

Analysis of Preferable Café Interior Design Using Human Sensibility Ergonomics For Different Age Groups

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Abstract

Maximizing profit is the most significant object of commercial places. Especially for some places where its atmosphere is main concern of customers like cafés, interior design is crucial. Thus it needs to evaluate human emotion and preference. Human Sensibility Ergonomics which is recently signified in various fields is an attempt to quantitatively analyze factors of human sensibility and apply it to design operation. This study attempted to infuse human sensibility ergonomics into café interior design and analyzed preferable café interior design factors. Because most cafés have their own target customers, so we assumed four different target customer groups divided by their age and gender groups in each age group. As a result, the difference of each group could be examined. Middle-aged group and males have main interest in the intensity of luminance, i.e. the brightness, whereas youths and females attach importance to both quality of light and color. In addition, there is a tendency for middle-aged group and males to see café as a public place while young people and females recognize café as a place for entertainment. Taking the result of this study into consideration can lead to successful café interior design for specific target customers.

Keywords: Human Sensibility Ergonomics, Café, Interior Design, Factor Analysis, Gender Difference, Age Difference, Preference

1. INTRODUCTION

Every space has its own purpose. The purpose of commercial place can be said to maximize profit. And its interior should be designed and built with same purpose. To gain the most profit, the tendency and preference of customers must be considered. The tendency of individual environmental preference is called "environmental disposition." Especially environmental disposition is very important factor for interior design. If the quantity and quality of human emotional tendency is evaluated and analyzed, a successful interior design fitting to the environmental disposition of customers can be achieved.

In this study, successful café interior design factors for specific customer group are investigated as an example. Since the main customers for a café are limited as certain gender or age group, to consider the preference of specific group, customized interior design for them can be built directly. And café is a commercial place that its atmosphere is more important factor for its customers than the taste or price of the food or drink of it. Thus café is a suitable example for evaluating environmental disposition. To do this, verifying and determining the design factors relating the preference of specific customer group is the purpose of this study. If the factors can be found, saving the expenses for the redesign and rebuilding and maximizing the profit will be possible. To achieve this, it must be necessary to analyze human emotion. The methods of human sensibility ergonomics is a solution for the matter.

In this study, the examples of café interior are collected and evaluated with major methods of human sensibility ergonomics, i.e. the statistical multivariate method, and semantic differential method (SD method). The subjects are divided to gender and age groups and they evaluated all the examples of cafés. And the similarity and difference are analyzed and the successful café interior design factors

for specific customer group are proposed.

In this paper, the definition and methods of human sensibility ergonomics is observed firstly, and then the interior designs of subject cafés are evaluated. Lastly the successful interior design factors are proposed.

2. HUMAN SENSIBILITY ERGONOMICS

(1) Definition of Human Sensibility Ergonomics

The literal meaning of human sensibility is the human's ability to experience and understand deep feelings, especially in art and literature (Oxford advanced learner's dictionary p. 1164). And its technical definition is a complex intellectual, emotional, and esthetic internal experience of human, induced from external physical stimulus of a product or an environment. Human sensibility ergonomics is a complex technical term that indicates all techniques to evaluate and analyze human sensibility scientifically and to adapt the result to designing of a product or an environment for more convenient, comfortable and safe human life.

It was used by Yamamoto Kenich, the chairman of Mazda corp. first (Park, K. 2000, pp.7) and was established by the pioneer of emotion engineering, Nagamachi Mizoh, professor of Hiroshima University, Japan in an ergonomic international conference in Sydney, Australia, in 1988 (Nagamachi, M. 1988.) According to the definition of professor Nagamachi, it is an engineering technique which applies human's image or emotion to physical product to achieve more preferable design, i.e. it is a technique to evaluate what makes human feels better, to build a database which categorizes and objectifies human's emotion, sense and psychological information representing human satisfaction and to apply the data to the real design process (Nsgamachi M. 1997, pp. 36-38).

Advanced technology enables to provide a product which is high quality in a lower price. Manufacturers of the product are not a matter of interest for the customers for the quality and price of the product from every manufacturer is almost same. After a product is popularized, customers want to satisfy his/her emotional demand. In other words, if customers have chasing or buying power, they choose the product has a better impression, though they should pay more money. They spend money for the function or quality of the product no more. Their decision making is very individual effected by their emotion-the good or bad impression of the product. This buying pattern is called emotional expenditure, and under this circumstance, the human emotional approach is crucial for all the designing fields (Park, K. 2000, pp. 5, 6).

(2) Methods of Human Sensibility Ergonomics

The representative methods of human sensibility ergonomics are multivariate analysis, virtual reality method, and taste scale, etc. In this paper, multivariate analysis method has been applied. It is a statistical approach which is used most frequently among the methods mentioned before. The words or adjectives which describe human emotion or sense are used in this method to approach the subjective matters (Lee, S. & Yang, S. 2000, p.41). There are important four steps for performing this method (Park, K. 2000, p.41).

