

The Appraisal Factors and Evaluation of Emotional Design

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Abstract

The research probed into the problem of emotional design to examine the differences between directly evaluated overall scores and accumulated scores when evaluating the creative design by expert designers. By combining factors of challenge (C) and valuation (V) to the evaluation formula of Alessi, which included the factors of function (F), communication language (CL), and sense/memory/imaginary (SMI), five factors for evaluation were yielded. Correlation analysis revealed that there were significant relationships between direct scores and accumulated scores. Examined with linear regression analysis, it was discovered that the most significant factor in affecting direct scores was valuation. By applying the five factors as evaluation criteria, this research has successfully screened four creative designs from 74 works of students, which have been developed in an emotional design workshop, for exhibiting in the Taipei Int'l Furniture Show 2007 and Fiera Milano 2007 (That's Design!- Superstudio 13, Italy).

Keywords: emotional design, appraisal factor, creative design evaluation

1. Introduction

Concerning a product's functional expression and communication of design language, there are many different perspectives. From the perspective of product semantics in the early stage, Krippendorff & Butter (1984) believed product semantics should properly communicate the message of how to use a product. In addition, a product also possesses the function of being self-expressive. Mono (in Wikstrom, 1996) also defined that a product may possess four semantic functions: to describe, to express, to signal, and to identify itself. From the perspective of cognitive psychology, the focus of product semantics has shifted from the product's narrative performance to psychological feeling. For example, Jordan (1998), the design researcher of Philips, analyzed the emotional responses of the users and suggested that on using a particular product, they may have six different kinds of pleasure: "security," "confidence," "excitement," "satisfaction," "entertainment," and "freedom." Meanwhile, Demirblik (2003) approached the problem from the perspective of ergonomics to explore the semantic and satisfactory emotional design with the intention of finding out how to trigger the pleasure arousing elements in a product. His research claimed that a product communicated its positive emotion with particular characteristics. The research also discovered that the feelings associated with a pleasurable product include: confidence, reliability, pride, energy, satisfaction, etc to create the emotions of happiness, senses, fun, and dreams. Later, the research concluded that there were six different forms of pleasure "senses, fun, cuteness, familiarity, metonymy, and colors." Recently, integrating semantics with emotional design, researches have been conducted on the "wow design" factor, the exclamation of excitement. For example, Desmet (2005) synthesized pleasant surprise, fascination, and desire to identify the "wow-experience," with which he formed the layered-emotional approach.

In addition, Norman (2004) pointed out that there were three levels in emotional design: visceral level, behavioral level, and reflective level. Visceral level, is related to external beauty; behavioral level to fun and function while reflective level emphasizes self-image, personal satisfaction, and memory, etc. This indicated that the design of a modern product must not only emphasized its function but also its characteristics of emotion, memory, and communication. For example, the products and the themes communicated by the well-known Alessi, an Italian manufacturer of daily utensils, has become one of the important indicators in cultural studies. In order to establish its outstanding product image, Alessi has developed a design formula to evaluate its products, including four appraisal factors: function, communication language, sense/memory/imagination, and price (Lin, 2003 and 2005). With the maximum score of 5 for each factor, Alessi will not

consider producing a product unless it scores higher than 12. However, is this method appropriate for evaluating design works of students? Obviously, factor of price may not so relevant on evaluating students' designs. On the other hand, the factors of "challenge" and "valuation" proposed by DROOG design (an internationally famous Netherlands designers group) and Moooi (a Netherlands avant-garde design furniture brand) for design assessment may be highly expected in students' creative designs. Therefore, this research has extended Alessi's design formula by reserving the factors of function (F), communication language (CL), Sense/ Memory/ Imagination (SMI), but adding "challenge" (C) and "valuation" (V) to it, to examine the teaching result of students' creations (note 1).

Generally, the score yielded from evaluating students' designs is a subjective score given by the evaluator on appraising the overall achievement of a work. The more objective and analytic evaluation method, such as the method of assessment mentioned above, has not yet been applied to appraise students' designs. This research supposes that there is a positive correlation concerning the overall impression of emotional design and the accumulation scores counted with the related 5 factors for evaluation. Then, if the overall impression of a design differs, there should be considerable correlation differences among the overall impression and the five factors.

2. Method and Procedures

First, this research planned the general design theme for the emotional design project: Emotion behind behavior (EbB). There were 74 design students (sophomores, aged between 20 and 22) participated in this design project which included two phases of creative process: inspiration of design topic and design development.

