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KANSEI EVALUATION OF THE PRODUCT DESIGN USING VISUAL IMAGES – FOCUS ON THE IMPRESSION OF PRODUCT APPEARANCE

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ABSTRACT:

The aim of this study is to examine the adaptability of an evaluation method using the visual images to evaluate the impression of a product design based on *Kansei*. It was compared the impression that user group received from the designed product by a designer with the visual images that a designer assumed motifs for design work, and identified the effectiveness of the design evaluation using the visual images.

It is the subjective evaluation based on the *Kansei* of the user to choose an image by oneself, is to express the feeling of the product for an image without using the language.

1. INTRODUCTION

Evaluation is the systematic determination of the value, merit, worth, and significance of something or someone. Evaluation often is used to characterize and apprise subjects of interest in a wide range of human enterprises, including the arts, business, computer science, and other human services. In the design field, an evaluating method is no less important than a design methodology, because an effective evaluation is useful for both the best design and the expression of feeling by a user. The image of a product is strongly influenced by the appearance, and its first impression is usually sensed earlier than anything. For this reason, approach of *Kansei* is necessary to evaluate impression. *Kansei* is a peculiar Japanese term, which is often translated as the higher order function of the brain as source of inspiration, intuition, pleasure/displeasure, taste, curiosity, aesthetics, and creation.

This study aimed to investigate the correlation of the image associated by a designer and the impression perceived by user. Visual images were used to examine the merit of the evaluation. The best result is provided using an object as an appropriate evaluation method. There are a lot of factors which influence to evaluation of a design. This study is limited to distinguish of the appearance from the aesthetic aspect, functionality, usability, and so on. Though sometimes the user has more or different impressions than intention of the designer, the value of design in this study is appraised that the intention (concept) of the designer is conveyed enough to the user.

2. LANGUAGE, SHAPE AND IMAGE OFSHAPE

Various techniques to express an object are language and shapes. They are two completely different ways of representing something, but are also interconnected. Shapes which are often expressed in images are used to supplement the missing part of the communication by language, and language is used to convey a form precisely. However, people tend to understand objects only based on image and language. Both language and shapes are quite important. Therefore, it is necessary to treat them with an appropriate method.

In a questionnaire, pertaining to introducing new objects, mainly the method of language was used. However, is the evaluation method by language enough to capture the *Kansei* of the person? It is thought that the operation of *Kansei* is formed by a non-verbal element such as the five senses. It is in particular possible for an image to express an object regardless of the knowledge

and language capacity of the subject. It is for this reason that evaluation researches based on non-verbal method are suggested instead of the other.

3. OVERVIEW OF EXPERIMENT

3. 1. SUBJECTS

The subject of two groups (a designer and a user) is necessary to give a demonstration from an idea in new product design to the evaluation of a design. The subject who is a designer of 29 years old has experience of the product design in actual business. The user group consists of 31 students, both from undergraduate and graduate level (17 female and 14 male, average age is 29.5).

3. 2. PROCESS FLOW

This experiment consists of three steps. The first step was choosing visual images that were used for the design motif and image sample. The explanation of design motif and the board of sample image will be given in the next part of this paper. The second step is letting a designer designs a product. The last step is to ask user to evaluate the designed products.

3. 2. 1. CHOICE OF VISUAL IMAGES

This step is very important because it will affect the flow and the result of the experiment. The images that were selected in this stage will become motifs for the designed product and also the samples for the impression evaluation.

The impression of images strongly associates with each attribute or qualities of the object. In this experiment, as the result of having performed inquest in statistical probability, 30 images are chosen from natural and man-made objects (Figure 1). The image of the scenery, the object and the texture are prepared for the same number to have variety without being partial one-sidedly. Since color often hints out certain impression too strongly, in this experiment only monochrome image are used. The images were provided to the designer separately, and were shown to users as an image-board.