1. Subject choice and collecting emotion words
2. Evaluation
3. Statistical analysis (factor analysis and multivariate analysis)
4. Generalizing the result and finding the relation between emotion and design factors

After the subject to examine is chosen, the emotional adjectives to measure the emotion are collected. Emotional adjectives mean the adjective words which are describing the expression of specific human emotion most properly (Lee, S. & Nagamachi, M. 2000, p.57). Initially as many as possible words are collected, and then they are reduced. The reducing process, factor analysis can be used.

The collected adjectives are analyzed with SD method. SD method is invented by an American psychologist Charles Osgood in 1959. It uses 'evaluating measure' which is a list of words that each one is coupled on its antonym like 'big-small' or 'beautiful-ugly.' Between the word and its antonym, five or seven meaning spaces are set and the subject chooses one out of them. Accumulating the subjects' choices, and averaging it, one adjective which is more describable than its antonym is selected. It is done to every word in the evaluating measure list. Seven meaning spaces might seem more accurate than five, but psychological studies proved that the number of meaning space is not important factor to the test result. That is, five is enough to most tests (Lee, S. & Nagamachi, M. 2000, p.58). So, five meaning spaces are used in this study.

In this study, the subject cafés were visited and collected their design factors. And then SD method were used to analyze the subjects' emotion. The emotional adjectives were collected from the words related café interior design and the subjects evaluated degree of describing their emotion all of the word couples in the list. Finally, the café which has good (or preferable) design was defined and the design factors related to it from the test result.

3. ANALYSIS OF CAFÉ INTERIOR DESIGN

(1) Spatial Characteristics of Café

Originated from the French word means coffee, café is defined as a place where people can buy drinks and simple meals (Oxford advanced learner's dictionary p. 1164). And spatial characteristic of café is as shown in the figure 1. It is a kind of place for service and recreation and it usually used for not only eating but also meeting. So café has both private and public spatial characteristics. And café is a commercial place for the owners benefit.

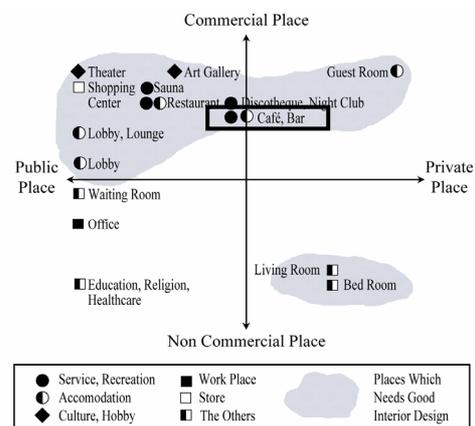


Figure 1. The Spatial Characteristic of Café (Source: Ham, J. 1993, p.27)

According to a survey of an internet site (<http://ranking.empas.com>), it was shown that the atmosphere of a café (96% of response) is the main concern for customers rather than the taste or price of the food (4% of response). Also the atmosphere of a café is directly related to the profit. Thus, interior design of the café is most important aspect for a café design. In addition, each café should have its own design theme and café interior should be designed to attract the target market. Different approach to café interior design for each café with its own target customer – café for the young people, café for the middle-aged, café for male, café for female – should be considered and this is very important as it is directly linked to the profit.

Therefore, because of the two reasons, firstly, the atmosphere of a café which is produced by interior design is a crucial factor, and secondly, as café is a profit generating space, interior of each café should be designed to fit the preference of the main target group to maximize the profit, café can be a fitting subject for investigating preference of

different age groups for interior design.

(2) Collecting Café Interior Design Samples

Collecting the examples of café interior design was performed two times in 2002 and in 2003. 39 university students collected examples in 2002 and 38 students did next year. They reported design factors of a café such as furniture, light, color, ceiling, flooring, wall, door, structure of café, and etc. with photos adding explanation and evaluation of the student who survey it. And eliminating the same cafés and the cafés which have very similar interior design factors, the number of cafés was reduced from 77 to 20 and finally, the 20 cafés were selected to be subjects. They are shown in table 1.

