Nov 17th, 12:00 AM

# Cyber-Rates: A Platform for Understanding Designer's Kansei.

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The objective of this research was to categorize Internet users by identifying their cyber-rate (abilities and activities when browsing on the Internet) and use this categorization as a platform for exploring designers' perception abilities and therefore improve information-design on the Internet. Comparing low and high ranking subjects might be a window for understanding the way kansei (Japanese for emotions, feelings, perception, etc.) acts in the brain. In the first stage, Internet users were interviewed about their abilities and categories were obtained. Based on the Protocol Analysis Method, subjects were asked to execute eight tasks on the Internet and were recorded on video. Retrieved data showed 78 actions from voice recording, and the importance of the words was statistically analyzed using Discriminatory and Multiple Regression Analysis. The resultant factors were named 'evaluation-rate', 'privacy-rate' and 'amusement-rate', which were assigned respectively to the 'X, Y and Z' axes of a 3D-viewer for dynamic observation and then related to user's variables such as 'gender', 'field of study' and 'Internet hours per day'. The hypothesis that these three factors can be measured with the eight tasks was proven and showed potential for use in information-design and Internet behavior studies. Further research will comprehend the development of a tool for measuring cyber-rates, based on the method applied in this study.

# CYBER-RATES

***A cyber-rate tool as a platform for understanding designer's kansei***


## ABSTRACT

The progressive generations involved in computer-based design are increasing extraordinarily. Browsing on the Internet has become a common activity, although some people go beyond the standards. Designers, accustomed to using computers and other devices as interfaces for communicating, buying, investing, and all those everyday activities that instead of being done physically could be done virtually, have an important role in this research, that aims to create a tool for grouping particular profile internet users. Categorizing users abilities and activities on the Internet (cyber-rate) and comparing low and high ranked subjects might be a window for understanding the way *kansei* (Japanese for emotions, feelings, perception, etc.) and the brain work together.

In the first stage Internet users were interviewed about their abilities. Categories were obtained from a questionnaire focused on profiles. Based on the Protocol Analysis Method, subjects were asked to execute eight tasks on the Internet. Records of their activities were simultaneously described by the subjects and recorded on video. The retrieved data was analyzed in order to obtain the keywords that reflected the whole experience through their interaction with the screen. Results showed 78 actions from voice recording. Data process started by listing the number of times the words appeared in the recorded tasks, the order of preferences was settled and then an analysis of the words importance was carried out using Discriminatory Analysis and Multiple Regression Analysis. The resultant groups were time, field of study and browsing hours, representing $1^{st}$, $2^{nd}$, and $3^{rd}$ factors (X, Y and Z axis). The hypothesis that these variables can be measured with this task's method was proven and showed the potential for use in future research on Internet behavior. Further research will comprehend the development of a tool for measuring cyber-rates, based on the method applied in this study. The objective will be to identify if a subject has a low or high cyber-rate and if this can be used as a base for targeting designers in an attempt to explore their perception abilities and therefore improve information-design on the Internet.

## 1. INTRODUCTION

An Internet user often interacts in an artificial environment designed for facilitating several activities. However, people facing the Internet may react differently based on their backgrounds. The ability to concentrate or to coordinate inside a screen might change from user to user. If Internet users could be identified according to their "cyber-rate" (users abilities and activities on the Internet), based on the idea that the way a product is perceived by a low cyber-rate designer is different from the one of a high cyber-rate designer, the platform for studies of [∝]*kansei*[1] (Japanese for emotions, feelings, perception, etc.) in a reliable group of qualified subjects might reveal useful data for the design and marketing fields. Testing low and high cyber-rated target groups for evaluating product designs, might also show a deep level of concentration in high cyber-rate designers. Additional studies for understanding emotional tasks, and proving that perception is developed in a different way when subjects are forced to use their imagination, are part of this basement for new studies. Since being able to properly browse on the Internet implies building scenarios inside a non-existent world, furthermore, in the marketing and design world, understanding how gradually the physical common activities are substituted by virtual actions is a field expecting to be explored with profitable possibilities in the future[2].

Japanese Akio Mori's research [3] showed a link between the playing of video games and the balance of activity in the brain. Do these sorts of studies show us that people used to many devices may be able to perceive in a different way?[4]

The way the Internet environment is designed makes every search a complex task, since there might be different accesses to reach the same objective. On one hand there is the route to follow, full of links and possibilities, on the other the marketing attempts to pull the users through attractive visual designs[5]. When facing the cyberspace, user's interaction and ability for browsing might vary based on their backgrounds.