	Texture	Environment	Object	Total
Man-made object	5	5	5	15
Natural object	5	5	5	15

Table1: category of visual images

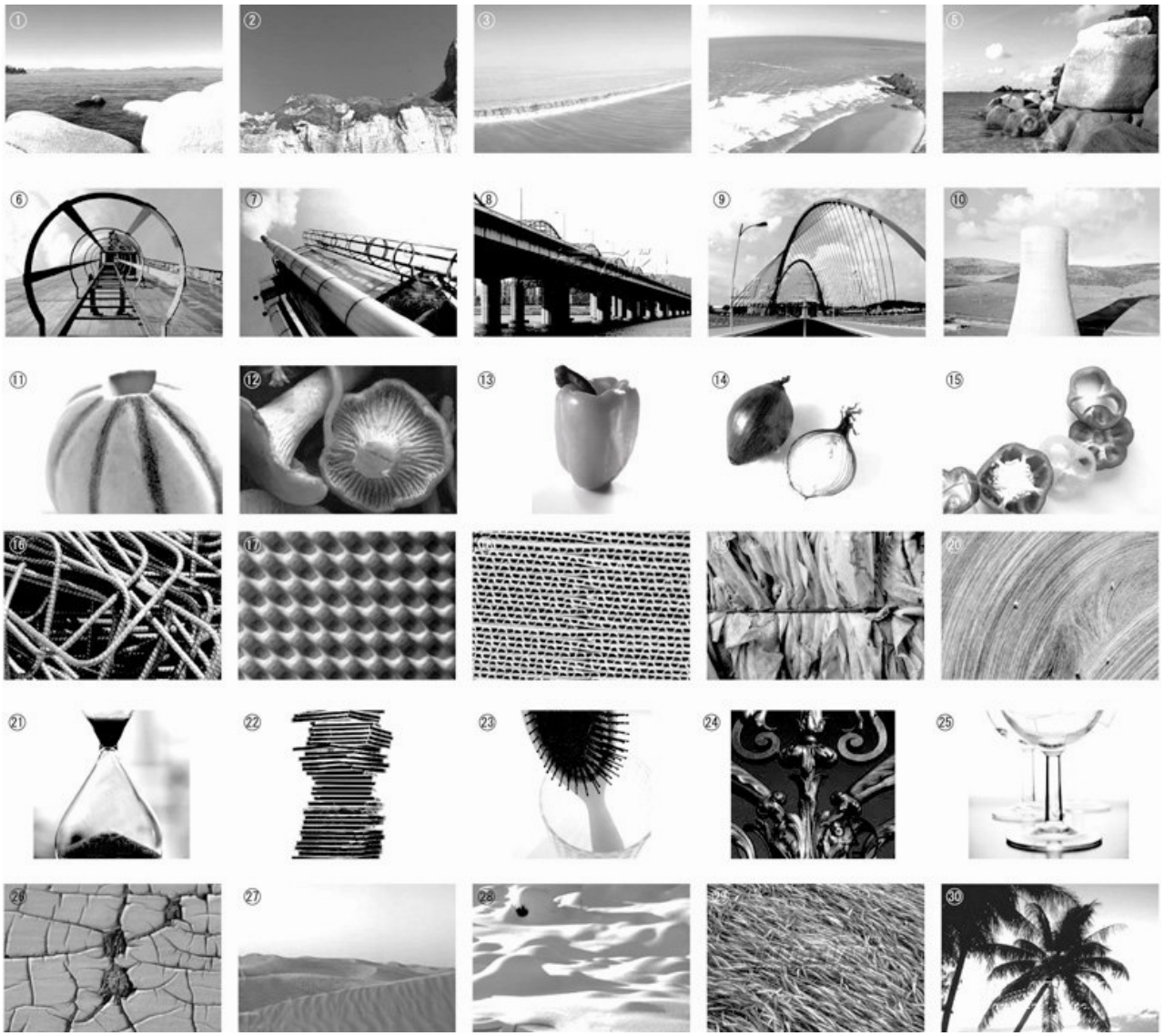


Figure 1: 30 visual images

3. 2. 2. DRAFT DESIGN OF PRODUCT

The designer chooses images from the image-board which then be used to design a product. The designer was asked to design a product in three styles, based on three sets of three images.

These sets of images are the design motifs (Figure 2). The product was designed are household humidifiers of three styles.

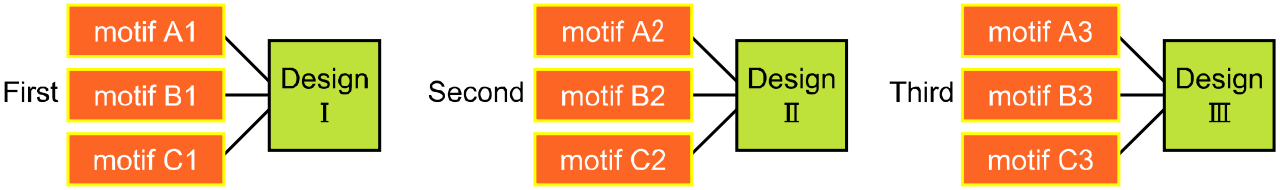


Figure 2: Structure of the design work for the experiment

Image that gave the strongest impression among the three images become the main motif (motif A), and then two left images become the sub motif (motif B and C). For example, in the Design Ⅰ (Figure 3) main motif is a green pepper, while the sub images are the sea and a glass.