Table 1. Cafe Interior Design Examples

Café	Photo	Interior Design Factors		
		Finishing Materials	Wall	Concrete, mud
A		Finishing Materials	Ceiling	Concrete
			Floor	Wood flooring
		Color	Mud yellow, ivory	
		Light	Sunlight, chandeliers, brackets	
		Furniture and Items	2 Seated orange color sofas, steel chairs, wood tables, iron stove	
			Wall	Wood, mud
B		Finishing Materials	Ceiling	Mud
			Floor	Laminated paper, wood, cement
		Color	Maroon, mud yellow	
		Light	Sunlight, stands, candles	
		Furniture and Items	2 Seated wooden chairs, cushions, antiques	
			Wall	Wood, glass, paint
C		Finishing Materials	Ceiling	Wood
			Floor	Wood
		Color	Brown	
		Light	Sunlight, chandeliers	
		Furniture and Items	3 Seated brown/navy color sofas, wood table, plastic chairs	
			Wall	Mud
D		Finishing Materials	Ceiling	Mud
			Floor	Laminated paper, tiles
		Color	Mud yellow, brown	
		Light	Sunlight, chandeliers	
		Furniture and Items	2 seated cream color sofas, wood tables, cushions, traditional grinder, iron stove, antiques	
			Wall	Glass, paint
E		Finishing Materials	Ceiling	Gypsum board
			Floor	Wood flooring
		Color	White, rose, navy	
		Light	Sunlight, chandeliers	
		Furniture and Items	Navy chairs, wooden pink chairs, White color wood tables, Steel frame glass tables	
			Wall	Mud
F		Finishing Materials	Ceiling	Mud
			Floor	Wood flooring
		Color	Mud yellow, brown, ivory	
		Light	Sunlight, stands, brackets	
		Furniture and Items	3 seated steel chairs, Steel frame glass tables, straw hats, herbs	
			Wall	Mud
G		Finishing Materials	Ceiling	Wood, mud
			Floor	Wood
		Color	Mud yellow, brown	
		Light	Sunlight, chandeliers	
		Furniture and Items	2 seated white/navy sofas, wood table, folding screen, antiques	

H		Finishing Materials	Wall	Gypsum board, paint
			Ceiling	Gypsum board, paint
			Floor	Marble
		Color	Ivory, brown	
		Light	Sunlight, pendant, chandeliers	
		Furniture and Items	4 seated ivory color sofas, wood tables, white wood chairs	
I		Finishing Materials	Wall	Glass, paint
			Ceiling	Gypsum board, paint
			Floor	Wood flooring, carpet
		Color	White, violet, brown	
		Light	Sunlight, chandeliers, down lights	
		Furniture and Items	Violet wood chairs, violet curtains, white steel frame tables	
J		Finishing Materials	Wall	Paint
			Ceiling	Gypsum board, paint
			Floor	Tiles
		Color	Cream, light brown	
		Light	Sunlight, chandeliers, down lights	
		Furniture and Items	3 seated ivory color sofas, pink wood chairs, square wood tables	
K		Finishing Materials	Wall	Wood
			Ceiling	Wood
			Floor	Wood flooring
		Color	Brown, cream	
		Light	Sunlight, chandeliers, down lights	
		Furniture and Items	2 seated white, green sofas, white wood chairs, square wood tables	
L		Finishing Materials	Wall	Paint, stainless steel
			Ceiling	Stainless steel
			Floor	Laminated paper, acrylic
		Color	White, black, red, navy	
		Light	Sunlight, down light	
		Furniture and Items	Red, navy cushioned steel frame chairs, glass wood tables	
M		Finishing Materials	Wall	Stainless steel, glass fiber
			Ceiling	Stainless steel, glass fiber
			Floor	Wood
		Color	Silver, fluorescence blue, brown	
		Light	Sunlight, chandeliers	
		Furniture and Items	Navy seated steel chairs, steel table, artificial sculptures	
N		Finishing Materials	Wall	Wood, paint
			Ceiling	Gypsum board
			Floor	Wood flooring
		Color	Ivory, brown	
		Light	Sunlight, brackets, down lights	
		Furniture and Items	Ivory 2 or 3 seated sofas, wood table, picture frames	
O		Finishing Materials	Wall	Mud, wood
			Ceiling	Wood
			Floor	Wood, Laminated paper
		Color	Mud yellow, brown, ivory	
		Light	Sunlight, chandeliers	
		Furniture and Items	Cushions, wood tables, farming tools	
P		Finishing Materials	Wall	Wood, paint
			Ceiling	Gypsum board
			Floor	Marble
		Color	Ivory, cream	
		Light	Sunlight, down lights, brackets	
		Furniture and Items	3 seated ivory sofas, wood table, decoration light brackets	
Q		Finishing Materials	Wall	Plaster, wood
			Ceiling	Wood, concrete
			Floor	cement
		Color	Mud yellow, brown, gray	
		Light	Sunlight, brackets	
		Furniture and Items	Wood chairs, white steel frame chairs, wood and steel tables, partitions, stove	

R		Finishing Materials	Wall	Wood, paint
			Ceiling	Gypsum board
			Floor	Wood flooring, carpets
		Color	White, brown, wine red	
		Light	Down lights, brackets	
Furniture and Items		Wine red color chairs, 2 seated red sofas, wood tables, wood partitions		
S		Finishing Materials	Wall	Paint
			Ceiling	Gypsum board
			Floor	Marble
		Color	White, black	
		Light	Down lights, brackets	
Furniture and Items		White steel chairs, wood table, decoration light brackets		
T		Finishing Materials	Wall	Paint
			Ceiling	Gypsum board
			Floor	Marble
		Color	White, black	
		Light	Down light, decoration light	
Furniture and Items		White 1 seated sofas, decoration light partition, sculptures		

(3) Collecting Emotional Adjective List

To collect emotional adjectives, the words were gathered from the students' reports of cafés and from the homepages of famous café chains. Antonyms were acquired from dictionaries and internet dictionary sites.

