

EXPLORING THE MEANING OF COMFORTABILITY IN WEB SITES: THE KANSEI APPROACH

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Abstract: Information Technology is becoming ubiquitous. Our lifestyle is changing due to this digital revolution. Many researchers had been working on exploring the meaning and ways to realize the comfortability in physical sites. With the appearance of huge amount of Web sites, which provide a variety of services like electronic commerce, network game, search engines and so on, there are many researchers working on the definition of Web Usability. In this research, we go one step forward, by exploring the meaning of Web Comfortability, based on Kansei Engineering methods.

Keywords: Web Usability, Web Comfortability, Kansei Engineering, Semantic Differential (SD)

1. Introduction

With the appearance of huge amount of Web sites, which provide a variety of services like electronic commerce, network game, search engines and so on, there are many researchers working on the definition of Web Usability. As a result, there are rule books and suggestions about building “Usable Web Sites”[1].

Many researchers had been working on exploring the meaning and ways to realize the comfortability in physical sites, in planes as well as in spaces. We believe that it is important to study the meaning of comfortability in Web sites as well, where this new paradigm of Web Comfortability goes beyond the concept of Web Usability.

In the same way that we visit more frequently and stay longer in physical places where we feel “comfortable”, we believe that applying the same feeling in virtual Web sites will be a key factor to become winner in this battle of Web sites to retain users.

The way of interacting with Web sites is based on two senses: audio and visual. So, it is very important to pay attention to the visual aspect, i.e. the design. In the case of design elements like layouts and combination of colors, the user can get at first sight the feeling of pleasant or unpleasant. If he feels unpleasant, he might go immediately to other site.

Thus, in this paper, we focus our attention to the influence of design elements -especially layouts- for Web sites in the concept of comfortability.

2. Kansei Engineering Approach

Kansei Engineering is a consumer-oriented technology process used to develop products. It uses the consumer’s feelings (Kansei) as a guideline in creating the product. In order to do Kansei Engineering, one must first determine the Kansei words suitable for the product to be designed. Designers would then create different concepts out of these words. After creating the concepts, these

concepts would then be presented to the consumers and rated with the same Kansei words gathered before to determine if the product has matched the Kansei. The rating test contains scales of 1 to 5 with antonym Kansei words on both ends. The process may continue to cycle until the people involved in the development are satisfied with the results[2].

The Kansei Engineering steps are in order to explore the meaning of comfortable in Web sites are:

- (1) Collection and arrangement of target Web sites
- (2) Collection and arrangement of Kansei words (as adjectives) which are able to express the image of target Web sites
- (3) Sensitive evaluation of the target Web sites, based on the selected adjectives. A 5-scale Semantic Differential method (to be explained later) is used.
- (4) Analysis, e.g. categorical regression analysis, correlation analysis, etc.

Semantic Differential (SD) [3] uses a number of rating scales, in this case a 5-scale with -2,-1,0,+1 and +2, where users rate bipolar “adjective pairs”, e.g. good-bad, heavy-light, etc. This is a technique for obtaining meaning space of man's feelings, by giving numerical values to bipolar adjectives (i.e. opposite) to facilitate the analysis.

3. Investigation Process

3.1 Extending the meaning of comfortable from physical sites to web sites

In the same way that it is important the visual aspects of color and structure in planes and spaces, the same is valid for virtual spaces.

Thus, we will investigate the influence of layout of Web sites based on Kansei Engineering approach, through Sensibility measurements, such as SD method. In these experiments, human are regarded as a measuring instrument and their psychological

reaction is studied.

Most of the adjectives were obtained from the brain storming session about comfortability in Web sites, with words expressing sensibility and emotions.

Some of the adjectives selected to express the Comfortability are: Uniform, Simple, Calm, Cute, Beautiful, etc.

3.2 Layout Patterns

The following 8 common layouts patters [4] shown from Fig. 1 to Fig. 8 were used. The corresponding abbreviations are shown in the parenthesis. The detailed explanations of each of the layouts were omitted due to the space constraints.