Marketing research for understanding users reaction to product design, advertisement, and Internet, is based on a group of subjects with certain qualities. Categorizing peoples abilities based on their cyber-rate, may yield a correlation between people with a high cyber-rate and their response to certain types of stimuli such as images or sounds.
Designers stand out among people with high tendency to use their imagination[6]. Are designers beyond the standards because of their constant exposure to creative situations?

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[∝] The word "*Kansei*" is interpreted variously and has been used in many researches related with not only design but also other research fields. It is a concept that inclusively involves the meaning of words such as sensitivity, sense, sensibility, feeling, aesthetics, emotion, affection and intuition.

## 2. PURPOSE OF RESEARCH

This research aims to create a tool for grouping particular profile Internet users by categorizing them according to their cyber-rate. Designers are main targets since they participate strongly in the development of the cyberspace. The results might show widely the link between creativity and behavior, in other words, how *kansei* and the brain work together when a subject browses on the Internet.[7]

## 3. METHOD

a) A questionnaire was created for obtaining the panoramic view and computer expertise of 10 subjects from different countries with different backgrounds. Their knowledge and abilities regarding computers varied, although they all were used to browsing on the Internet. The data and activities retrieved are shown on figures 1a and 1b.

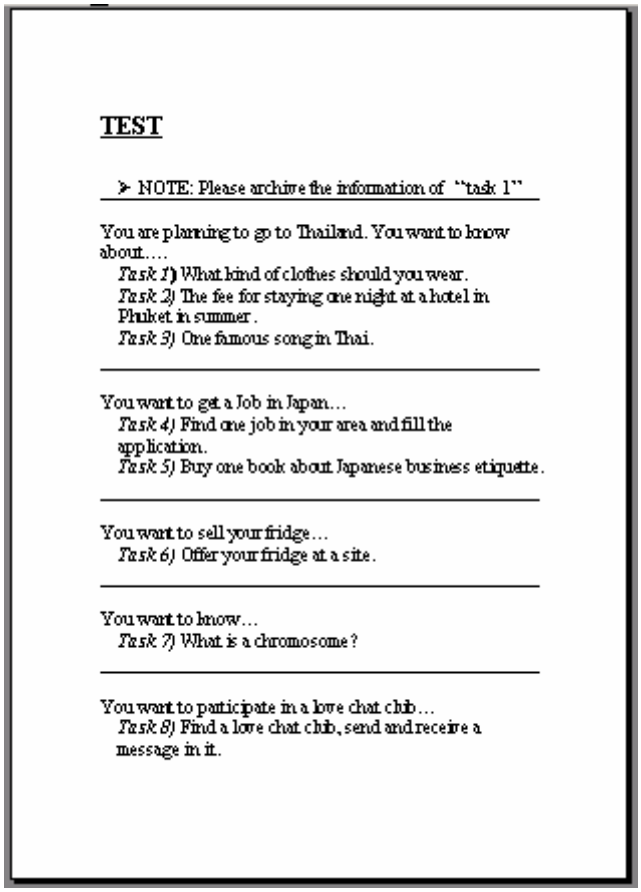
| *Data/ Subjects* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* |
|---|---|---|---|---|---|---|---|---|---|---|
| Age | 26 | 26 | 33 | 33 | 25 | 29 | 25 | 29 | 25 | 32 |
| Gender | M | F | F | M | F | M | F | M | M | M |
| Nationality | Fr | Kr | Ch | Kr | Ch | Mx | Aus | Jp | Mx | Mx |
| Field of study | Eng | Dsg | Dsg | Dsg | Dsg | Pub | Bio | Psy | Eco | Eng |
| Internet hours a day | 5 | 7 | 6 | 3 | 3 | 10 | 2 | 7 | 3 | 10 |

Figure 1a. Data retrieved from Questionnaire.

| *Activities/Subj* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* |
|---|---|---|---|---|---|---|---|---|---|---|
| Email | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| News | Y | Y | Y | Y | N | Y | Y | N | Y | Y |
| Radio | Y | Y | N | Y | N | Y | N | N | N | N |
| Messenger | Y | Y | Y | Y | Y | Y | N | Y | N | Y |
| Shopping | Y | Y | Y | Y | Y | Y | N | N | Y | N |
| Downloads | Y | Y | N | Y | Y | Y | N | N | N | Y |
| Searching | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| Web manage | Y | Y | N | N | N | N | N | N | N | N |
| Reservations | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |

Figure 1b. Activities retrieved from Questionnaire.

b) A Test was made based on the Protocol Analysis Method (Fig. 2). Subjects participated solving eight browsing tasks on the Internet, which were created based on the questionnaire answers (Fig.1b) and aimed to capture the main actions that people often do when browsing on the Internet.



