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The Relationship between Intuitive Preference and Emotional States Considering Inherent Images

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Abstract: It has emerged from preference research that people's preferences are often based on intuition more than rational thought. This concept was derived from the previous studies on human facial expressions, and has been applied to product design researches. The influence of intuitional construction on preference applies to this study as well. However, this study does not focus on preference itself, but on the relationship between intuitive preference and emotional states with inherent images derived from car front faces. One hundred thirty-nine car front face photos were used as stimuli. This research consists of two experiments: experiment 1 and 2. Experiment 1 purposed to investigate the relationship between intuitive preference and emotional states, and experiment 2 aimed at eliciting inherent images from the stimuli. In experiment 1, twenty subjects participated in consecutive sessions: item-screening and affective-scale evaluation sessions. Subjects made decisions within limited time whether like-dislike the car front face photos (an item-screening session), and evaluated the stimuli with SAM (Self Assessment Manikin), an efficient measurement method of emotional responses: valence, arousal, and dominance (an affective-scale evaluation). In experiment 2, two other subjects dichotomized the 139 car front face photos with subjective states, and reported a scale that they used in dichotomizing. They conducted it five times per person. The results showed that valence was the most affective value to intuitive preference whether subject differences were considered or not, and elicited "cuteness" from the 102 car front face photos as an inherent category.

Keywords: *Design, Kansei, Metaphor*

1. INTRODUCTION

The study of preference aims not only at understanding decision-making but also aiming improving it. The view of users' desire has much to offer it. It is important for designers as well as marketers to understanding users' latent desires for products. However, inherent images are not easy to express in words for users or designers. Hence, to know what users see on the product can be a clue to understanding their latent desires. Considering a tenet of Gestalt psychology, the whole is different from the sum of its parts [1]. The surreal paintings by a Mexican painter, Octavio Ocampo, show the example [Figure 1]. The more time one looks at his works, the more explicit become revealed. Faces come into focus at a distance and metamorphose into something else entirely in close up. Instead of face one can see birds, instead of the general-two people. Each painting reveals a new facet that is different to each viewer. New configuration creates different shapes in the same painting. Absolutely, Ocampo's paintings were created the artist with a certain intention. However, the focus of this explanation is on why he used faces, which are formed from birds, dogs and even humans. Portraits reveal other figures in the paintings. His "intended" metaphorical pictures incorporate superimposed images in the paintings, and people "do see" the doubled

images from the paintings. It is a showcase that corresponds to a tenet of Gestalt psychology; "the whole is different from the sum of its parts [1]." The Gestalt theory plays a role in products as well as paintings. It is not hard to find those products surrounding us. A house consists of a front gate, windows basically. Whether those parts are designed along with a designer's intention, such as Ocampo's paintings or not, people see human faces from those houses. Figure 2 shows products evoking human faces. At least having similar sized circles in horizon and another circle below those circles might be triggered people human-like face inherently. It comes from a tendency of a human to interpret "configuration" as

Figure 1: Paintings of Octavio Ocampo. *Family of Birds* (the left) and *General's Family* (the right)

“something,” such as Ocampo’s works and houses on Figure 2. It does not aim at showing whether the painter or designer intended human faces or not, but whether people “see” human faces from those paintings or products.

There are many possible descriptors for the preference attributes of a product, such as utility, price, and so on. In this study, those descriptors were excluded from preference attributes. A pre-screening was conducted to identify descriptors or attributes that people consider important for the evaluation of a product. In this study, intuitive preference was the descriptor. For that, a time limit was imposed to screen more intuitively preferred (or non-preferred) car front face photos, which could affect the preference attributes, as interrupting the rational thinking process during their choices. The idea that cars have faces has been proposed [2], and has been investigated systematically [3]. However, it remains resolved on the relationship between intuitive preference and emotional states with inherent images despite the importance in design. Automotive fronts were metaphorically related to human facial expressions. Since metaphor is not only a device for seeing something in terms of something else [4] but also a way we understand new things in terms of things we already know it, hence products can be a powerful tool for conceptualizing, orienting, and personifying products [5]. In emotional aspects of a human, feeling states can be described by their position in at least two fundamental dimensions: arousal and valence [6]. However, in this study, three emotional values were applied: not only arousal and valence, but also dominance due to the important effect on preference for human-like face [3].