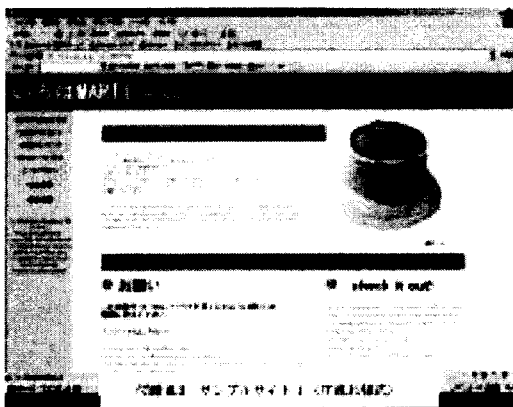


Fig. 1: Right/Left (R/L)

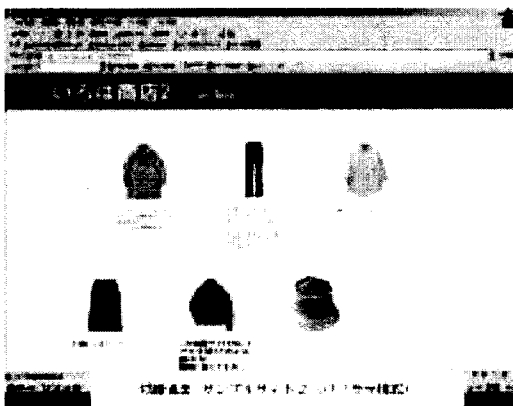


Fig. 2: Panorama (Pan)

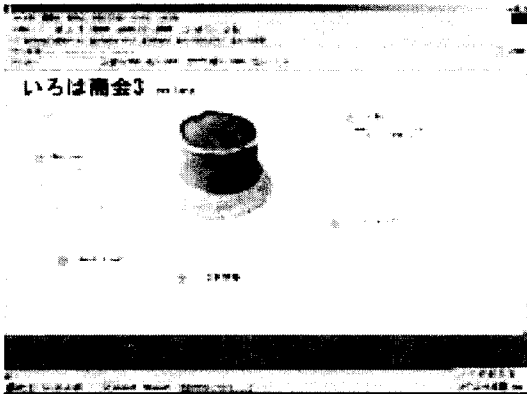


Fig. 3: Satellite (Sat)

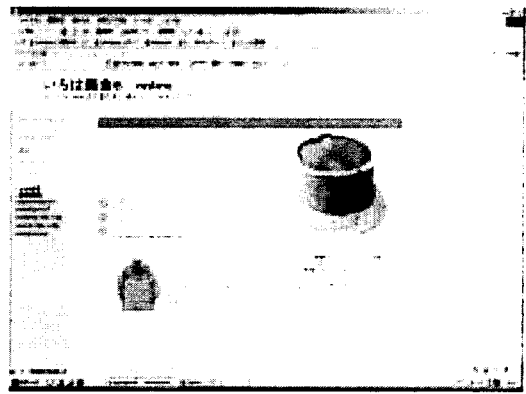


Fig. 6: Dispersion (Disp)



Fig. 4: Photo (Ph)



Fig. 7: One slope (1Slp)

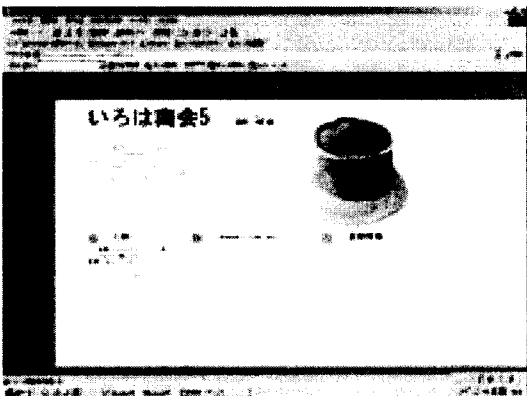


Fig. 5: Enclosed (Enc)

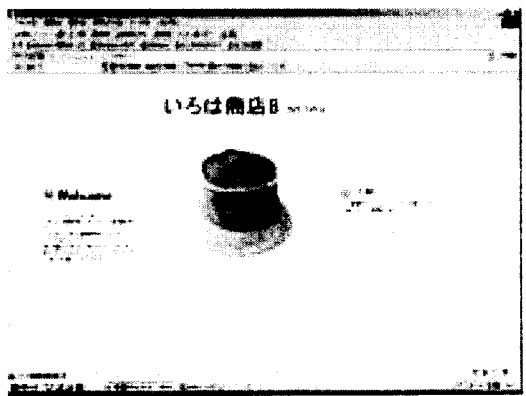


Fig. 8: Simmetry (Sim)