2.1 Inspiring Design Topic

In this phase of design theme inspiration, to induce the design imagination with diverse thinking, the 74 students were grouped into 18 teams (with the maximum of 5 students and the minimum of 3 in a team). Each team was asked to search for its own specific design topic through observation and discussion on related phenomena and issues during a four-week workshop

where three seminars were arranged (note 2). At the end of this phase, the 18 topics decided could be classified into three categories:

- Topics related to communication and memory: communication, habits, memory, childhood, expectations, transition, and friends.
- Topics related to feeling and experience: surprise, sense of belonging, sharing, naughtiness, and sense of security (2 teams select this topic).
- Topics related to extended reverse thinking with emotions: irony, embarrassment, contradiction, ambiguity, and profound emotion.

2.2 Individual Design Development

According to the design topic decided by his team in the last phase, each student then was asked to develop his design concept individually in this phase. During the preliminary presentation, the design concepts were reviewed and discussed with the teachers to obtain practical suggestions for revisions. After the preliminary presentation, there were 4 weeks for each student to fully develop one design. In the final presentation, each student displays his design with an A1 illustration board in the exhibition area for evaluation (no oral description was given by the designers about their design on evaluation).

2.3 Design Evaluation

In the final presentation, 4 expert designers (including 2 senior designers and 2 design teachers) were recruited to assess each of the complete designs consecutively. The assessment items included “scores for overall impression” and “scores for each of the five factors.” The lowest score for the overall impression, regarded as “direct score”, was 0, and the highest was 100. The lowest score for each of the emotion assessment factors was 1, and the highest 5. Therefore, the total of the five scores, regarded as “accumulated scores”, ranged from 5, the lowest, to 25, the highest. The marking scheme for each of the assessment factors was as follows:

- (1) SMI (Affective): the sense (conscious)/memory/imagination/innovation of the product (whether it could excite people or not)

(2) Communication Language (CL): the product's ingredients/ presentation means/ messages communicated/ (Is it possible to identify the designer's idea from the appearance?)

(3) Function: the product's performance

(4) Challenge: visual tension /strength of presentation/potential of future development of the product

(5) Values: the completeness /degree of refinement/quality and texture/beauty and taste of the product

2.4 Analysis of Evaluation Data

The scores collected from the 4 expert designers then were statistically analyzed.

(1) To compare the "accumulated scores" to the "direct scores" for either all the design works or for the three groups of works with different degrees of overall evaluation(groups of top 10, middle 10, and bottom 10 designs).

(2) To analyze the related influence of the 5 assessment factors to overall impression for the three groups of works with different degrees of overall evaluation.

3. Results

3.1 Results of Correlation Analysis

3.1.1 Correlation between direct score and accumulated score

The result of correlation revealed that the direct scores was highly correlated to the accumulated scores (with the correlated coefficient of 0.973**) regarding to all 74 works. It was clear that the accumulated scores of emotion were valid for overall evaluation. For the three groups of works with different degrees of overall evaluation, it was discovered that the correlation coefficients of the "accumulated scores to the direct scores" of the top group was 0.831**; middle group, 0.769**;

and the bottom group, 0.809**. (** implied related at the significant level of 0.01) Overall, they all reached a high degree of correlation, although they were not congruent.

3.1.2 Correlation between overall scores and scores of the five factors

The correlation analysis also indicated that the coefficients of the direct scores (overall impression of the products) and the 5 assessment factors, from high to low, were: valuation (0.881**) > SMI (0.852**) > CL (0.832**) > challenge (0.815**) > function (0.766**). Each factor was significantly related to, though with varied degree, the overall evaluation.

Concerning the correlations (coherence) between the 5 component factors to the accumulated scores, the order from high to low were: valuation (0.889**) > CL (0.876**) > SMI (0.847**) > challenge (0.842**) > function (0.80**).

3.2 Results of Linear Regression Analysis

Regression analysis was conducted to examine the related weights of the factor scores to the overall evaluation. Here, the direct score was set as the dependent variable y, and the independent variables were the score of: emotion, communication language, function, challenge, and evaluation - the five assessment factors (a1-a5).

