Designing a Social Network Profile Model Based on Human Computer Interaction (HCI)

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ABSTRACT: *The goal of this article is to design an interface for social network according to aesthetic, human computer interaction principles and find an appropriate location for items on a page. For this purpose, we studied 5 aesthetic principles(golden section, dynamic symmetry, Gestalt laws, color harmony and Goethe's color theory), the effect of web aesthetic on users first credibility perception, the importance of user profile for designing interface and Motivation-Hygienetheory. The method in this paper was experimental for which a group of participants were asked to draw what they expect their profile page should look like. Subjects were 18 students from Shiraz University of Technology. According to important factors for designing user interface, analyzing these studies, doing experiments, and collecting participant's opinions, drawings and designs, we presented a model for user profileand home interface design and then we analyze them.*

1. Introduction

Virtual social networks are used for indicating complex relations and connections between people in social systems, from individual interactions to national ones[1]. Today the importance of social networks is not unclear. Many people use these networks to connect with their friends and families, learning, gaming, sharing beliefs, culture, pictures, films, finding new friends and other facilities. Each social network has a user interface and if it has a week design it can cause dissatisfaction, stress, low performance, low efficiency, wasting time, wasting money, more user faults and users avoidance to use it again.

In this paper, the purpose is to design an appropriate user profile page that satisfy users, based on human interaction concepts.Previous works, experiments, comments and opinions collected from a group of subjects. In the following, in sections 2 and 3 human-computer interaction and social networks have been discussed. In section 4 Aesthetic principles, the effect of web aesthetic on user's first credibility perceptions andMotivation-Hygienetheory has been reviewed. Finally in section 5 an appropriate model for designing user profile interface has been introduced, based on collected opinions from participants and principles discussed in section 4, and it has been analyzed.

2. Human Computer Interaction (HCI)

Human computer interaction is a field of study and action consisting of cognitive science and human factors engineering that has been produced and expanded as a special section in computer science (1980). Interfaces were always attractive in computer usage. Even the most complex machineries are worthless unless humans can use them correctly. There are important terms in HCI consisting of functionality and usability. Functionality is a set of actions or services that are presented for users. The value of function isunderstood when it can be used efficiently by users. Usability of a system with special capabilities is the degree that the system can be used efficiently and used enough for accomplishing specific goals for specific users [2].

HCI design should make a balance between users, machineries and services in order to reach a special functionality in quality and improve services; that are usually mental and depend on the scene, situation and available technologies like commands, menus, graphical user interface or virtual reality to reach out for computers functions [2].

HCI design also should consider many aspects of human behavior and his/her needs to present users a simpler, more interesting and more satisfying experience. User's activities has three levels consisting physical (visual, hearing, touch) cognitive and emotional. New methods and technologies in HCI combine old interactive methods and advanced technologies like network and animation [2].

On the other hand, one of the HCI goals is to produce secure and usable systems. Improving effectiveness and efficiency are obvious and habitual goals. HCI consider making systems that are easy tolearn and use. Computer systems that are weekly designed can be so annoying for users. Benefits of HCI are mainly invisible, intangible and unquantifiable. Examples of designing applications for HCI are text editing, spreadsheets, computer aided design, video games, etc. Also, motion detection, multimedia, three-dimensional, virtual reality, augmented reality, natural language and speech are fields ahead in HCI [2].

3. Social Networks

Social network sites are web services that allow individuals to make a public or semipublic profile in a constraint system, express a list of other users that have connection with, visit and follow others' or themselves' connections in the system and meet friends and family and also new people. The state and name of this links and connections are variable in different social networks. Backbone of social networks is visible profiles that show users friends that are also system users. Profiles are exclusive pages that individuals can introduce themselves in them. In fact profiles show individual information like name, last name, sex, location, favorites, pictures, applications, etc. [3].

The structural difference between visibility and access are the main characteristics that distinguish social networks from each other. Most social networks need two ways of conformation for friendship and some others don't. One way connections usually are called followers [3].

In most social networks users can put comments on their friends profile or send them private messages. Some social network sites choose specific geographic areas or specific language or specific focus groups, ethnic, religious, sexual, political, or other identity categories as a target. Another case that is important in social networks is the correctness of individual's information and to what extent profiles are valid [3].

