

A Study on the Mobile Effects of Using Flat Techniques in Web Design

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Abstract:

In today's world of technology, internet sites are a part of our daily life. Especially with the presence of mobile devices, used by people ranging in age from 7 to 70, technology is with us at every moment and everywhere. As the screen sizes of these devices shrink, web design techniques must adapt to accommodate the new styles. Elaborate, appealing and complicated designs, however, are difficult to render on shrinking screens. The flat design techniques have emerged to address this matter. With this design-style, particular importance is given to special-effect free simplicity, neatness, flatness and ease of understanding in interface design. In this study, two different web pages, one prepared by flat-design and one by skeuomorphism-design techniques, were compared in terms of speed and usage. The results give clues into why flat design has emerged as the design technique of choice and why today's web designs should be plain.

Key words: web design, flat design, skeuomorphism, mobile, interface, technology

1. Introduction

Powell defines web design as the process of making the website ready for publishing in terms of technology, structure, content and design by managing its interaction with various disciplines, such as graphics, animation, photography, writing, information architecture and communication design [1].

Visual design is a tool used to convey messages rather than being the message itself. The Turkish Language Association defines the concept of design as a conscious post-replica of a phenomenon or object that has been perceived in the past or a format that has been perceived in the mind [2]. In other words, design can be defined as the visualization of the form that the human mind has created out of past experiences, such that other minds can perceive it – something akin to stage design in theater or set design in film. Web design, one of the most important features of internet communication, falls, in part, under the field of visual design [3]. The software design concept can be defined as the combination of patterns, representations, strategies and techniques used to designate how a system or component will be implemented. This phase includes interface design, data design, architectural design, design evaluation processes and design tools developed for users. The design phase involves work on both the backbone of the programs and the user interfaces of the software. Beyond simply being suitable for the function of the software, the design to be prepared must be realized by taking into careful consideration issues such as safety, resources and performance. The basic principle of flat designs is that the screen on the computer represents a self-contained two dimensional design without placing 3D objects from the real world [4]. The user interface elements must be simplified. [5]. In view of all these concepts, web

design is clearly a key element in preparing web pages. In this study, web design techniques are discussed. Two applications have been developed, one using the older design technique of skeuomorphism and one using flat design techniques. The designs prepared are examined in technical terms and yield significant results. Ideas for additional research on the subject are discussed at the end of the paper.

2. Web Design Techniques

In looking at how design techniques have historically evolved, it begins with material design, followed by flat design and skeuomorphism. In keeping with the notion of design evolution, the sequence of techniques have developed by either adding or subtracting various features from previously applied techniques.

2.1. Skeuomorphism

In skeuomorphism, when designing interface components, such as areas of web elements (button, banner, form, etc.), the real-world visuality is wholly transmitted to the digital medium. Visual richness serves to captivate the attention of the users. It is important to note that high-resolution designs do not look good at low resolution. The time required to load visually-rich web pages takes too long and causes rapid depletion of today's mobile data packages. This design technique is also very troublesome for designers, insofar as it takes hours of efforts to deal with the design of the buttons, as shown in Figure 1 [6].



Figure 1. An example of a button prepared according to the skeuomorphism technique

2.2. Flat Design

The most important elements in this design principle are that the design is simple, clean, plain and easy to understand, with no special-effect items present on the front panel. Unlike the skeuomorphism technique, effects such as shadows, glyphs, color transitions, and depth are not used. The images, icons and shapes used in the design are rendered as sharp and clear as possible.

Completion of the above elements of the design has the added advantages of making the messages much easier to convey and not tiring the web users. Flat designs facilitate better interaction with the users by shortening the perception duration. Flat design also provides more

efficient use of smaller design areas, such as mobile devices. The dominant philosophy behind this design principle is simplicity; that is, the simplest possible interface is used in design elements. For example, each geometric shape is used with plain colors. The goal is that users be able to grasp the interface simply and that items have the capability of being clicked, browsed by touching, and opened. Users should be able to have intuitive, comfortable interaction with the web page, without the requirement of any explanations. The color tones of the text items must be compatible with the overall color scheme of the design. Embossed lettering is not used in the flat design, and plain colors are generally preferred. Since gradient colors are not used in flat designs, a larger number of colors are made use of compared to the number employed in traditional designs. Typically with flat design, there are 6-8 color combinations, with green and blue tones, turquoise, salmon and retro colors often being preferred. In the design of a web page, complexity should be avoided as much as possible, as well as unnecessary additions. Only those items that serve to enhance function should be used. Simple colors and text are therefore employed to meet this end. Images and icons are used to render visual elements [7]. In Figure 2, it can be seen that the logos used by large firms in recent years feature a simple, flat design.



Figure 2. Transition to flat design in the logos of Google, YouTube and Yahoo in recent years

3. Flat Design Application

A mobile-compatible website was developed by applying flat design principles. The practical design of the site was created using the Bootstrap design tool. Bootstrap is a free, open source CSS framework. With Bootstrap, it's easy to make website designs and themes for the browsers of mobile devices and desktops that fit the size of the device used. Figure 3 presents a desktop sample of the visual design of the application [8].

In the next stage of this study, a website was designed using a template enriched with visual elements of greater complexity and created according to skeuomorphism principles, which do not necessarily conform to flat design principles. The visual design of this application is shown in Figure 4.