Firstly, 532 words were gathered and they were reduced to 77 adjectives eliminating synonyms and the words which have relatively low connection with interior design field. Secondly, through internal test using factor analysis, the 77 words were shrunken to 20 words. And to evaluate the preference, 'good-bad' was added to the list. Therefore total 21 adjectives were chosen as shown in the table 2.

Table 2. The Emotional Adjective List

No.	Word	Agree	Disagree	Antonym
1	Bright	1-2-3-4-5		Dark
2	Spacious	1-2-3-4-5		Small
3	Heavy	1-2-3-4-5		Light
4	Simple	1-2-3-4-5		Complex
5	Soft	1-2-3-4-5		Hard
6	Common	1-2-3-4-5		Unique
7	Unfashionable	1-2-3-4-5		Fashionable
8	Exciting	1-2-3-4-5		Dull
9	Clean	1-2-3-4-5		Dirty
10	Comfortable	1-2-3-4-5		Uncomfortable
11	Elegant	1-2-3-4-5		Inelegant
12	Artificial	1-2-3-4-5		Natural
13	Western	1-2-3-4-5		Eastern
14	Open	1-2-3-4-5		Close
15	Familiar	1-2-3-4-5		Unfamiliar
16	Static	1-2-3-4-5		Dynamic
17	Cold	1-2-3-4-5		Warm
18	Plain	1-2-3-4-5		Luxurious
19	Modern	1-2-3-4-5		Traditional
20	Harmonious	1-2-3-4-5		Inharmonious
21	Good	1-2-3-4-5		Bad

(4) Evaluation

The number of subjects is 71. The subject group was divided two gender groups (male/female) and two age groups (youth/mature adult). The youth group had the person whose age was 10 to 29, and the middle-aged group

had the person whose age was 30 to 60. The proportion was shown below. 45 % (35/71) of subjects were male and 55 % (39/71) were female, and 54 % (38/71) were youth group and 46 % (33/71) were the middle-aged group. The preference of café design for different gender groups has already been done in previous works (Seo, H, 2006, pp. 175-182)¹.

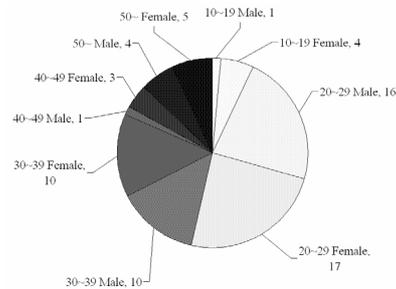


Figure 2. The Proportion of Age Groups

The 20 café interior design samples with 4~6 photos were presented to the subjects and they were requested to evaluate how much the emotional adjectives could describe their emotion. The photos were seat, counter, light of each café and etc. and the subjects could examine them without restraint to grasp the atmosphere of them.

5. EVALUATION OF CAFÉ INTERIOR DESIGN FACTORS IN EACH GROUPS

The preference for age groups follow from the first sub chapter and the relationship between age and gender are also discussed from the next sub chapter.

(1) Age Groups

The preference ranking for age groups is shown in table 3. In the table, the cafés of first five places are classified as preferred cafés and the last five ones as rejected cafés.

Table 3. The Preference Ranking

Group	Prefer	-	Reject
Entire	NOTHD	JSEFIKMQRP	CALBG
Young	NOTDS	EJHFMRPKI	ABCLG
Mid-aged	NHJOS	ITDFKEQMCR	PALGB

The characteristic of cafés which young people prefer is 'soft', 'exciting', 'clean', 'comfortable', 'elegant', 'familiar', 'harmonious.' And those of cafés which they do not prefer is 'complex', 'hard', 'unfashionable' and 'inelegant.' The cafés which middle-aged people prefer are

¹ In that study, the difference of sex in preference regarding café interior design could be observed. Males have main interest in the intensity of luminance, i.e. the brightness, whereas females attach importance to both quality of light and color. In addition, there is a tendency for males to see café as a public place while females recognize café as a place for entertainment.

‘bright’, ‘soft’, ‘fashionable’, ‘clean’, ‘elegant’, ‘open’, ‘familiar’, ‘static’, ‘harmonious’ cafés. The characteristic of rejected cafés is not clear but it can be said to be ‘heavy’ and ‘static’ cafés.

In figure 3-6, X axis indicates the emotional adjectives, hence the higher the adjective rated by the subjects (same as figure 8, 9), the more it is close to X axis. Each café was rated on a 5-level scale from 1 to 5. Figure 6-9 show the results of emotional adjectives of preferable cafés for age groups. To examine the graphs of preferred cafés, young people have non uniformity in ‘artificial-natural’, ‘western-eastern’ and ‘modern-traditional’ factors. But middle-aged people preferred ‘artificial’, ‘western’ and ‘modern’ cafés uniformly except example O. It seems that young people like cafés of various themes and it also indicate that there is difference of recognition of cafés between young and middle-aged people.