**TEST**

➢ NOTE: Please archive the information of "task 1"

You are planning to go to Thailand. You want to know about….
*Task 1)* What kind of clothes should you wear.
*Task 2)* The fee for staying one night at a hotel in Phuket in summer.
*Task 3)* One famous song in Thai.

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You want to get a Job in Japan…
*Task 4)* Find one job in your area and fill the application.
*Task 5)* Buy one book about Japanese business etiquette.

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You want to sell your fridge…
*Task 6)* Offer your fridge at a site.

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You want to know…
*Task 7)* What is a chromosome?

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You want to participate in a love chat club…
*Task 8)* Find a love chat club, send and receive a message in it.

Figure 2 Test for subjects.

The test concerned five sections: amusement, education, commerce, knowledge, and communication, distributed on eight tasks: clothes, hotel, song, job, book, fridge, chromosome and love-chat. In each section the subjects were asked to solve a situation by browsing on the Internet and simultaneously describe their actions. Subjects worked in a private room without a time limit.
A video of the screen was taken recording also the subjects' voice (Fig 3).

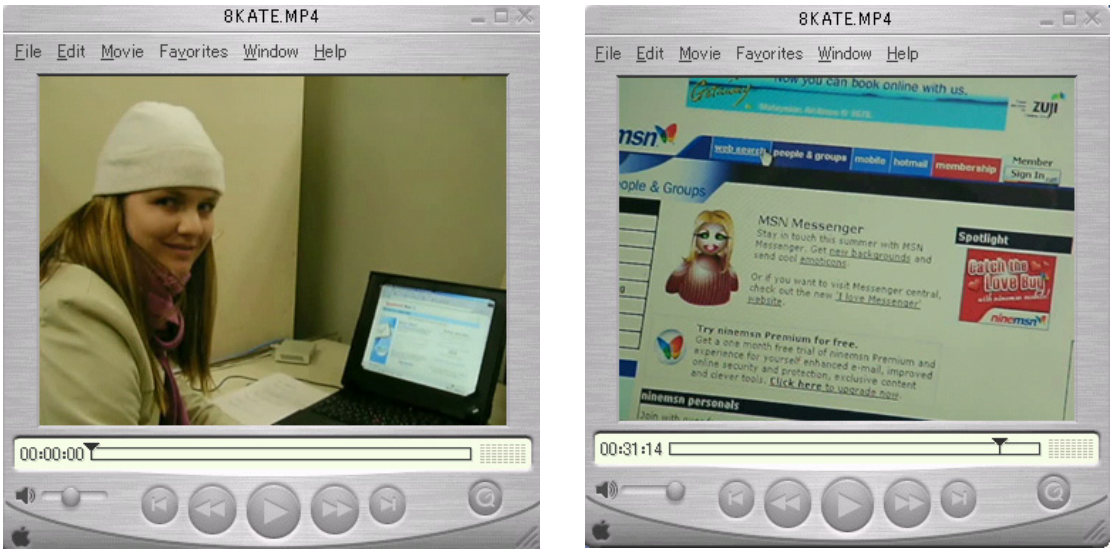



Figure 3 Video of test.

## 4. RESULTS

From the audio of the subjects, 78 actions were obtained (Fig. 4). The actions were organized on a table that finally showed the number of repetitions of each action verb, and their appearance order.

There was a focus on *voice data* as the first stage for analysis in the present research, leaving the *observed data* for a further complete study.

| | | | |
|---|---|---|---|
| add | find out | make | say |
| apply | finish | make use of | see/look |
| buy | forget | mistook | sell |
| can | get/receive | move | send |
| change | get in/get to/access | need | spread |
| check/consult | get out | open | specify |
| choose | give up | order | subscribe |
| click | go back | participate | talk |
| close | go to | paste | tell |
| come | have | pay | to think |
| continue | have a look | pay attention | translate |
| copy | highlite | play/reproduce | try |
| decide | input/put | push/press | type in |
| do | keep going | read | use |
| enter | know | realize | visit |
| erase | listen | register | wait |
| explore | log in | remember | want |
| fill in | look for/search | repeat | work |
| find | maintain/let | save/keep | write |

Figure 4 The 78 actions obtained from subjects' voice.

The actions were organized in a matrix in order to obtain the times each action was repeated through the sections as shown on figure 5.