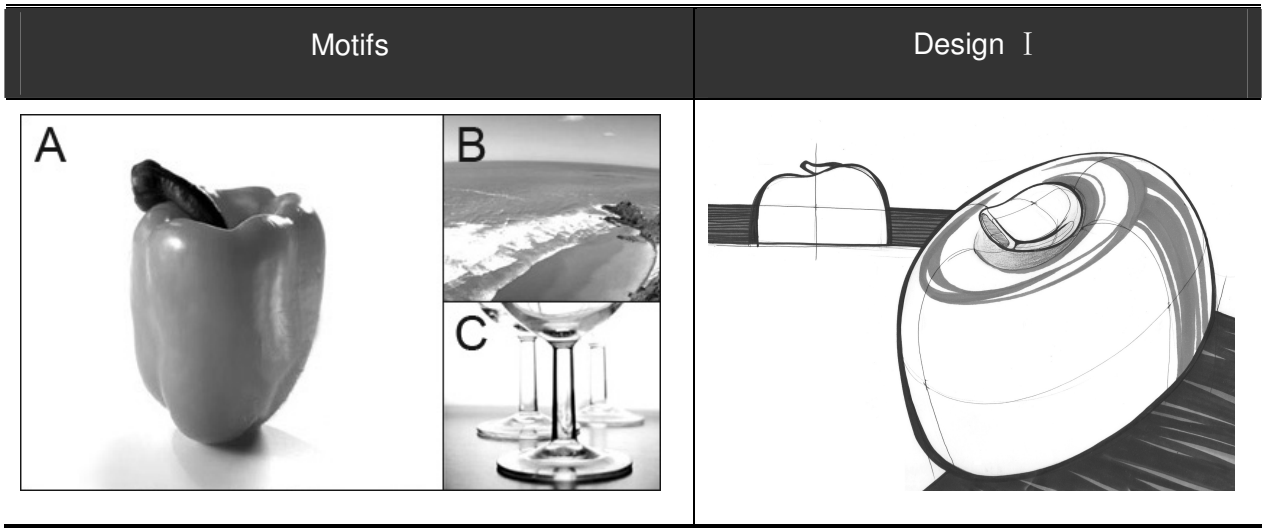


Figure 3: Design Ⅰ from one main motif and 2 sub motifs

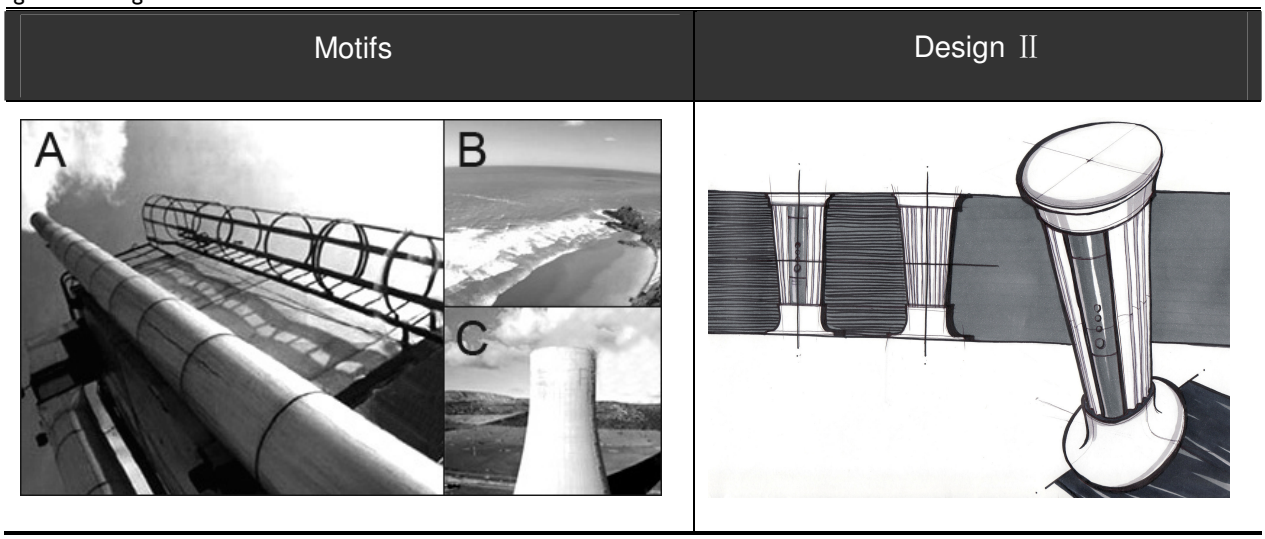


Figure 4: Design Ⅱ from one main motif and 2 sub motifs

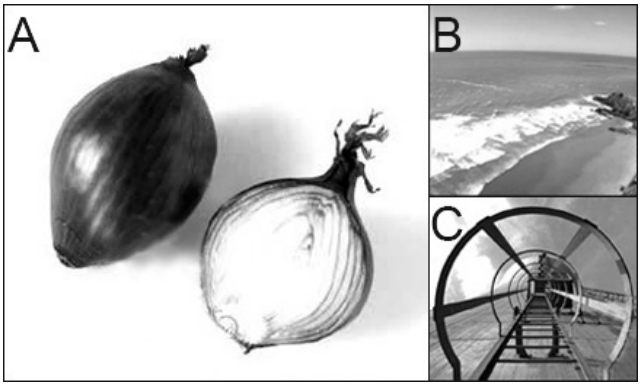
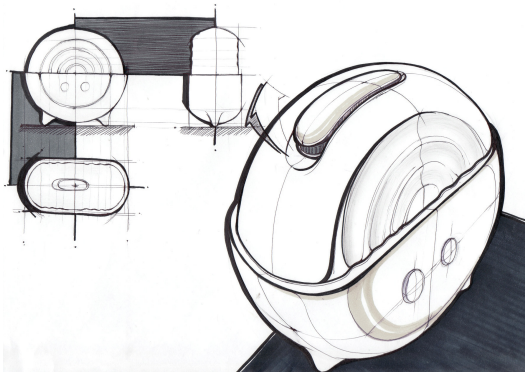
Motifs	Design Ⅲ
	

Figure 5: Design Ⅲ from one main motif and 2 sub motifs

3. 2. 3. DESIGN EVALUATION

It was presented the three designs, one by one, to the users and explained to them the function of the products. The users evaluated the overall design and their impression of the three design styles.

The first, subjects evaluated the total impression for the design. Five evaluation items were referred to evaluation sheet from Good Design Award of Japan focus on appearance. The “Good Design Award” is Japan’s only comprehensive design evaluation and commendation system. The evaluation point is five levels from -2(I do not think so at all) to +2(I think very so). Baseline is “0” that means a normal. Therefore, one design gets evaluation point from minimum -10 points to maximum +10 points. In other words, we can judge it as a good design more than a total 0 point, and a not good design lower than a total 0 point.

No.	Original Evaluation item	Trance for the English
a	美しさがある	An beautiful design
b	独創的である	An original design
c	魅力が感じられる	An attractive design
d	デザインコンセプトが優れている	An design of a good concept
e	斬新な造形表現がなされている	The design that molding expression is fresh image

Table 2: Evaluation item of the design

And then, image samples are showed to the subjects. They were asked to choose three images out of thirty that fit best to the design. Further, they were asked to comment on the specific

element of the design which correlated to the three images they have chosen, they do this with all three designs (Design Ⅰ, Ⅱ,Ⅲ)

4. RESULTS AND ANALYSES

4. 1. DESIGN EVALUATION

Table 3 shows the total result of evaluation score of all 31 users. The sum total score of each design is the order of DesignⅢ, Design Ⅱ, Design Ⅰ. DesignⅢ got the highest score, and it was referred to as having the best design among three designs. As for Design Ⅱ, only originality(b) was estimated highly, while scores low on other evaluation items. Evaluation of Design Ⅰ was low generally, and only plus scores significantly on evaluation items of beauty(a). In other words, Design Ⅰ is the normal form that is used a lot, but was judged to be not good. In contrast, the slim Design Ⅱ has an original style, but the total sum was not high indicating than DesignⅢ that the evaluation can be different, depending on individual taste.