The comparison between higher preference café groups and lower preference café groups (Table 3) shows the following results. Firstly, it is noted that for the young people group ‘soft’, ‘exciting’ and ‘familiar’ are the important factors for the higher preference café group whereas cafes emphasized with ‘complex’, ‘hard’, ‘exciting’ and ‘unfamiliar’ factors are lied in the lower preference café group. For the middle-aged group, cafes in the higher preference group have ‘bright’, ‘soft’, ‘open’, ‘familiar’, ‘static’ and ‘plain’ characteristics while cafés in the lower preference group has ‘heavy’, ‘complex’, ‘hard’, ‘exciting’ and ‘eastern.’

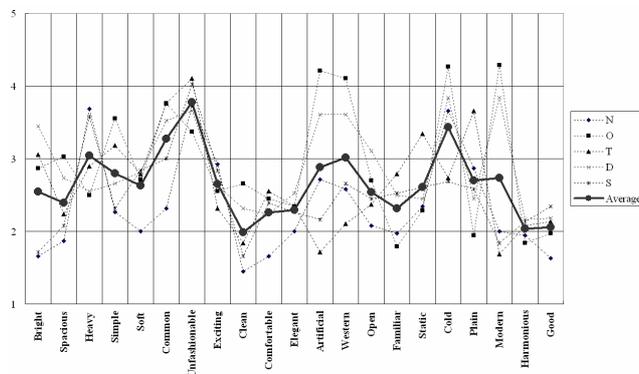


Figure 3. Preference Top Five Cafés of Young People Group

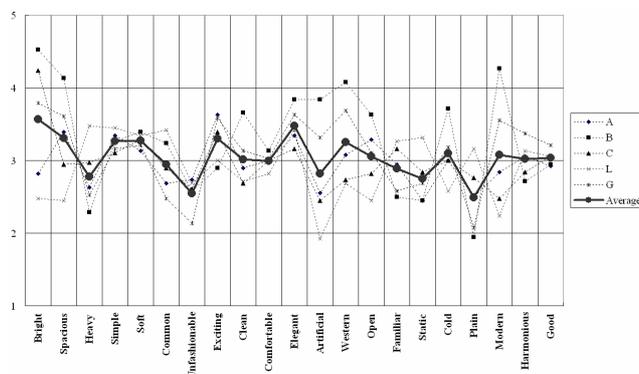


Figure 4. Preference Bottom Five Cafés of Young People Group

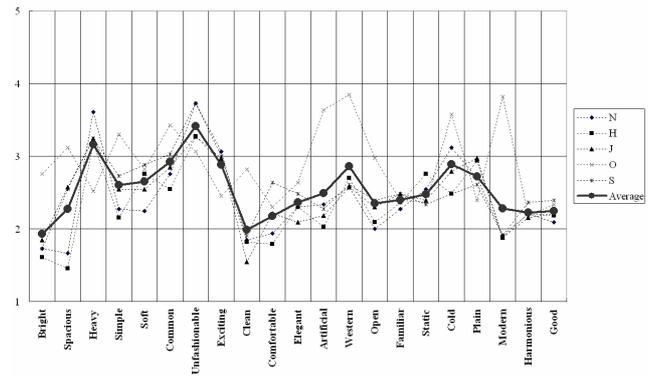


Figure 5. Preference Top Five Cafés of Middle-aged People Group

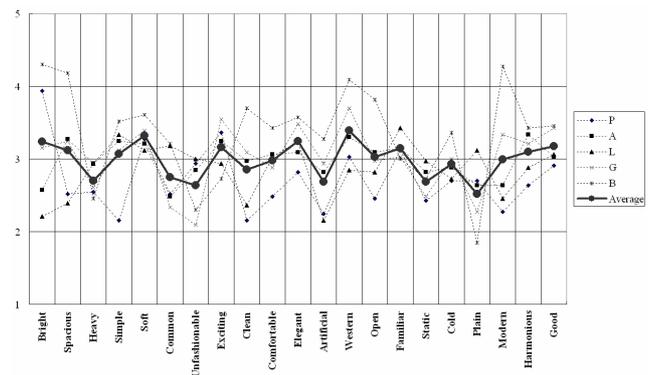


Figure 6. Preference Bottom Five Cafés of Middle-aged People Group

The general tendencies of age groups are discussed briefly. And factor analysis was performed to find out main factors (emotional adjectives) to evaluate the effect of each emotional adjective for preference easily. Factor analysis of 20 emotional adjectives - ‘good’ which can be an overall assessment factor for a café was excluded - was performed with a statistic program SPSS 13.0. Factor analysis enables to assess the mutual relationship between the emotional adjectives and to extract a small number of major factors which have significant influence on deciding preference. Also to what extent each major factor can contribute to the overall result. Extraction Method: Principal Component Analysis and Rotation Method: Varimax with Kaiser Normalization were applied for factor analysis in SPSS.