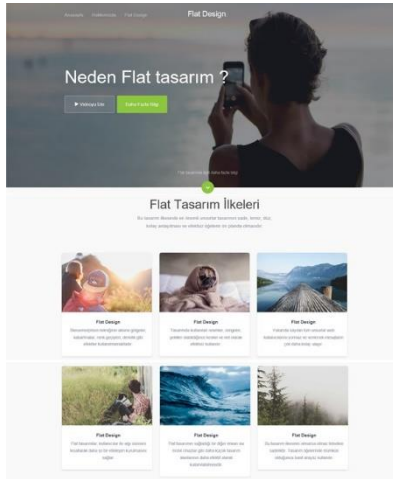


Figure 3. Flat design application



Figure 4. Skeuomorphism design application

4. Technical Examination of Applications

The mobile web pages designed with flat design principles and Skeuomorphism design principles were published by registering a domain name and leasing a host. The purpose of publishing the web pages on the same server computer was to allow for the evaluation of the pages in a controlled manner, with the same bandwidth and broadband speeds. The characteristics of the server on which the web pages are hosted are shown in Table 1.

Table 1. The characteristics of the server used

Characteristics	Explanation
Processor	Intel® E3-1240 v2 3.40 GHz
RAM	16 GB DDR-3 RAM
Hard disk	2x1 TB NLSAS Disk
Broadband Speed	200 Mbit

The same client computer and internet service provider subscription was used to technically examine the web pages. The characteristics of the client computer and the ADSL line used are shown in Table 2.

Table 2. The characteristics of the client used

Characteristics	Explanation
Processor	Intel® Core™ Q 720 1.60 GHz
RAM	8 GB DDR-3 RAM
Hard disk	250 GB 540MB/520MB SSD
Broadband Speed	Download: 10.6 Mbps Upload: 0.8 Mbps

In order to measure the speed of our web applications, we used the Network section of the DevTools console of the Google Chrome web browser. The measurements were executed by emptying the cache and providing a full reload. Figure 5 shows the DevTools screen snapshot.

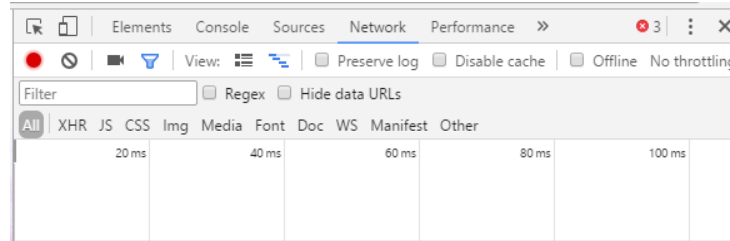


Figure 5. Google Chrome DevTools screen snapshot

5. Conclusion

It was observed that the flat design application was able to be loaded faster than the skeuomorphism design application according to page load duration. The chief reason for the faster loading can be attributed to the fact that larger file sizes of the objects were designed using the techniques employed prior to the introduction of the flat design approach. Table 3 shows the test results from the Chrome browser.

Table 3. Measurement results of opening web applications in the browser

	Flat design	Skeuomorphism design
Download duration (sec.)	1.39	6.06
Size of the file downloaded (Kb)	862	7372

Based on these results, we compared the file sizes to the download times to derive the speed of web pages uploaded under the same conditions.

Flat design : $862 / 1.39 \equiv 620 \text{ Kb/sec}$
 Skeuomorphism design : $7372 / 6.06 \equiv 1217 \text{ Kb/sec}$

According to these results, 620 Kb of data need to be transferred per second to load a flat designed web page, whereas for the skeuomorphism design, almost twice as large of a transfer rate is required. This goes to show that the upload speed of flat designed web pages is quite fast, while that of the Skeuomorphism design is rather slow.

The results also found that with flat design, the smaller file sizes do not have as big of a data drain on the data package usage of mobile devices. Because the file sizes of web applications prepared with the skeuomorphism technique are very large, this technique consumes data packages faster and is therefore not preferred by users. Another reason that websites designed with a design technique applied prior to the introduction of the flat design are not preferred by

mobile devices is the difficulty in usage of rendering the PC screen-display on small screen mobile devices. In Figure 6, the mobile device screen displays of the applications are shown.

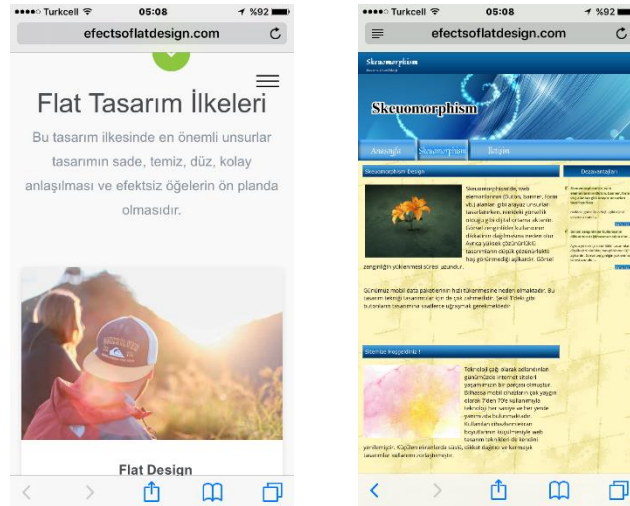


Figure 6. The mobile device screen displays

Our study shows advantages of using flat techniques at web design with tests by a lot of methods. Despite increase of using flat design a lot of web sites (especially most of government sites) are still using traditional techniques and not adaptable with mobile using. After our study it is expected that to notice flat techniques to both web engineers and researchers.

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