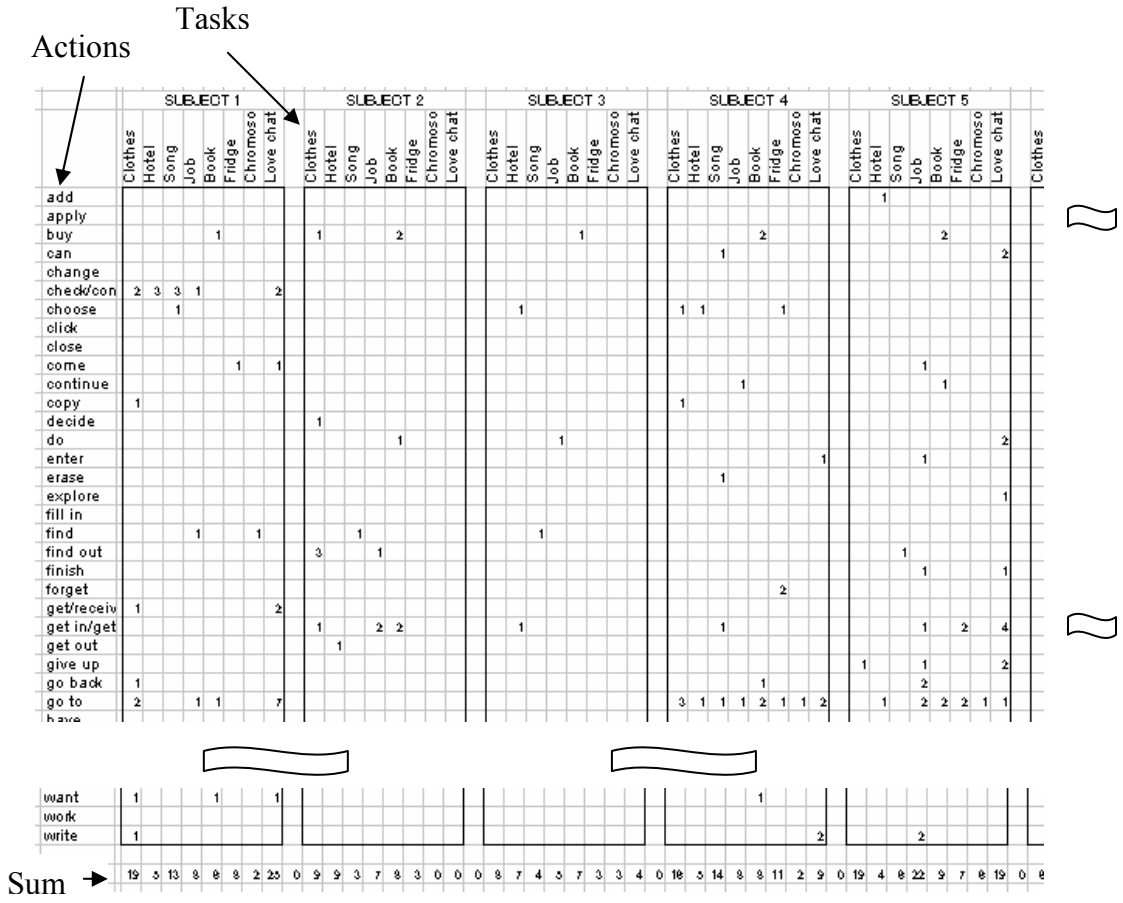



Figure 5 Retrieved actions from subjects' voice

In addition to the questionnaire variables (Fig.1a): age, gender, nationality, field of study, and Internet hours a day. The time each subject took on fulfilling the test was also retrieved as "time taken" (Fig.6) and considered for the analysis.

| *Data/ Subjects* | *1* | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* |
|---|---|---|---|---|---|---|---|---|---|---|
| Time taken | 53 | 44 | 39 | 46 | 39 | 29 | 34 | 37 | 41 | 44 |

Figure 6. Time taken on finishing the test.

## 5. DATA ANALYSIS

The data analysis was first made using Principal Component Analysis (PCA). The data obtained was the result of processing the total of words repeated for each of the subjects through the eight tasks (Fig.7)