For the young people aged from 10 to 29, factors can be reduced to 4 main factors; ‘artificial-natural’, ‘elegant-inelegant’, ‘light-heavy’ and ‘common-unique’ (Table 5) and this resulted from switching of 1 and 2 of contribution rank of the whole sample set (Table 4). This can be said that the first main factor for whole subjects-‘elegant-inelegant’ is separated to two main factors-‘elegant-inelegant’ and ‘light-heavy.’ And it also can be said that young people think ‘artificial-natural’ factor to be the most important aspects about café interior design. For the middle-aged group (Table 6), there is a little difference in main factors as they are reduced to ‘elegant-inelegant’, ‘artificial-natural’ and ‘common-unique’.

As mentioned before, for the young people, the direct relationship between preference and the first main factor

'artificial-natural' is hard to find. But preference for young people has strong proportional relationship with 'elegant' factor in the second main factor 'elegant-inelegant' and has weak proportional relationship with 'light' in the third factor. And it can be found that a proportional relationship with 'unique' in the fourth main factor. For middle-aged people, cafés have 'elegant' factor in the first main factor are preferred strongly and the cafés have second main factor 'artificial' are preferred, too. But the third main factor 'common-unique' has little relationship with preference.

Table 4. Factor Analysis for Entire Sample

Main factor	Sub factors	Contribution (%)
Elegant	Bright, Spacious, Light, Simple, Soft, Fashionable, Clean, Comfortable, Open, Familiar, Harmonious	43.050
Artificial	Western, Dynamic, Cold, Luxurious, Modern	29.875
Dull	Common	16.128
Total		89.053

Table 5. Factor Analysis for Young People Group

Main factor	Sub factors	Contribution (%)
Artificial	Western, Unfamiliar, Dynamic, Cold, Luxurious, Modern	29.790
Elegant	Soft, Fashionable, Clean, Comfortable, Harmonious	27.754
Light	Bright, Spacious, Open	18.920
Common	Simple, Dull	15.228
Total		91.693

Table 6. Factor Analysis for Middle-aged Group

Main factor	Sub factors	Contribution (%)
Elegant	Bright, Spacious, Light, Soft, Fashionable, Clean, Comfortable, Open, Familiar, Harmonious	38.736
Artificial	Western, Dynamic, Cold, Luxurious, Modern	28.193
Common	Simple, Dull	19.203
Total		86.132

The most significant difference between the young people group and the middle-aged group can be found in relation to 'artificial-natural' factor; for the young people group 'artificial-natural' factor does not affect the preference significantly whereas for the middle-aged group 'artificial-natural' factor is important for deciding preference of a café. Furthermore, it is noted that compared to middle-aged group young aged group's 'common-unique' factor have relatively high influence on preference.

In summary, it is observed that young people like variety more than middle-aged people. The cafés that young people preferred have various themes and characteristics of interior design, but the cafés preferred by middle-aged group have some kind of standard uniformly. Particularly, middle-aged people prefer 'western' style cafés. It means that a café is recognized as a place from western culture by them. But young people also like 'oriental' style cafés and it shows that they recognize a café as a place for entertainment and they like cafés with various characteristics.

For the lower part, C is on the higher preference in the middle-aged group than in the young people group; eight-

eenth in the former and fourteenth in the latter, and P is the thirteenth in the middle-aged group and sixteenth in the young people group. Following factors are noted from analysis of those cafes that have different preference rank in the middle-aged group and in the young people group. Firstly, the cafes have higher preference in middle-aged group have stronger 'light', 'artificial', 'familiar' and 'cold' factors, while the cafes have lower preference have stronger 'bright' and 'cold' factors. This means that the main factors extracted by factor analysis shows middle-aged group prefer café interior design which has rather artificial and soft characteristics. It is observed that middle-aged group has a preference for café with western style interior design since it was shown that preference rank for cafes with traditional eastern theme such as D is low whereas preference rank for cafes with western style interior is high.

On the other hand, T and P which is relatively high in preference ranking for the young people group have rather unique interior design. As mentioned above café D is designed with traditional eastern theme and it has high (fourth) preference for the young people group, thus it shows that the factor 'eastern' or 'western' is not really taken account of, but decorative aspect, such as ornaments or small items displayed, of the café interior design plays more important role.

(2) Gender Groups in Each Age Group

For young males, they prefer 'bright', 'soft', 'exciting', 'clean', 'comfortable', 'elegant', 'open', 'familiar' and 'harmonious' cafés, and they reject 'dark' and 'hard' cafés. And the young females prefer 'fashionable', 'exciting', 'clean', 'comfortable', 'elegant' and 'harmonious' cafés. But the characteristic of cafés which young females dislike is not clear. In this result, it is observed that young males have clearer preference pattern than young females and they prefer 'brighter' cafés relatively. And it can be also said that young females have various preference patterns that are not easy to specify their standard preference.

It is very similar results in the previous works for different gender groups. In that study, males' weaker ability to recognize color makes them to prefer brighter cafés. And females' purpose (or interest) about cafés is mainly for fun. So it is natural that females have more various preference patterns than males and they do not seem to have uniformity. In young people group, the characteristic of gender groups can be clearly observed again.