The results are summarized in Table 1. They indicate that the R^2 of this analysis (.955) was significant enough. All the five factors had significantly (with the significant level of 0.01) contributed to the overall evaluation. The correlation coefficients of the five factors in the table show that the factor of valuation had the strongest influence to the overall evaluation, while the factor of communication language the weakest. According to table 1, the equation of the linear regression can be expressed as follows:

$$Y = 31.55 + 2.70x(\text{valuation}) + 3.61x(\text{SMI}) + 2.03x(\text{function}) + 1.99x(\text{challenge}) + 1.12x(\text{CL})$$

It is interesting to note that if we substitute the maximum scores of 5 into the variables of the 5 assessment factors in this equation, the resulted y score will be 88.85, not the maximum overall score of 100. This means that even if a design performs perfectly in all emotion aspects, it may not be fully appreciated in its overall score. Perhaps this may be partially due to the highest direct

score of our input data being less than 90, or it may be because some other influencing factors were not taken into consideration.

We have also examined the relative influence of the five factors to the overall evaluation for the top group works, middle group, and bottom group works, respectively, by the similar regression analysis. However, the significance of the three analyses did not achieve the significant level of 0.05.

Table 1. Result of linear regression analysis to the overall evaluation

	R ² = .955		
	Non-standardized Evaluation	B Standardized Coefficient Beta Distribution	significance
(Constant)	31.554		
Valuation	2.70	.328	.00
SMI (Affective)	3.61	.316	.00
Function	2.03	.204	.00
Challenge	1.99	.183	.00
C L	1.12	.109	.02

3.3 Results of Factor Analysis

To examine the relationship among the five factors of emotion, this study has conducted a factor analysis. The five factors (SMI, CL, function, challenge, and evaluation) were condensed into two factors (with total variance accounted of 82.66%). Factor 1 (x-axis) was composed by SMI, CL (communication language), challenge and valuation, whereas Factor 2 (y-axis) was composed by function only. Then we located of the select three group (top, middle & bottom) works in the image plane, according to the factor scores of the design works that was transformation by variance of two factors from 74 works as shown in Fig. 1. As shown in this figure, all the top ten designs were located in the first quadrant.

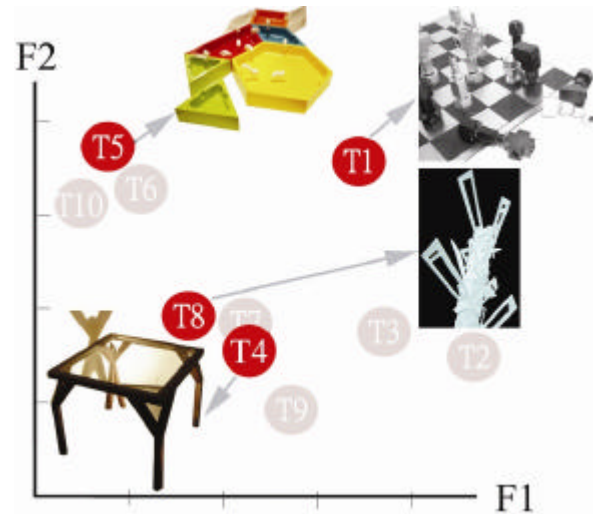
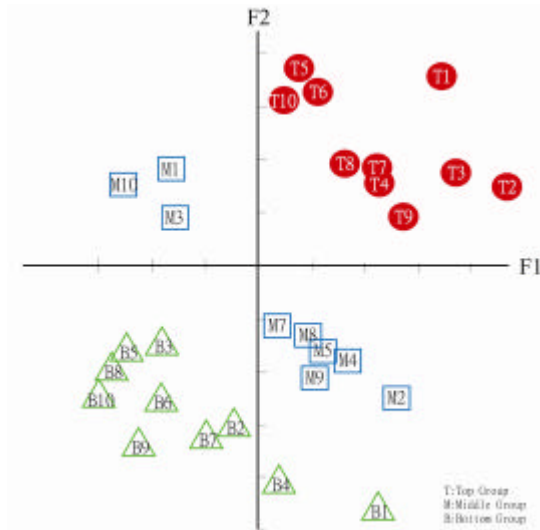


Fig.1 Distribution of the 3 group Works in the image plane Fig.2 Distribution 4 of the top 10 Works in the first quadrant

4. Discussion of some Design Works

Out of the top ten works, there were two works, CHESSCREW (T1) and Chair' S (T8), as shown by the solid red circle in Fig. 2, selected by the design teachers and expert designers and approved by the committee (Superstudio 13), to be exhibited in "That's Design!," Superstudio 13, and Fiera Milano 2007, Italy. Meanwhile, the works Shadowgraph (T4) and Collation Hollowware (T5) were selected to be displayed in TIFS, 2007, hosted by TDC (Taiwan Design Center). (note 3)