Using social networking has many advantages consisting of Media literacy, learning outcomes, teaching and non-formal learning, creativity, selfexpression, social ties, a sense of belonging and collective identity, establishing and strengthening communities, civic and political participation, efficacy and safety [3].

4. Previous Works

4.1 Aesthetic Principles
"*Aesthetics*" is the feeling of beauty and taste (Ford, 2009). Five aesthetics principles that are used in formatting the screen and distributing elements and use of color in designing web sites are as following: 1- Golden section is "$1.618 = height / width = \varphi$"that is introduced by Weisstein andimproves feeling of natural discipline, harmony, balance,convenience and usability (Friedman, 2008) [4].

2- Dynamic symmetry is using dynamic rectangles with the ratio of width to length proportional to √2, √3, √5 or φ , √φ, φ2 (Hambidge) and is visually pleasant for human [4].

3- Gestalt laws in designing context and content, organizing and grouping web elements caused more usability, help efficient searching and better information skimming. Gestalt laws are: 1) Law of Proximity:close objects belong to each other. 2) Law of Similarity:similar objects are grouped. 3) Law of Common Fate:elements should move in one direction. 4) Law of Good Continuity:images or context should be in one line. 5) Law of Closure:close images should be grouped. 6) Law of Prägnanz:the human eye can distinguish between objects according to the background [4].

4- Color harmony has a major impact on user interface. Combination of red, yellow and blue forms the color wheel. Complementary colors placed against each other in color wheel and are contrast. They are good for highlighting information but bad for text. Analogous colors are close to each other and using them in background theme cause a comfortable feeling (Tiger Media). Strong contrast of foreground and background makes it easy to read the text and helps colorblind people (Hess 2000).Colors that have warm effects are red, orange, yellow and the cold colors are blue, green andviolet (Noack, 2010). Hess suggests that it is better to write elements functions on the elements instead of using colors [4].

5- According to Goethe's color theory (1810) a dark element seems smaller than a bright one at the same size and it has more prominent visual effect,smoother visual impact and harmony for users [4].

On this area an experiment was done in 2012. In that they made two websites, one with aesthetic principles and the other by breaking all of them, with the same subject and functionality for testing, interviews and reviews. The result showed that in nonaesthetic website finding information and reading text was hard for users and usability was low. Elements distributions caused chaos and unprofessional feeling for users and they didn't want to spend more time on it. But the website with aesthetic principles was beautiful, simple and easy. Aesthetic theories made a good graphical user interface in designing website [4].

4.2 The effect of Web Aesthetic on Users First Credibility Perception

When the website is creditable for members they will use it more. Content, aesthetic, availability, and solution for technical problems have effect on credibility. By the first user perceptionfrom the main page, he decides whether or not to continue to visit the web site.Impressing on his judgment on validity, usability and buying things influence website's success. Researchers test the validity of website in a systematic way depending on real users, interactional perceptions, aesthetic factors evaluationin website and their effects on website credibility [5].

They believe that human cognition is involved in aesthetic and their frame for web aesthetic factors, is a combination of interaction and aesthetic calculus. Balance and harmony are also the minimum requirements for achieving unity and make pages beautiful and comfortable for the eye, while contrast and dominance increase user attention and interest. Unity makes it possible for viewers to see related and integrated sections as a whole and it is a goal of every compound design. Unity can achieve harmony, balance, contrast and dominance by size. Pages that have unity in their design are more credible that the others [5].

4.3 The Importance of User in Designing User Interface

Mental model is a mental or internal representation of facts that people use to understand events like that. In finding direction while interacting with new and unknown user interface, expert users use old mental models and novice users use their chance.Existing mental model can be either useful or preventive for expert users (Liu,2009)that depend on the similarities or differences of old and new/unknown models. In practical view, Liu suggests 5 standards for defining complex levels of user interface: (1) ease of manipulation in learning and teaching (2) The breadth and depth of the hierarchy of tasks (3) the amount of information in menu or pop ups (4) the number of elements in menu and pop ups (5) the amount of cognitive source and physical source needed in this operations [6].