	Design Ⅰ	Design Ⅱ	Design Ⅲ
a	5	-7	21
b	-5	16	21
c	-1	2	25
d	-6	4	19
e	-11	6	13
total	-18	21	99

Table 3: Result of design evaluation

4. 2. IMPRESSION EVALUATION

Table 4 shows the frequency of popular items chosen by users for each of the three designs.

Design Ⅰ		Design Ⅱ		Design Ⅲ	
Image No.	Times	Image No.	Times	Image No.	Times
13	18	7	17	6	14
11	12	25	15	20	12
6/28	9	10	13	14	11

Table 4: Image No. and times that were chosen by user group

From this result we can see that a lot of images with asymmetrical curves of natural objects, such as in image No. 13, 11, 6 and 28 become motif for Design Ⅰ. The reasoning for choosing the green pepper image can be grouped into two. Some users refer to the curve of the green pepper and associate this to the product. Others refer to the stem of the green pepper.

As for Design Ⅱ, because of the impression of the column was strong, a lot of images like a geometric form of man-made object, such as image No. 7, 25 and 10.

As for Design Ⅲ, an man-made object such as image No. 6 and 20, and the natural object such as image No. 14 were chosen together. In particular, the group which paid attention to the layer of rings on the side of the product chose the cement wall texture (image No. 20) and the onion (image No. 14). And the other group which paid attention to an outline shape circular chose circle and balls. Figure 6, 7 and 8 expressed an impression image to a graph based on Table 4. The orange bar in the graph shows the main motif that a designer chose.