| PRINCIPAL COMPONENT ANALYSIS | | | | | |
|---|---|---|---|---|---|
| | 1st Factor | 2nd Factor | 3rd Factor | 4th Factor | 5th Factor |
| Eigen Value | 2.731316 | 2.4302363 | 1.1987277 | 0.7457143 | 0.560036 |
| Contrib.ratio(%) | 34.14145 | 30.377953 | 14.984096 | 9.3214285 | 7.0004501 |
| TOTAL (%) | 34.14145 | 64.519404 | 79.503499 | 88.824928 | 95.825378 |
| | | | | | |
| FACTOR SCORE | | | | | |
| | 1st Factor | 2nd Factor | 3rd Factor | 4th Factor | 5th Factor |
| **(Clothes) 1** | 0.4454902 | 0.1916591 | -0.184509 | -0.512207 | -0.416035 |
| **(Hotel) 2** | -0.295542 | -0.49712 | 0.113 | -0.046886 | 0.2562871 |
| **(Song) 3** | 0.4515466 | -0.161862 | 0.3555518 | -0.141191 | 0.5896236 |
| **(Job) 4** | 0.4916154 | -0.138859 | 0.3168575 | 0.3651443 | -0.140717 |
| **(Book) 5** | 0.4599351 | -0.254981 | -0.249671 | 0.419135 | -0.119922 |
| **(Fridge) 6** | 0.1991604 | 0.3953312 | -0.483339 | -0.052899 | 0.6154101 |
| **(Chromosome) 7** | -0.127805 | 0.5188898 | 0.0856835 | 0.604428 | 0.0244129 |
| **(Love-chat) 8** | 0.0327745 | 0.4243923 | 0.6504446 | -0.195895 | -0.008238 |
| | | | | | |
| SAMPLE SCORE | | | | | |
| | 1st Factor | 2nd Factor | 3rd Factor | 4th Factor | 5th Factor |
| **SUBJECT 1** | 0.6593121 | 0.622391 | 0.9073673 | -1.881771 | -0.090852 |
| **SUBJECT 2** | -1.515123 | -2.834121 | -0.572132 | -0.380349 | -0.445591 |
| **SUBJECT 3** | -1.644291 | -1.423168 | -0.180752 | 0.2000188 | -0.436013 |
| **SUBJECT 4** | 0.8479405 | -0.171667 | -0.648532 | -0.998359 | 0.6445661 |
| **SUBJECT 5** | 1.2914794 | 1.0548763 | 0.5549317 | 0.4590532 | -1.2984 |
| **SUBJECT 6** | -1.342235 | -0.128484 | 0.5051608 | 0.7952651 | 1.213568 |
| **SUBJECT 7** | 3.1113478 | -1.705885 | 1.0869584 | 0.8675196 | 0.3393353 |
| **SUBJECT 8** | -2.076063 | 1.7433174 | 1.186642 | 0.3966036 | -0.430909 |
| **SUBJECT 9** | -0.276902 | 1.7945818 | -0.419796 | 0.0600345 | 0.8184371 |
| **SUBJECT 10** | 0.9445348 | 1.0481597 | -2.419849 | 0.481984 | -0.314141 |

Figure 7 Data obtained after Principal Component Analysis (PCA).

Results showed that the *Eigen value* was over 1.0 on 1st, 2nd and 3rd factors. Therefore, the analysis was based on these three factors.

Based on the FACTOR SCORE DATA:

The 1st factor showed higher similar values on the tasks 1, 3, 4 & 5 (“clothes”, “song”, “job” and “book”). From the opposite value of task 2 (“hotel”), that showed lower contribution to the 1st factor, it could be said that the subjects tended to interpret the “hotel” task as a public variable instead of browsing based on their personal preference as they did on the “clothes”, “song”, “job” and “book” tasks. Subjects might act on the latter showing subjectivity and browse on the “hotel” task based on set means, such as looking for the cheaper price.

The 2nd factor showed a similar group on tasks 6, 7, & 8 (“fridge”, “chromosome” and “love chat”) opposite to the value of task 2 (“hotel”). The interpretation involves the practical judgment of a proceeds oriented task (“hotel”) opposite to the personal judgment applied mainly to the “love chat” task, and in a lower plane to the tasks “fridge” and “chromosome.

On the 3rd factor there was a positive value on tasks 3, 4 & 8 (“song”, “job” and “lovechat”) opposite to the lower contribution of task 6 (“fridge”). The observed data might show a tendency of subjects to consider “song”, “job” and “lovechat” as related with their *kansei* since involves their mental status, and to separate “fridge” as an object that doesn’t involve any particular feeling.

Based on the SAMPLE SCORE DATA AND VARIABLES

In order to understand the meaning of the “X, Y and Z” axis, the data was treated graphically using the 3D-viewer software [8] shown in figure 8.

"Coordinate-variable values", were input on the 3D-Viewer: the PCA sample score of each of the subjects on the 1st, 2nd, & 3rd factors plus a 4th variable (Figs. 1a & 6) one at a time (X,Y,Z,variable). Each subject was identified using the cluster color index and afterward the axis was rotated to observe the relationships (e.g. on Fig.8: subject 1 (0.65,0.62,0.90,7) meaning the 1st, 2nd & 3rd factors' value and color 7 for women (which was 1 in the men's case)).