The evaluation of usability in different design stages is important and essential to avoid problems from the beginning. The level of experience and expertise of users can affect the problems that could happen in interaction learning time or while interacting with a user interface,so it affects usability [6].

Users cooperation in designing process for understanding users need and choosing subjects (the participants for experiment) for extracting users requirements is a key problem in studying user (Engelbrektsson 2004). In traditional scientific view they used novice users in order to avoid old experiences and habits (Chapanis, 1959). Johnson and Baker (1974) believe that

in experienced users can invalidate the experiment results in product progressing. Users with low experience of using product, do their evaluation just based on the experience of interacting with product (usability), while users with long experience of using product,do their evaluations based on their old experience and also interacting with testing product (Engelbrektsson et al. 2000) [6].

4.4 Designing and Analyzing Website User Interface
According to Herzberg Motivation-Hygienetheory, hygiene factors are out of work itself.If they were not enough they cause high dissatisfaction. Motivation factors are motivating for improvement and success. Hygiene characteristics are necessary for being sure of users satisfaction from user interface, but they are not enough,and motivation characteristics are related to user satisfaction and using website permanently. Individual psychological characteristics, such as resource of control and empowerment / self-efficacy and the effect of web interface features mediate user satisfaction. People are satisfied from a website (presence of both hygiene and motivation factors) or they are dissatisfied from it (lack of hygiene factors). Some motivation and hygiene features are more important for websites than the others [7].

5. Social Network Profile Design

Participantswere asked to draw their demanding home and profile pages. By analyzing results and drawings, a page for home and one for profile was gained. In designing the results pages, the fact that designing user interface according to HCI should be done by users comment and taste, was considered; because aesthetic concentrate on beauty and taste [4] and 75% of website verification is based on aesthetic [5]. If an interface can get users motivation and satisfaction, long term interest will take into exist.Good graphical design also will help information transferring [4]. Then by study and comparison of participant's drawings, we record the results of profile and home in 2 tables, like Table 1then calculate and write down the percentage of each item being in each location.

Item	Left Up	Left Corner	Left Down	Center Up	Center Center	Center Down	Right Up	Right Center	Right Down
	%	%	%	%	%	%	%	%	%

Table 1. How Items Placed in Tables

5.1 A Few Examples of Subjects Designs
As you can see in Table 2 subjects were bachelor students of Shiraz University of technology most of whom have experienced working with different social networks. According to the study of Considering the Importance of User Profiles in Interface Design in order to avoid too much effect of their mental model we also use students that didn't have worked with any social network. The number of subjects consists of 18 participants that conclude 13 women and 5 men. The age interval was from 19 to 23 and from theseparticipants 2 of them had not worked with any social network, 7 of them worked with 1 or 2 social networks and 9 of them had worked with more than 3 social networks.

Number of subjects		18
Female		13
Male		5
Age		19-23
Education		Bachelor students of Sutech
Experience of different social networks	Not at all	2
	1 or 2	7
	3 or more	9

Table 2. Subjects

In Figure 1 some of subjects drawing and designs are presented. For example among drawn home ages 18.75% of participants put messa es (inbox) u p-left like sam ple (5) and sample (2), 6.25% of participants put it up right, 31.25% center-left like sample

1, and 6, 6.25% of participants put it cent er-right and 6.25% put it down-left and 31.25% didn't use it at all like sample 4. Soin final design we put inbox at center-left. Also for profile pages 25% of participants put it up-right, 18.75% center-left like samples 1,4 and 6, 12.5% center-center, 6.25% center right,6.25% down-left and 25 % didn't us e it. So in final design of pr ofile pages we put it up-left.