The Kansei words related to comfortability used in the evaluation were extracted from brainstorming session (as explained before) as well as from Kansei Engineering literatures. We have got a set of 9

bipolar (or opposite) adjectives to be evaluated on a 5-scale with the SD method: Comfortable — Uncomfortable, Calm — Dynamic, Simple — Complex, Beautiful — Awkward, Familiar — Unfamiliar,

	R/L	Pan	Sat	Ph	Enc	Disp	1Slp	Sim
Comfortable	0.30	0.44	0.44	0.30	0.02	0.58	0.78	0.18
Calm	0.12	0.38	0.04	-0.04	0.38	0.50	0.82	0.62
Simple	0.92	1.46	0.64	-0.1	1.16	0.86	1.08	1.38
Beautiful	0.46	0.30	0.44	0.78	-0.02	0.50	0.84	0.32
Simple	0.54	0.68	0.66	0.58	0.04	0.46	0.44	0.26
Like	0.46	0.24	0.44	0.54	-0.28	0.10	0.48	0.04
Uniform	0.68	0.58	0.16	0.08	0.34	0.14	0.38	0.32
Reliable	0.34	0.24	0.30	0.38	0.01	0.38	0.18	0.16
Safe	0.42	0.26	0.24	0.36	0.10	0.28	0.26	0.24
OVERALL RATE	0.47	0.51	0.37	0.32	0.19	0.42	0.59	0.39

Table 1: Average of Simple Statistical Analysis of SD Method applied to the 8 Layouts

Uniform – Not uniform, Like – Dislike, Reliable – Unreliable, Safe – Unsafe

4. Performed Analysis

4.1 Simple Statistical Analysis

50 male and female students from 18 to 24 years have participated in the experiments of evaluating the 8 web layouts based on SD method.

Based on these evaluations, Simple Statistical Analysis, such as calculation of average were performed, the results are summarized in Table 1.

We can see that the bigger the value of the average is, the better that Web layout corresponds to that Kansei word.

First, we have asked to the participants in a straight way the image of “Comfortable” for the 8 layouts, and the average are shown in the first row of Table 1. From the results -regarding “Comfortable”- we can see that 1Slp (av. 0.78) gives the best image, while Enc (av. 0.02) gives the worst image.

In the same way, in Table 1, it is possible to see for each factor or Kansei words i.e. Calm, Simple,

Beautiful, Like, Uniform, Reliable and Safe, the Web layouts with the corresponding image values.

In the last row of Table 1, we have calculated the Overall rate as the average of the factors previously mentioned. We can observe from the values that 1Slp (av. 0.59) gives the best overall value. On the other hand, it is important to note that Enc (av. 0.19) gives the worst value for the overall calculation, as well as for most of the individual factors.

4.2 Correlation Analysis

In order to check the correlation among the Kansei words used, we have performed a Correlation Analysis, using SPSS. The results of the correlation factors are shown in Table 2. Correlation factors bigger than 0.6 mean that there are some correlations, while factors less than 0.3 mean no correlation.

We can observe from the results that there are some correlations between Comfortable-Calm (0.645), Comfortable-Like (0.651). The other correlated factors are Beautiful-Like (0.669), Safe-Reliable (0.657), Like-Familiar (0.701) and Like-Reliable (0.602).

	Comfort.	Calm	Simple	Beauty	Familiar	Like	Uniform	Reliable	Safe
Comfort.	1.000	<u>0.645</u>	0.272	0.553	0.588	<u>0.651</u>	0.414	0.482	0.536
Calm	<u>0.645</u>	1.000	0.416	0.495	0.399	0.547	0.479	0.433	0.548
Simple	0.272	0.416	1.000	0.165	0.200	0.190	0.353	<u>0.080</u>	0.249
Beauty	0.553	0.495	0.165	1.000	0.460	<u>0.669</u>	0.459	0.506	0.534
Familiar	0.588	0.399	0.200	0.450	1.000	<u>0.701</u>	0.363	0.417	0.473
Like	<u>0.651</u>	0.547	0.190	<u>0.669</u>	<u>0.701</u>	1.000	0.444	0.564	<u>0.602</u>
Uniform	0.414	0.479	0.353	0.459	0.363	0.444	1.000	0.480	0.569
Reliable	0.482	0.433	<u>0.080</u>	0.506	0.417	0.564	0.480	1.000	<u>0.657</u>
Safe	0.536	0.548	0.249	0.534	0.473	<u>0.602</u>	0.569	<u>0.657</u>	1.000

Table 2: Results of Correlation Analysis for each of the Kansei words used.