The image profiles of these four designs, as shown in Fig. 3 indicate the scores of the four exhibited works in the five factors. As revealed in figure 3, the scores for SMI and C L (communication language) of all the four works were very close. Although the valuation of design 4 (T8) was comparatively low, its scores in the factors of SMI and challenge allowed it to stand out and to be chosen. The further discussion and analysis of the four representative works were as follows: (note 4)

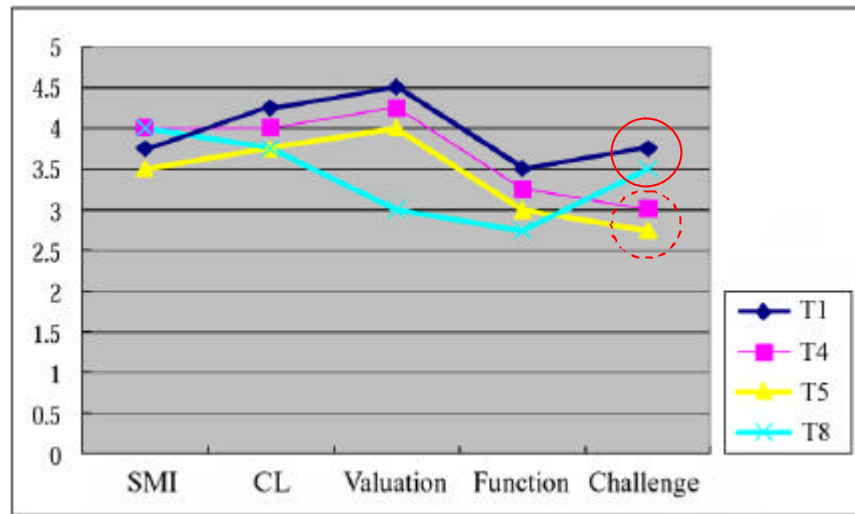


Fig 3. The profile graph of the 4 exhibited works in the five factors

4.1 CHESSCREW

This design (Fig. 4) was connected to our memory in daily life - metal nuts and a chessboard. However, it created different combinations through the idea of game and fun. The designer connected the unrelated but familiar and existing objects of a chessboard, nuts, and screws together. With this unusual combination and appearance, it conveyed a different meaning of chess. In the world of machines, the major task of the nuts is to fix and fasten the screws. Meanwhile, the thread works to propel and advance the screw. Their semantic meanings resembled the roles played by the chess pieces, such as defense and attack. In addition, by the chessboard, a hexangular spanner was placed, extending, transforming, and reassembling the original semantic meanings of the objects skillfully.

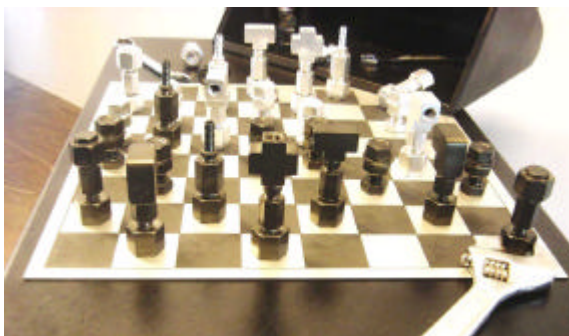


Fig. 4 CHESSCREW



Fig. 5 Shadowgraph

4.2 Shadowgraph

This design (Fig. 5) employed the supporting structure as the major appeal. Through the slanting Y legs, it allows the four corners of the square table to suspend; however, it also represented the effect of the structure's role of taking a burden. On one of the legs, a "human" form was hidden. With the effect of spotlight lighting, the shadow, which emphasized the outstanding structure, created surprises. Through the "lifting of the weight" gesture, it animated the lifeless table and aroused the viewers' resonance.



Fig. 6 Collation Hollowware



Fig. 7 Chair' S

4.3 Collation Hollowware

This design utilized the idea of a jigsaw to assemble different vividly colored plates into a collation hollowware (as shown in Fig. 6). Between different utensils, different animals were chosen as tenons to fix the plates together. The animal shaped tenons allowed people to recall the imagination between animals in different districts (in a zoo the animals were displayed in different zones), provoking "childhood memory" skillfully.

4.4 Chair' S

This design (as shown in Fig. 7) was a coat rack formed by assembling chairs of different sizes together. The racks and frames extended from the minimized chairs at different angles, and they gathered at the bottom of the square cone. The original idea was inspired by the habits of hanging clothes casually on the back of the chairs. Likewise, this indirect idea could arouse the viewers' emotion after interpreting the artistry behind the work. In addition, the viewers could feel sublime

because of the challenge to create high intensity. This explained that although this work did not receive high scores in function and valuation, it scored highly in “SMI” and “challenge.”