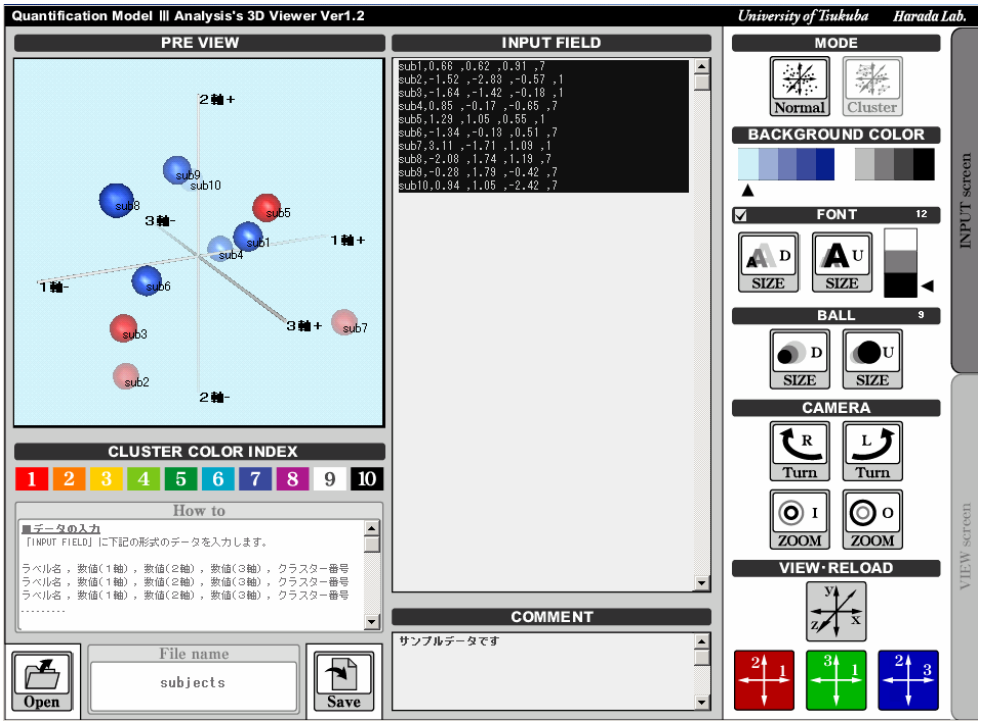



Figure 8 The 3-D Viewer main screen.

A second analysis was made based on the Discriminatory Analysis of the 1st, 2nd & 3rd factors of the sample score for each of the subjects (Fig.9).

Analysis by STATISTICA

| | Canonical correlation | Normalized canonical factor value | | | Contribution by first canonical value | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Factor 1 | Factor 2 | Factor 3 | | | Factor 1 | factor 2 | factor 3 |
| 1. Age | 0.5336623 | -0.84 | 0.317 | -0.634 | Young | Elder | 0.298 | -0.109 | 0.323 |
| | | | | | p=.50000 | p=.50000 | -0.298 | 0.109 | -0.323 |
| 2. Gender | 0.7181044 | -0.32 | 0.997 | -0.344 | M | F | -0.139 | 0.618 | -0.227 |
| | | | | | p=.60000 | p=.40000 | 0.209 | -0.927 | 0.34 |
| 3. Nationality | 0.4570594 | -0.893 | -0.529 | 0.161 | Occidental | Oriental | 0.255 | 0.151 | -0.064 |
| | | | | | p=.50000 | p=.50000 | -0.255 | -0.151 | 0.064 |
| 4. Field of Study | 0.5120379 | -0.299 | -0.937 | -0.373 | Nondesign | Design | 0.075 | 0.279 | 0.142 |
| | | | | | p=.60000 | p=.40000 | -0.112 | -0.418 | -0.213 |
| 5. Internet hrs. | 0.6708475 | -0.992 | -0.267 | -0.225 | Long | Short | -0.491 | -0.108 | -0.129 |
| | | | | | p=.60000 | p=.40000 | 0.736 | 0.162 | 0.193 |
| 6. Time taken* | 0.352 | 0.138 | 0.09 | -0.311 | *Analyzed by Multiple Regression | | | | |

Figure 9. Results from Discriminatory Analysis.

## 6. DISCUSSION

Through the analysis it was possible to observe the grouping of subjects according to the different variables. The 3D-Viewer enabled panoramic perspectives of the data to be shown. Therefore, the depth of the relationships was graphically observed and the views offered clearer results than a usual 2D analysis.