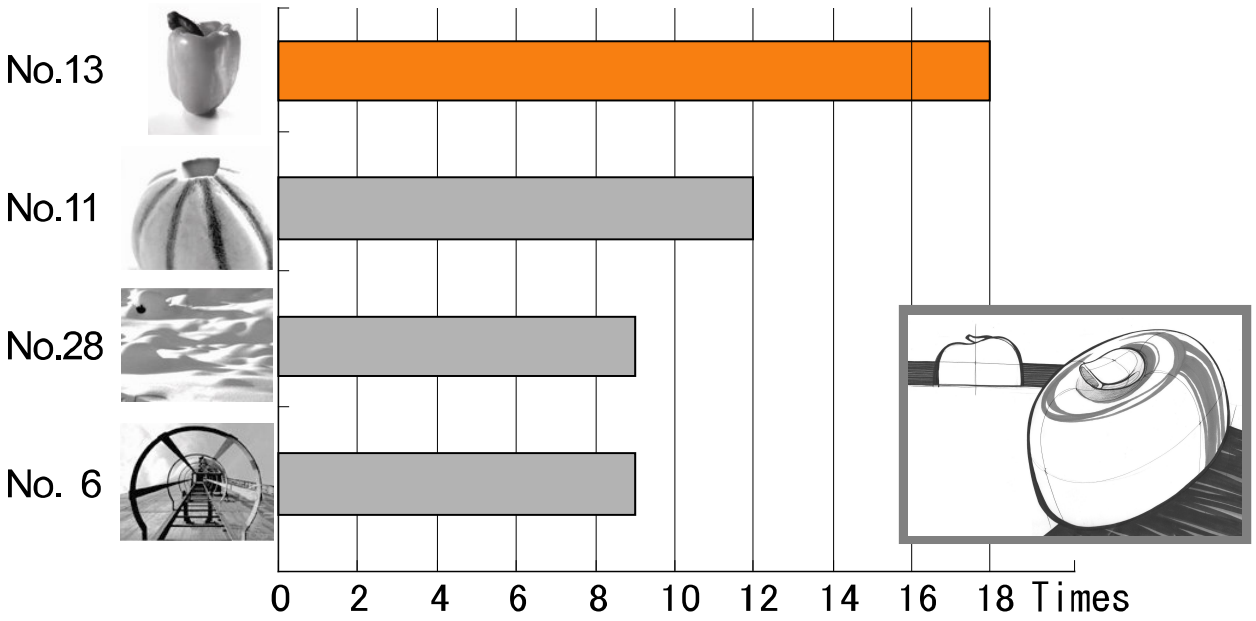


Figure 6: Best impression of Design Ⅰ

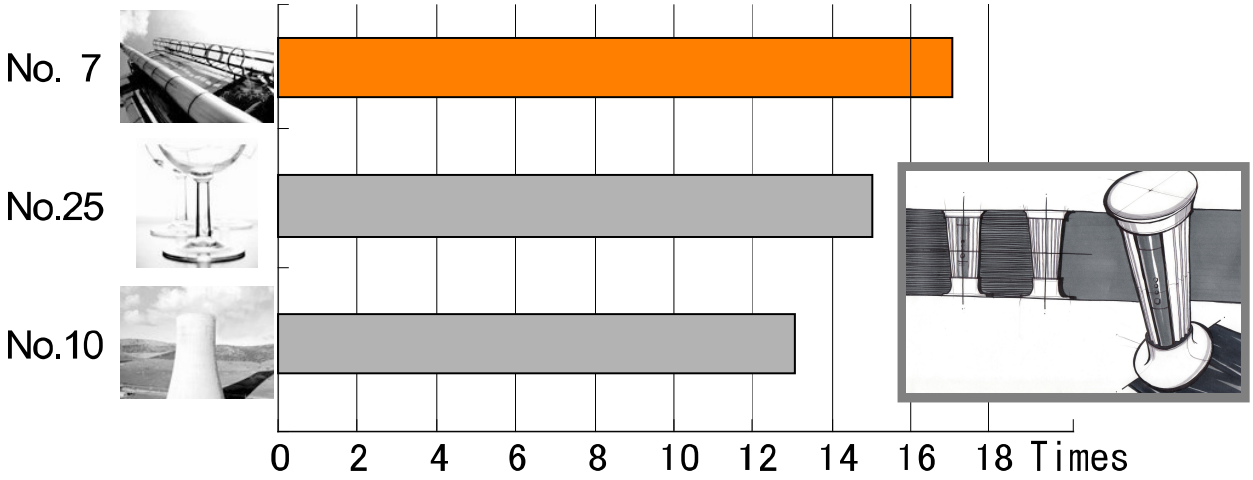


Figure 7: Best impression of Design Ⅱ

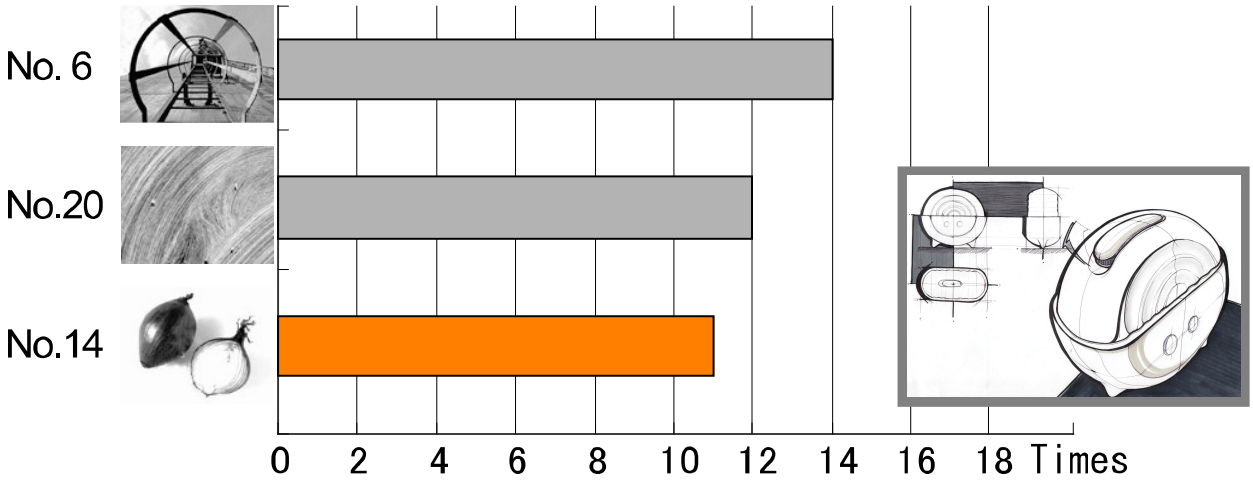


Figure 8: Best impression of Design Ⅲ

4. 3. RELATION OF EVALUATION AND USER'S IMPRESSION

We did it to an index whether the impression of the designer reached the user, and whether the user chose the main image that a designer chose as a basic motif. It was narrowed it down to only the main image that a designer chose as a design motif and analyzed it. The user group was classified in an impression agreement group with the designer and the disagreement group. Table 5 shows the summary of the mean evaluation score and standard deviation for all the designs.