According to Herzberg motivation-hygiene theory items that are used by more particip ants, recognized as hygiene characteristic and missing them will result in user diss atisfaction.Th ese items are suggested to be used by all social networks. For home pages these items were: name, new feeds, profile picture, friends, applications, posts, search, games, messages, favorites, settings and chat. For profile page the hygiene items consist of name, profile picture, education, friends, posts, personalize, country, messages, favorites, settings and about me Then by gaining statistics from tables and by considering aesthetic principles discussed in section 4, such as gold en section, dynamic symmetry, Gestalt laws, color harmony and Goethe'solor theory a page for home and one for profile were designed. This meansthat in those pages we pu t each item in the place that in tables like Table 1, the highest percentage was allocated to it.
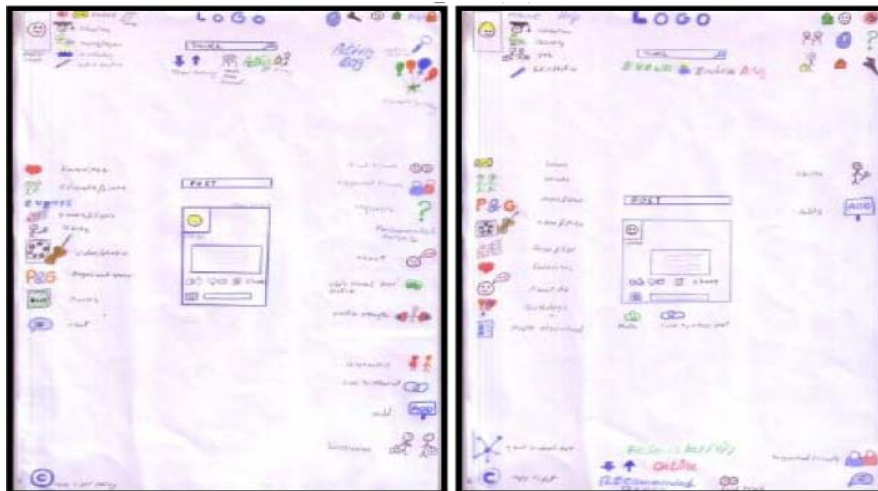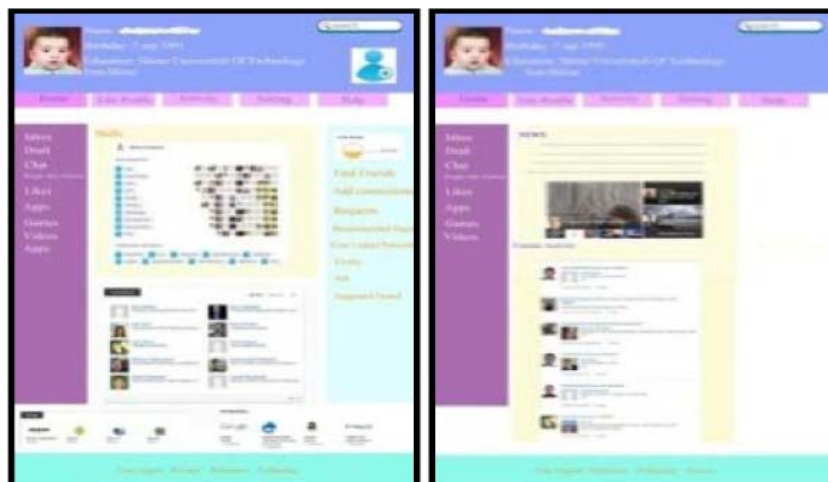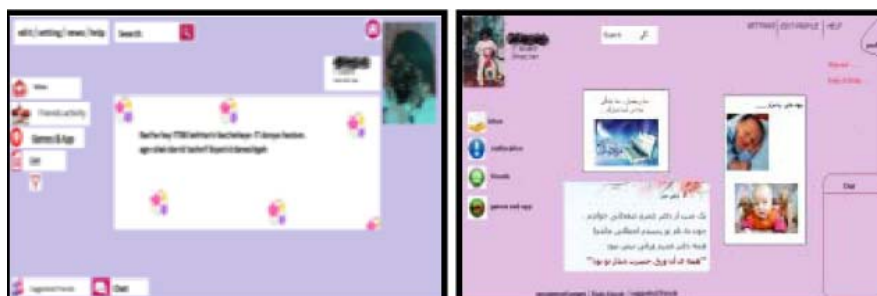

Sample (3)

Sample (2)

5.2 Analyzing Subjects Designs for Home page

In this section according to participant's drawings and designs and human computer interaction laws, we designed a desired home page like Figure 2. The page was divided to 9 parts including up-left, up-c enter, up-right, center-left, center-center, center-right, down-left, down-center, down-right and put items in each location according to the highest percentage in table like Table 1, that is the number of usage of each item by participant's in each section. In cases that the same percentage of participants