The middle-aged male group has the most uniform preference pattern. They mostly prefer 'bright', 'spacious', 'soft', 'fashionable', 'exciting', 'clean', 'comfortable', 'elegant', 'familiar', 'static' and 'harmonious' cafés and they reject the cafés which have 'complex' interior design. But the middle-aged females have more various preference patterns than middle-aged males. But their rejecting pattern is more uniform than males. And they reject dull cafés whereas males do not reject cafés for 'exciting-dull' reasons. It shows that females do have more interest in 'exciting-dull' factor than males in middle-aged groups. And it is observed again that males prefer 'brighter' cafés.

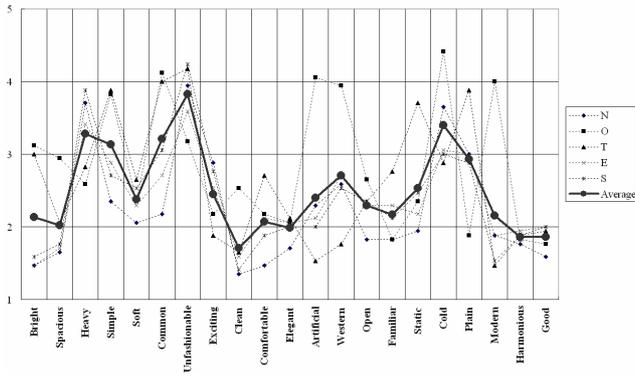


Figure 7. Preference Top Five Cafés of Young People Group

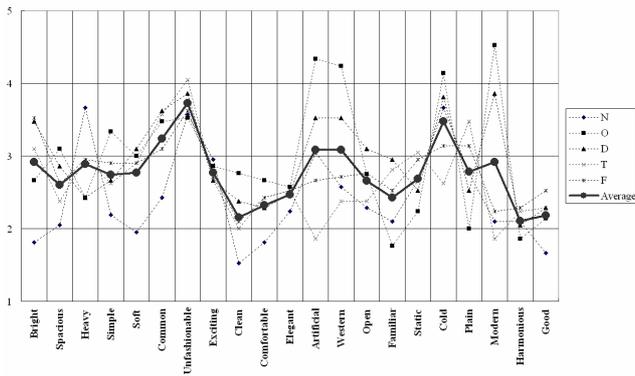


Figure 8. Preference Top Five Cafés of Young People Group

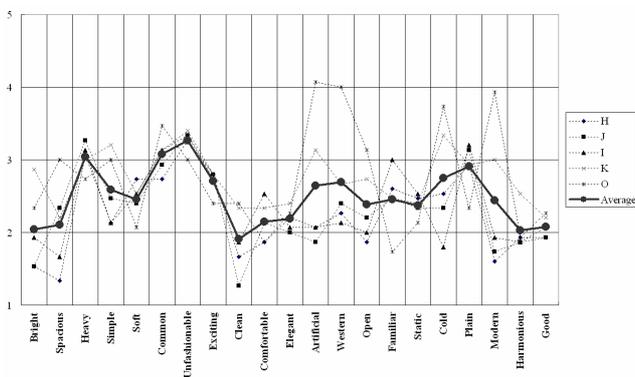


Figure 9. Preference Top Five Cafés of Young People Group

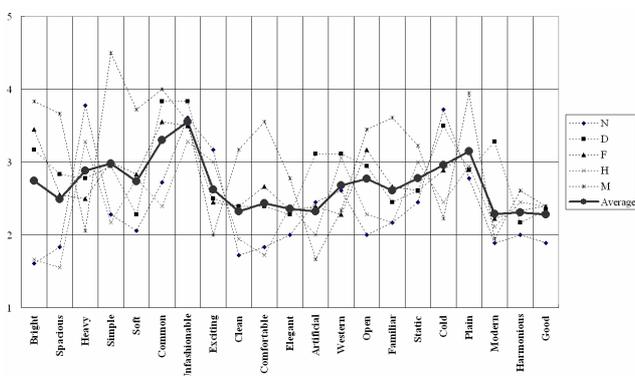


Figure 10. Preference Top Five Cafés of Middle-aged Group

According to factor analysis, it is obvious that males' viewpoint about cafés is the places for public relationship

rather than for entertainment. One of main factors in both young and middle-aged female is 'exciting-dull' factor and it has strong relationship with preference. The factor includes 'fashionable' and 'harmonious', too. That means the exciting factor is one of significant aspects for female groups and females' viewpoint for café is the place for entertainment. It is also similar to the result of previous work.