As for Design Ⅰ, the evaluation score was the lowest (Table 3), but the concept about the form of the designers were conveyed well by a user, as agreement of 18 among 31 users. The evaluation score of the group that the impression of the user accorded with a motif of designers was high in Design Ⅰ and Design Ⅲ, but low on Design Ⅱ (Table 5).

User	Items	Design Ⅰ	Design Ⅱ	Design Ⅲ
20 users	Mean	-0.58	0.68	3.19
	SD	4.66	5.24	3.38
The agreement group	User number	18	17	11
	Mean	1.33	0.24	3.91
	SD	3.93	4.89	1.97
The disagreement group	User number	13	14	20
	Mean	-3.23	1.21	2.80
	SD	4.40	5.77	3.94
P		0.01	0.61	0.39

Table 5: Comparison of evaluation score by the agreement of the impression

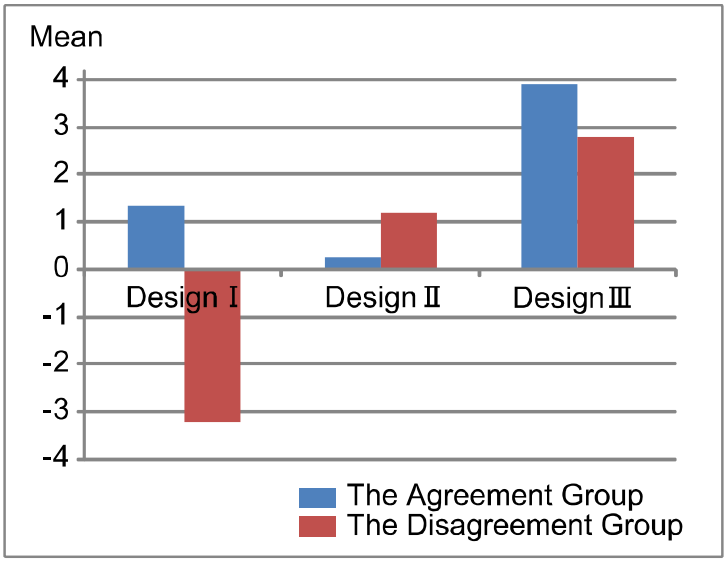


Figure 9: Comparison graph of the mean by the agreement

Evaluation score for Design Ⅱ about originality was high, and Design Ⅱ was strong in the impression of the man-made object. In other words, it is hard to say to level of the evaluation when an impression came for all designs to be connected with each other. Therefore, we think that it is necessary to examine availability of the impression evaluation using an image for by the characteristic of the design. We should analyze it based on *Kansei* or personality of users, because the comment of the user who talked about the characteristic of the impression among the group which chose the same image is very different across individual.

5. DISCUSSION AND CONCLUSION

This study investigated the difference of the impression for the same product design of a designer and the user. To achieve this aim, the new product was designed by a professional designer, and

it was evaluated by users based on form, style and impression characterize. The three different products were designed form each three motifs, which are images of man-made and natural objects. From the results of this examination, we understand that the outline (curve line or straight line) of products have strongest influence on the impression on 2D plane.

Design evaluation that is regarded only total grade as important moreover by a large numbers without grouping of the users, have to require further examination because total grade is made the mean point. In the fact, the user evaluates focus on only each evaluation item, but the impression of products is not decided on each feeling about items. To answer this problem, visual images are used by evaluation tool based on Kansei to express the impression which is made from eyesight for visual images.

Two designs among the three designs have the high evaluation score by the group that chosen the same images a designer and user. It proves relevance of design evaluation was thought to be matching with impression between a designer and user. Because an image has various meaning, sometimes it may be difficult to evaluate detail part of a product. But we argue that impression about a product should be evaluated to synthesize the whole feeling based on individual *Kansei*.

Since the use the image as technique of the evaluation gives different impressions by a viewpoint, it must be treating carefully. This study investigated the difference between the impression of a designer and the users and the relation with the design evaluation focusing on the total feeling and synthetic valuation of a product design. And then it was suggested an evaluation method of the product design based on the *Kansei*.

This subjective evaluation, based on the Kansei of the user, is to allow users to express the feeling of the product for an image without using the language. It is to evaluate only the morphological characteristics of the product design. In the future, we will examine an application possibility to internal evaluation such as functionality or usability in the future.

6. ACKNOWLEDGMENTS

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