Sample (1)

Sample (6)

Sample (5)

Sample (4)

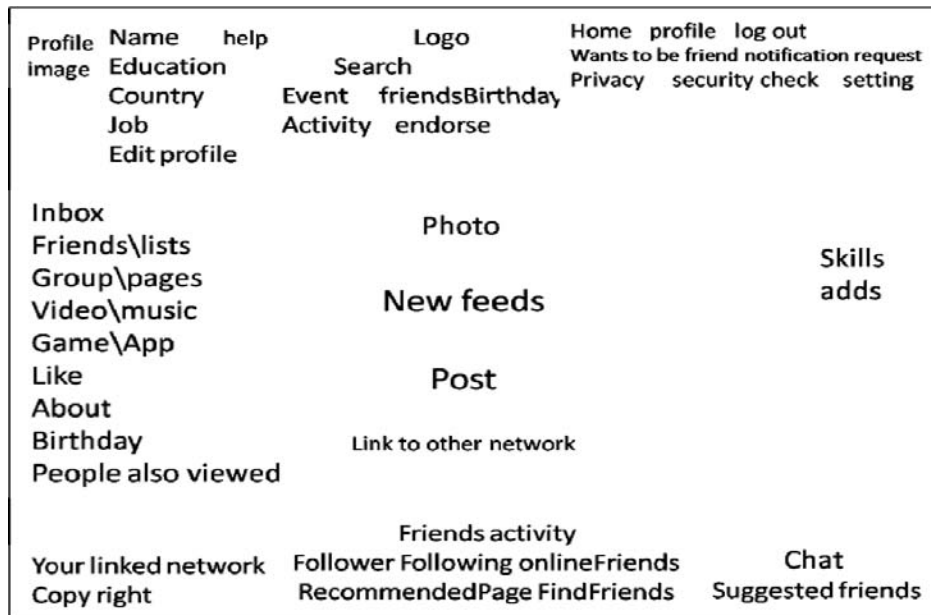Figure 1. A Few Examples of Subjects Designs

Figure 2. The Result of a Analyzing Subjects Designs For Home Page

used items in different sections we select a place that as confirmed by Gestalt laws. For example online friends were used equally in center- up and center-down, so by considering the principle of grouping the same elements, center-down was selected.

As you can see in Figure 2, Herzberg Motivation- Hygiene theory is obeyed and all hygiene items are used, there also exist some motivating items and it also obeys Gestalt laws, because the main standard for aesthetic is mind, spirit and human taste, and Gestalt laws have also been extracted from this characteristic. For example in up-left section, features like name, education, job, country and edit profile is located, that are all characteristics belongs to person (law of proximity), in the section center-up all items belong to the events that happened that d ay or recently are located (law of similarity), the section up-right, first line are items that redirect us to another page (law of common fate). The second line is the requests and news from friends and the third line indicate the cases related to security, personalization and settings (law of similarity).

In section center-left items like messages, game, application, film, music, friends, lists, favorite pages, and most viewed pages that are all social networks tools, are located. In section center-center there are all items related to posts and shared pictures and in right-center advertise and skills are located. At down-right a network from connected people and copy right rules placed and in down-center you can see friend's activity, followers and following, finding friends and new pages are placed (law of similarity) and finally at left-down chat ad suggested friends are located. So by using aesthetic theories, this designing helps people do special task effective and carefully.

We also use Weisstein golden section ($1.618 = height / width = j$) as formatting and as you see rectangle height i s 3.24 and width is 2. As Friedman said golden section in web designing is important and can provide sense of the natural order, harmony, balance and comfort to visitors therefore improve website usability.

Considering that distance learning is on of social networks application, there should exist some icons for visiting others in network, online people technical support, sharing and interaction between learners and ease of imagine and manipulating information and application [8], that all above mentioned, exist here. It is completely impossible to expand a mathematical theory for means during aesthetic and aesthestic is an action that human perceptions are highly involved in it [5] so we use analysis of participant's drawing for designing home page. We also use both novel and expert users as subject.