The variables showed the following variances:

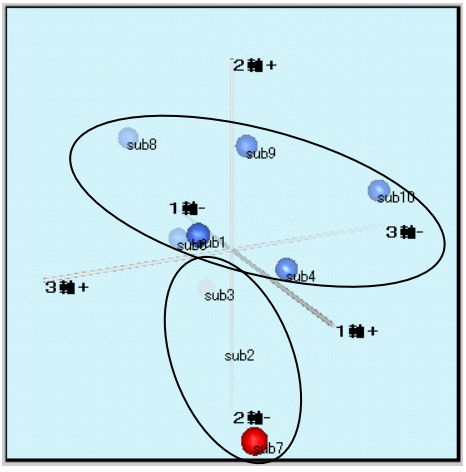
**a) AGE.** The data (Fig.1a) was divided into two age groups: “younger” from 25 to 28 years old & “elder” from 29 to 33 years old. The coordinate-variable values were input on the 3D-Viewer and the XYZ axis was rotated. There were not clear findings of relationship of the subjects’ age.

After discrimination analysis (Fig.9) it was found that the factors distributed by PCA discriminated age groups at 53% of probability, where the most functional to discrimination was the 1st Factor. The “younger” group had positive tendency for 1st & 2nd Factor.

**b) GENDER.** The data (Fig.1a) was divided into “male” and “female” groups. The coordinate-variable values were input on the 3D-Viewer and the XYZ axis was rotated. The separation of male and female subjects on the 2nd factor axis was identified by the rotation of the 3D-viewer on (-35,35) degrees. The perspective showed the male group on the top of the axis and the female group on the bottom (Fig.10).

After discrimination analysis (Fig.9) it was found that the factors distributed by PCA discriminated gender groups at 72% of probability, where the most functional to discrimination was the 2nd Factor. The “male” group had positive tendency for 1st Factor.

male




female

Figure 10 Division between male and female.

The influence of the gender takes importance when linking the values on the 2nd factor that showed a difference from proceeds' oriented tasks opposite to personal judgment. The subjects' interpretation might have been influenced by their gender.

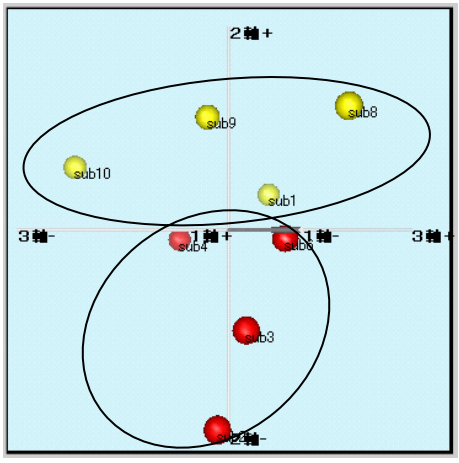
**c) NATIONALITY.** The data (Fig.1a) was divided into "oriental" and "occidental" groups. The coordinate-variable values were input on the 3D-Viewer and the XYZ axis was rotated. There were no clear findings of a relationship between the subjects' nationalities.

After discrimination analysis (Fig.9) it was found that the factors distributed by PCA discriminated nationality groups at only 46% of probability, where the most functional to discrimination was the 1st Factor. The "occidental" group had positive tendency for 1st Factor.

**d) FIELD OF STUDY.** The data (Fig.1a) was divided into "design" and "non-design" groups. The coordinate-variable values were input on the 3D-Viewer and the XYZ axis was rotated. There was a clear separation of the subjects involved in design on the bottom of the "2nd factor" axis, and the other fields of study at the top (Fig.11). Considering that the gender variable also showed a separation on the 2nd factor, the axis merges "gender" and "field of study" on a meaningful relationship for the research since this could be a main indicator of subjects background and *kansei* influence on their fulfillment.

After discrimination analysis (Fig.9) it was found that the factors distributed by PCA discriminated field of study groups at 51% of probability, where the most functional to discrimination was the 2nd Factor. The "design" group had negative tendency to all factors, especially to 2nd Factor.

Non-design



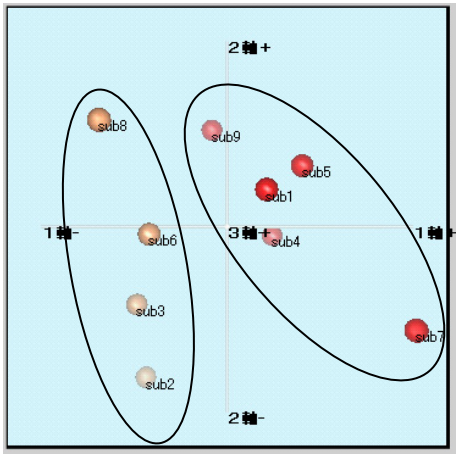

Design

Figure 11 Axis for "design" and "non-design" study fields.