4.3 Categorical Regression Analysis

In order to check the influence of the Kansei words on the comfortability of web sites, we have performed Categorical Regression Analysis, using SPSS. As a result, we have obtained a “comfortability function” which expresses the comfortability as a weighted sum of Kansei words, as shown below.

$Y(\text{comfortability}) =$

$$0.373 \times \text{Calm} + 0.04871 \times \text{Simple} + 0.108 \times \text{Beautiful} + 0.239 \times \text{Familiar} + 0.150 \times \text{Like} - 0.05251 \times \text{Uniform} + 0.05249 \times \text{Reliable} + 0.138 \times \text{Safe}$$

For this case, we have the values $R=0.787$, $R^2 = 0.619$, where $R > 1$ indicates that the obtained function is good to represent the comfortability in terms of the given Kansei words.

On the other hand, the value of H_0 is $0.00 < 0.005$, which indicates that this function’s ability to predict values of comfortability.

By replacing the average of each of the factors or Kansei words -calculated in the Simple Statistical Analysis- we have calculated the comfortability of each of the 8 Web layouts under study.

The resulting order is shown in the Table 3. From the results of calculation with the comfortability function –summarized in Table 3- we can see that the layouts 1Slp (0.648), Disp (0.457) and Pan (0.456) gives the higher values for comfortability, while the layouts Sat (0.356), Ph (0.349) and Enc (0.156) gives the lower values. Note the poor value of this last Enc (0.156) in comparison with the other layouts.

Order	Layout	Point
1	One Slope (1Slp)	0.648
2	Dispersion (Disp)	0.457
3	Panorama (Pan)	0.456
4	Symmetry (Sym)	0.423
5	Right/Left (R/L)	0.371
6	Satellite (Sat)	0.356
7	Photograph (Ph)	0.349
8	Enclosed (Enc)	0.156

Table 3: Layouts ordered by results of comfortability function

What we can say in common from the Simple Statistical Analysis and the Categorical Relation Analysis is that in both analyses, the best corresponds to 1Slp, while the worst corresponds to Enc. The differences in order between both analyses for the other layouts may be due to the low influence of some of the Kansei words on the comfortability function.

5. Results

From the results of the analysis we give the following recommendations.

- (1) The layouts giving positive images of comfortability are those with the “sense of relief” and “open world”. For example, 1Slp with plenty of free blank spaces at the right side, Disp and Pan which give the “sense of relief”, where the user’s glance can come from any of the directions.
- (2) The layouts giving negative images of comfortability are those with the “sense of closed world”, and “center-stable”. For example, Ph and Sat, with pictures concentrated in the center of the page, and Enc, in which the central picture is surrounded by colors, giving the image of “closed world”.
- (3) Also, layouts giving negative images where those with too much text, like R/L and Sat.

6. Conclusions and Future Works

In this research, we have explored what is the proper layout of a comfortable web site from the Kansei Engineering approach. To do so, we first have investigated the layout of several Web sites in order to extract Kansei words which express the image of comfortability for such sites. Next, based on Categorical Regression Analysis, we have found a function which expresses the comfortability as a

weighted sum of Kansei words. According to our findings, the weights of the Kansei words Calm, Familiar and Like were the higher in this comfortability expression. We have applied this function to each of the design layouts, in order check the layouts that give the image of comfortability in Web sites.

According to this calculation, the more comfortable layouts are those which give the sense of “relief” and open, like 1Slp, Disp and Pan layouts.

On the other hand, the “uncomfortable” layouts are those providing the sense of “closed and limited world”, such as Enc, Ph and Sat layouts.

Our future works include applying the method we have proposed, in order to study the influence of other design factors such as combination of colors on the comfortability. Also, we will extend our research to more dimensions, as the current study is mainly on two-dimensions, i.e. the page layout.

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