Table 7. Factor Analysis for Young Male Group

Main factor	Sub factors	Contribution (%)
Artificial	Western, Unfamiliar, Cold, Luxurious, Modern	28.021
Harmonious	Soft, Fashionable, Clean, Comfortable, Elegant,	26.002
Light	Bright, Spacious, Open	18.849
Common	Simple, Dull, Static	16.550
Total		89.423

Table 8. Factor Analysis for Young Female Group

Main factor	Sub factors	Contribution (%)
Clean	Bright, Spacious, Light, Simple, Soft, Comfortable, Elegant, Open	35.682
Artificial	Western, Unfamiliar, Dynamic, Luxurious, Modern	29.578
Exciting	Unique, Fashionable, Harmonious	17.123
Total		82.382

Table 9. Factor Analysis for Middle-aged Male Group

Main factor	Sub factors	Contribution (%)
Modern	Spacious, Fashionable, Artificial, Western, Open, Cold, Luxurious	31.783
Elegant	Soft, Clean, Comfortable, Familiar, Harmonious	28.879
Common	Simple, Dull, Static	14.851
Light	Bright	9.820
Total		85.333

Table 10. Factor Analysis for Middle-aged Female Group

Main factor	Sub factors	Contribution (%)
Comfortable	Bright, Spacious, Light, Simple, Soft, Clean, Elegant, Familiar	41.281
Exciting	Unique, Fashionable, Western, Harmonious	22.347
Artificial	Dynamic, Luxurious, Modern	18.817
Total		82.446

Table 11. The Preference Ranking for Each Gender Group

Group	Prefer	-	Reject
Young Male	NOTES	JDHRQMFIAC	LPBKG
Young Female	NODTF	MSHEJKPQIB	RAGLC
Mid-aged Male	HJKO	TNSEFQCCLR	PAMGB
Mid-aged Female	NDFHM	OSJEQTKCIP	RALBG

To compare the ranking of preference of example cafés makes the difference more clear. The example O is preferred by females but not by males. For the example O has quite dark environment, males do not prefer it, but it also has warm and harmonious color and many entertaining items, therefore females like it. And the example M has very unique interior design and it is chosen to be the most exciting café. But males do not like it while females love it. It emphasize that females recognize café as a place for entertainment but males do not see it like that way.

(3) Proposal of Café Interior Design Factors for Each Group

To sum up, when there is higher male proportion in the group and when the age of the group is older, cafes with higher brightness are more preferred. Also, each group has different views on café; when there is higher male proportion in the group and when the age of the group is older, café is more considered as public place for a rest or social life rather than private or entertaining place. Based on the findings, following design factors are suggested to be considered for café interior design. As a result, we can get some characteristics of café interior design factors which are preferred by specific group. The proposal of preferable café interior design is shown in table 12.

Table 12. Proposal of Café Interior Design Factors for Each Group

Group		Interior factors	
Young People	Prefer	Finishing materials	Not magnificent characteristics
		Color	Bright color (white, cream)
		Light	Sufficient of sunlight, high intensity of light
		Furniture and Items	Spacious and ordered positioning Unique items and decorations
	Reject	Finishing materials	Unprocessed materials (wood) and cold materials (steel, acrylic)
		Color	Dark(brown), using complementary colors
		Light	Insufficient sunlight
		Furniture and Items	Multiform items in a same kind of furniture
Middle-aged People	Prefer	Finishing materials	Artificial material like gypsum board, tiles, paint
		Color	Bright color (white, cream)
		Light	Sufficient sunlight
		Furniture and Items	Bright color furniture, simple items
	Reject	Finishing materials	Unprocessed materials (wood)
		Color	Dark(brown), using complementary colors
		Light	Insufficient light
		Furniture and Items	Not magnificent characteristics

4. CONCLUSION AND FUTURE WORKS

(1) Conclusion

As examined above, the emotional preference of age and gender groups and interior design factors are observed using human sensibility ergonomic approaches.

Each group shows similar tendency in general but there are differences in emotional preference and each group views café with different perceptions. The males and the middle-aged group sees café as a public place and prefer bright illumination while the females and the young people group recognize café as a private and entreating place, and also attach importance to uniqueness and overall harmony rather than just brightness. Cafes targeting young people or females should be exciting places, so it might be better to have unique items or decorations. On the other hand, cafes for middle-aged people or males should be modest and quite places for public purposes. And to get high intensity of light, it would be good to have wide window for natural lightness. Following these proposals, there are more possibilities to design and build successful interior design for cafés and they can benefit both designers and owners.

(2) Future Works

Since human sensibility ergonomics is quite new approach in interior design field, more fundamental studies are needed to understand the relation between human emotion and interior design factors. Especially, the relation of emotional adjectives needs a close examination. As collecting more words, there are more possibilities to raise unmentioned factors.

And in this study, the age groups were divided too simply for the subjects' age was unbalanced. So getting more subjects and subdividing into more age groups, more accurate study can be done. And age is changing in the stream of time, so constant study should be needed. And other combination of subject group such as their jobs or regions can be possible and fitting interior design to the specific groups, the profit of the commercial place will be increased. And human sensibility ergonomic interior design can be applying other field not only café, so the subject can be expanded. And development of standard studying methods and tools for them was needed to design and build interior design which satisfying human emotion.

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