5. Conclusion

In this research, the theme of emotional design was explored through group inspiration of design topics, and then individual design development. Then, the created conceptual designs were assessed in two parts “overall (direct) scores” and “accumulated scores” that included five assessment factors. The result indicated that “accumulated scores” could reflect “overall scores” properly. Concerning efficiency, “overall score” was more convenient in representing the evaluators’ assessment of the works directly; however, scores were dependent largely on the experts’ subjectivity and experience. When representing a particular theme or exploring the emotional qualities and potential creativity of different designs, perhaps “factor scores” could be served as support in assessment to allow the design students to revise the necessary parts or seek a breakthrough in accordance to the experts’ comments. The factor score could also serve as a reference for the selection of works with specific merit for exhibitions, as demonstrated by the four representative works discussed in this study.

There is still plenty of room for further improvement in the evaluation on emotional design. For example, the five assessment factors in “accumulated scores,” are discussed in three perspectives for further suggestions.

1. According to the opinion of the evaluators in this study, the factor of “valuation” is easier to assess; however, considering whether the designers limited their imagination to fit in this criteria or sacrificed challenge for valuation needed further discussions. As valuation was presented through the making quality and visual quality of the model, when evaluating, it was necessary to consider the quality of the model of design works because they might be different in the degree of refinement depending on who was making the item: the designer himself or the entrusted model maker. Perhaps, the model making skills could promote the degree of refinement and valuation. In brief, it was necessary to consider all of the following: material and quality of model, the cost/benefit effect of model making, and the sense of participation in learning because in the stage of learning how to design, the students should make the models by themselves to lay solid foundation in their actual experience and maintain the courage of risking innovation.

2. It was more difficult to assess the merit on the factor of communication language; although, it was discovered from the result of this research that if designs excel in both emotion and communication language aspects, they were more likely to get higher evaluation. How could the designers manipulate emotion and communication language factors to make the viewers feel the “wow” factor or communicate special experience through the design to arouse the sense of pleasure were the issues that required further research.

3. Concerning the factor of challenge, it implies the evaluators’ expectations. If a person highly expects a work, she/he tends to regard it as a lack of a challenge. Meanwhile, due to the differences in difficulties to design different items, it is hard to compare and assess different works with the same criteria. Further studies may be needed to develop a valid way for assessing the factor of challenge.

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Notes

1. In the preliminary stage, this research combined 5 research viewpoints, trying to sort out the 5 assessment factors for the evaluation of emotional design. The implied question: whether or not SMI are corresponding to Norman's (2004) suggestion of the visceral and reflective levels, and whether reflective level corresponds to challenge or not. For different people, they have different value systems for valuation. It is highly related to quality but also related to the consideration between the viewers ' senses of possessions and the price they are willing to pay. It is necessary to discuss the corresponding meanings further.

	Affective (SMI)	Communication Language (CL)	Function (F)	Challenge	Valuation
Desmet (2005) wow - experience	pleasant surprise			fascination	desire
Norman (2004) 3 levels of emotional design	visceral level/ reflective level	behavioral level		reflective level	visceral level
Lin (2003) Alessi design formula	Affective (SMI)	Communication Language (CL)	Function (F)		Price
Demirblik (2003) 6 emotional response	senses	Cuteness, colors		Metonymy , fun	familiarity
Jordan (1998) 6 pleasure in product use	excitement	confidence	security	Entertainment, freedom	satisfaction

2. There were three seminars for the designers on Emotion (behind) Behavior.

- Seminar 1 < Topic: “ Design Scenario ” Speaker: Der-chang Yu (Scenario Lab).

- Seminar 2< Topic: “ Tension of Design ” Speaker: Chun-long Wang (ZOE Design).
 - Seminar 3< Topic: Observation of a Product’s Emotional Expression, Speakers: Chien-kuo Teng (SCID), Yu-Rung Chou (Philips design center, Taiwan); Terry Ko (Xrange ID dept.).
3. TIFS 2007 Exhibition was sponsored by Taiwan External Trade Development Council and Taiwan Furniture Manufacturing Association and New Designers Zone was planned by the Taiwan Design Center.
4. The four designers of the four works discussed in this study included: Chin Li-yen (CHESSCREW); Chung Chang-ling (Shadowgraph); Chou Ying-chi (Collation Hollowware; Lin Yen-ting (Chair’S). All of the design works are guided by coordinator Chien-kuo Teng, the Department of Industrial Design, Shih-Chien University.