**e) INTERNET HOURS A DAY**- The data (Fig.1a) was divided into "more hours" and "less hours" a day groups. The coordinate-variable values were input on the 3D-Viewer and the XYZ axis was rotated. There was a division of two groups

concerning the hours using Internet showing the subjects that took from 5 to 10 hours to the right and less than five to the left of the “X” axis (Fig.12).

More hours




Less hours

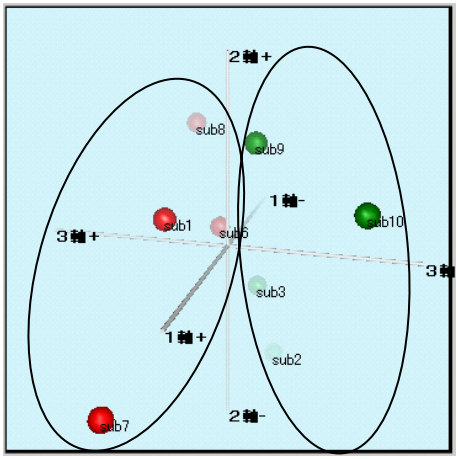
Figure 12 More and Less hours use of Internet per day.

Based on the values from the 1st factor, the relationship between the user’s time a day browsing on Internet and their personal preference might show a personality characteristic linked. Thus, subjects with “more hours” a day on the Internet might show a complex preference attitude than the “less hours” subjects.

After discrimination analysis (Fig.9) it was found that the factors distributed by PCA discriminated nationality groups at 67% of probability, where the most functional to discrimination was the 1st Factor. The “less hours” group had positive tendency to the 1st Factor.

**f) TIME TAKEN.** The data (Fig.1a) was divided into “short” and “long” period groups. The coordinate-variable values were input on the 3D-Viewer and the XYZ axis was rotated. Two groups emerged on the “3rd factor” axis meaning the ”short period” and “long period” of time taken for completing the browsing test, separated at the center of the axis from left to right (Fig.13). The image was shown on perspective from a rotated angle of (30, 35) degrees that allowed a clear view of the groups’ organization.

Short period




Long period

Figure 13 The short and long time periods for completing the browsing test

The time spent on finishing the test in relation to the mental status identified on the 3rd factor, indicates correspondence with the subjects' *kansei*, since their personal taste might be guiding their actions.

Since the data for time taken (Fig.6) had an almost continual distribution, instead of applying the discrimination analysis, the Multiple Regression Analysis was applied. The factors distributed by PCA had a low 35% regression to the "time taken" variable, where the most functional to discrimination was the 3rd Factor.

## CONLUSION

From the method used it was possible to show that the pattern of the actions are related to the *kansei* status, emotional attitude and personality of the subjects. Thus, it could be said that the patterns show some characteristics of the subjects.

The 3D visualization method support improved the interpretation of the Discrimination Analysis.

Among the six subjects' variables "Internet hours" showed the greater relationship between the users' behavior and their characteristics. This relationship shows that the used method can potentially be applied for designing a cyber-rate measuring tool based on the user's behavior.

## FUTURE RESEARCH

The next step for understanding designers' *kansei* includes developing a cyber-rate tool, combined with tasks performed using an "Eye Tracker" device and Brainwaves measurement. These tasks have already begun and the data obtained in the present paper will be integrated in the new research.

## REFERENCES


[1] Lee, S.H., A. Harada, and P.J. Stappers, Design Based on Kansei, in Pleasure With Product: Beyond Usability. 2002, Taylor and Francis: London. p. 219-229.
[2] Turban, Information technology for management, 1999, USA, John Wiley & Sons,
[3] Games decrease brain activity, http://www.newscientist.com/news/print.jsp?id=ns99992538
[4] Kotulak, Inside the brain, 2003, USA, Phoenix.
[5] Kinnear, Marketing Research, 1993, Mexico, Mcgraw-Hill.
[6] Lee, S.H. When you feel, the brain blinks: An analysis of brain waves generated by various behaviors and creation/imagination, The 3rd Design and Emotion Conference, 2002, Loughborough.
[7] Carter, Mapping the mind, 2002, London, Diana.
[8] 3D Viewer, Kakiyama/Harada, developed at University of Tsukuba's Institute of Art and Design, 2003.