5.3 Analyzing subjects designs for profile page

Considering obtained statistics from subject's designs and the locations that they put items, the profile page in Figure 3 was designed. As you see related items are close to each other. For example items like name, education, region, birthday, profile picture that are all personal information are placed up-left (Law of Proximity). Items like pages, groups, games, videos, lists and
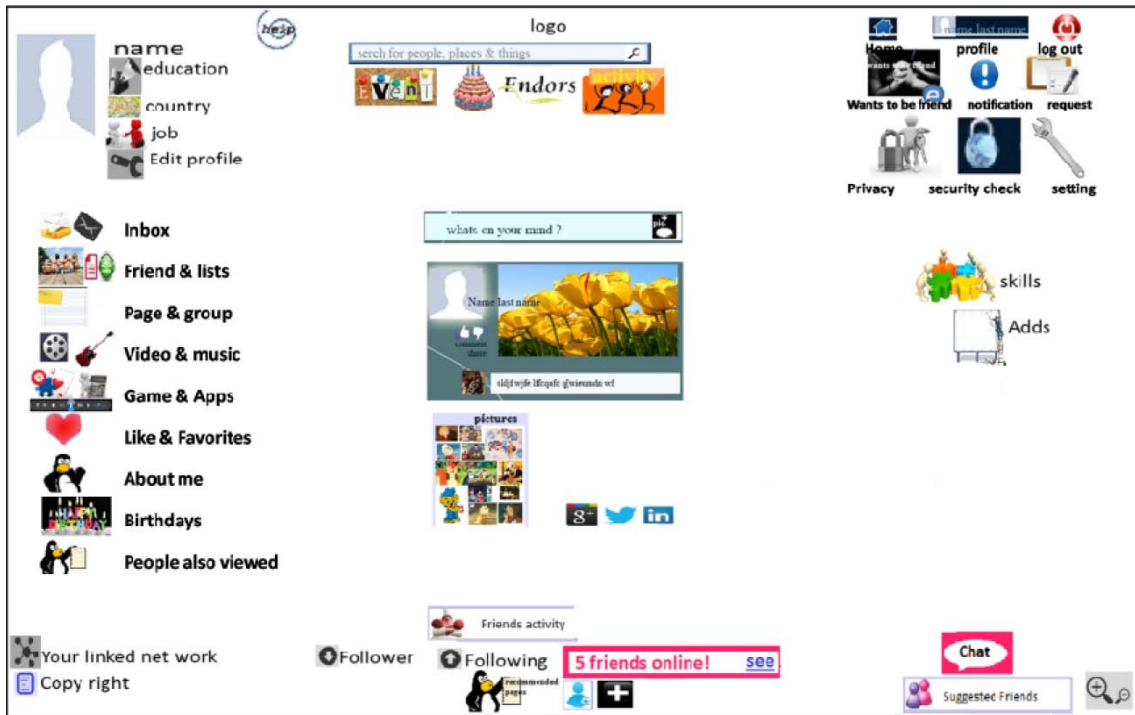
Figure 4. Page Designed for Home

Figure 5. Page Designed for Profile

etc. that are tools are in the center-left. Suggested friends, suggested pages, searching friends, profile viewers and etc. are at center-right. Items like setting, help, security check, personalization (Law of Similarity) are located at up-right. Notification, friend request, etc. are center-up. According to the above mentioned, the harmony between things can be seen mean that the items that their use is in same field are close to each other that is a confirmation to Gestalt theory. This picture also use golden section (1 .618 = height / width = φ) and the rectangle width is 2 and its height is 3.24.

6. Conclusion

Figure 4 and 5 are the final results of this article. After studying previous works and analyzing subject's designs and by using Gestalt laws, Herzberg Motivation-Hygiene theory and aesthetic principles we find an appropriate location for placing items in home and profile pages and analyze them, then we review the icons that were used by subjects; for example all subjects have used envelope for messages (inbox) and used magnifier for search, so we use these icons in model designs. According to the icons subjects used in their designs and found locations in Figure 2 and 3, and mentioned theories, home and profile pages are designed and analyzed and an aesthetic, beautiful, efficient and user-friendly interface obtained.

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