menu list items so that the function of items is directly related to the name given to those items.

Prototypicality is a measure of representation shown for a class of objects. This is formed through mental models, and can be described by means of Gestalt theory [5]. Gestalt theory states that the sum of the parts is different from the whole which resembles how humans try to make sense of their surroundings perceptually. People who have visited similar websites in the past have an idea or mental model of what the new website should look like. Each time the user visits a new site, he/she will compare the experience to prior experiences on similar websites. In [9], the authors formed the conclusion that VC and PT have a significant impact on the aesthetic judgments of web visitors - more complex websites are perceived as being less beautiful than less complex websites, whereas websites of high PT are perceived as being more beautiful than websites of low PT. Therefore, a combination of low VC and high PT on web pages yields higher visitor engagement. Since aesthetic perceptions form within 50 ms of landing on a website, for designers this means that they must design webpages that give a positive and meaningful first impression to viewers very quickly. To achieve this, we need to analyze what the users know (i.e. designing with high PT) and what the users can cognitively process (i.e. designing for low VC).

Law of Prägnanz [8] in Gestalt theory, also known as figure-ground segregation, addresses the user's perception of the relation of objects. It explains the relationship between an object and its background. When an object has two or more distinct areas, humans tend to perceive the object as part of the background [3]. Therefore, law of Prägnanz is described as the process of humans trying to interpret objects, often time ambiguous objects, in the simplest possible way.

In order to improve web interface designs, other Gestalt laws (in addition to Law of Prägnanz) such as symmetry, continuation, closure, proximity, and similarity should be considered for effective website design. Designers should investigate relevant design rules that are related to brightness, color, texture, foreground and background objects appropriately.

## 5. Webpage Design and Visitor Engagement

In Human-Computer Interaction (HCI), user interface (UI) plays a vital role since users interact with the computing systems through these UIs. Many disciplines contribute to HCI, including psychology, ergonomics, engineering, and graphic design [3]. Various elements like scroll bars, text boxes, clickable hot spots, links in the form of text or images, etc. belong to the interface of a web page. Making these elements functional for users is where HCI and website design intersect in order to make webpages functional, interactive and easy to use. We can apply Gestalt theory [5] in webpage design. Gestalt's laws refer to human's ability to interpret the meaning of objects and organize visual data [8]. It is important for designers to recognize "good, bad, and poor" designs because these designs can make the difference in whether or not a user will be engaged with a website. User interface design principles based on psychological theory and prior experience is necessary for web designers as they design and develop web pages.

We commonly claim that first impressions are everything. This is also true for web visitors. In [4], a survey on web visitors for one month across 2 billion web page visits shows that 55% web visitors spent fewer than 15 seconds actively on a page. According to [6], web designers have 50 milliseconds to capture a web visitor's attention. What this means for a web designer is that they must captivate web visitors with great design almost instantly. There is no time to scroll - good designs must appear at the top of the web page. What web visitors see when they land on a website depends on a variety of design elements like structure, color, spacing, text, fonts, symmetry, etc. When these elements combine, they must create designs that are low in visual complexity. The simpler and more familiar a website's design is, the higher the visual appeals for web visitors. As per [6], in an eye tracking study conducted on a group of students, logos, main navigation menus, search boxes, main images, written content, and the bottom of the website (in this order) were ranked as the most compelling or interesting aspects of the website. A British study mentioned in [6] found that first impressions are driven primarily by the "look and feel" of a website. In fact, 94% of feedback from test participants was about the design of a website. Only 6% of feedback was related to the website's content. This proves our point that web design greatly impacts the level of engagement a visitor has with a website. Furthermore, the author in [6] found that visually appealing stimuli were the most important factor in engaging web visitors. Usability and credibility were, respectively, the second and third most important factors for visitor engagement.

In [7], authors found that a relationship exists between the designer and developer of every interface. Though

often in website design, the designer and the developer are the same person, there is a need for the algorithm (which is the code) and the aesthetic (which is the design) to blend in order to form the engaged interaction. In order to achieve an engaged interaction, an end-user driven development scheme should be followed in order to receive real-time feedback from the prospective users of the websites. Moreover, a compromise must be made between the complex code needed to implement the functionalities and the aesthetic principles of the website's design in order to load and run the website contents along with the rich advertisements in a handheld device. Therefore, the user experience must somehow connect to the user's cognitive framework by targeting the focus, emotions, and reflections of the potential users. Through careful selection of forms, lines, colors, spaces, and textures, designers can try to guide the user's aesthetic experiences in a positive way.

## 6. Conclusion

The goal of a website is its function. Web visitors want a website that looks good and gets the job done. On the other hand, for website publishers and online advertisers, the goal is to make money from advertising revenues while pleasing the customers or website visitors. For web designers, it is not necessarily true that ads are the number one concern when designing a website, but they certainly are an important consideration for website design. Failing to account for advertisements in web page design could result in websites with awkward layouts, distracting the user or resulting in ads that are ignored by users. Therefore, for web designers, it is tricky to satisfy these goals because advertisements take up space on the site and interfere with the flow of content. For media sites, which rely heavily on revenues from advertisements, it is essential that they increase visitor engagement. Consequently, if designers account for ads early on or immediately during the design phase, then they may avoid site designs that look unorganized; they may also avoid the potential need for re-designing the site later. In order to effectively use native advertising, we believe that web designers need to understand the content that the visitors are most engaged with and how it is presented. For example, when the advertisement is placed at the top of the page, visitors are more inclined to scroll down if they are very interested in the main content. Therefore, placement of advertisements on a web page, other contents of the webpage, and the design of the web page play vital roles in determining how a web visitor engages with a particular website. When the level of engagement is high, the time spent on the website increases. The greater the amount of time spent on the website, the more likely a visitor will be able to recall a



brand. Designers should try to plan ahead for advertisement spaces and identify specific advertisement spots in the layout of the website so that advertisements appear as though they were meant to fit in the location they are placed. Designers may produce empty ad slots and fill them with temporary content. When these spaces are needed for additional advertisements, there is space available and the design of the website is not compromised. In a nutshell, designers must understand the level of priority for an advertisement, the advertising needs of the client, and how to create an attractive design space. In our future work, we plan to investigate a method for accurately measuring web visitor engagement in various websites.

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