2. METHOD

This study was conducted in order to reveal the relationship between intuitive preference and subsequent emotional states by investigating both the relationship and

Figure 2: Products evoking human-like face

inherent images derived from the stimuli. The authors hypothesized as follows: inherent images of the products affect people’s preferences intuitively (H1), those inherent images move people’s feelings on exciting (or calm), happy (or unhappy), and dominate (or in-dominate) states (H2). Those hypotheses were verified with experiment 1, and confirmed with experiment 2. Experiment 1 has a goal to demonstrate whether inherent images of the products affect people’s preferences or not, and those images move people’s feelings or not. Experiment 2 reveals inherent categories that influence intuitive preference.

2.1 Experiment 1

2.1.1 Subjects

Twenty university students (13 males and 7 females, 24.1 years old in average and $SD=2.69$) recruited from University of Tsukuba. No subjects have taken part in any kind of a similar experiment.

2.1.2 Stimuli

Car front face photos of 139 models selected from thirty-five brands were used as stimuli. The photos were taken from copyright-free Internet sites and photograph collections, and all car categories, such as sedan, coupe, convertible, pickup, SUV, hatchback, minivan, wagon, full-sized van and classic were included, to increase variety. However, due to the identical condition of the stimuli, the authors limited the aspect of those photos within which look straight in the face. Figure 3 shows the samples. Pickup, hatchback, minivan, wagon, full-sized van were excluded from the collecting. A quality of photos was only considered in the stimuli collecting. The selected photos filtered in a gray scale to avoid a color effect. License plates were erased, although brand logos were retained, and rendered at 580×370 pixels.

2.1.3 Procedure

Subjects were informed about the general procedure, and reminded that there were no right or wrong answers to evaluate the stimuli with an affective-scale. Each subject was assigned to two consecutive sessions, item-screening and affective-scale evaluation sessions. In the item-screening session, subjects chose a button between “Like” and “Dislike” [Figure 4]. Mentioned in introduction, Imposed time-limitation contributed to screen more intuitively preferred (or not non-preferred) car front face photos as

Figure 3: Stimuli examples

Figure 4: Item-screening session

interrupting the rational thinking process during their choices. Item-screening session was conducted to select images that meet the following criteria: car front face photographs perceived as “preferred” or “non-preferred” for the corresponding subjects’ preferences.

At the time of the experiment, photos were categorized into 2 groups (like and dislike) while the time the subjects took for making a choice was measured as well. Based on the database, the five most-preferred and five least-preferred car front face photos were selected after analyzing the response time to all photos per like and dislike groups, for each subject [Figure 5].

In the affective-scale evaluation session, subjects evaluated ten car front face photos that passed a screening with analyzing in the item-screening session. In other words, different stimuli were used in experiment 1 with ten car front photos per subject that were affected subjective preferential bias on the stimuli. Table 1 shows 102 car front face photos that passed a screening with analyzing in the item-screening session. Seventy stimuli were selected as preferred by the subjects whereas sixty-nine stimuli were selected as non-preferred. Since the most preferred stimuli chosen four times (i.e., stimuli number of 54, 55 and 92), it can say that there was wide statistical dispersion of subjects in the preferences. Hence, the average of valence, arousal, and dominance by a subject adapted as

Figure 5: Item-screening process

Table 1: Item-screening result

Sti. No.	The Number of Choosing		Sti. No.	The Number of Choosing	
	Like	Dislike		Like	Dislike
1	1		71	.	1
2	.	1	72	1	1
3	.	.	73	.	.
4	1	2	74	.	2
5	1	1	75	.	.
6	2	.	76	1	2
7	2	1	77	2	2
8	.	1	78	2	.
9	1	.	79	.	.
10	.	.	80	1	.
11	1	.	81	1	.
12	3	.	82	2	2
13	2	1	83	.	.
14	.	.	84	.	.
15	1	2	85	1	2
16	.	.	86	.	1
17	.	1	87	1	1
18	.	.	88	1	1
19	.	.	89	.	.
20	1	.	90	1	2
21	.	.	91	.	2
22	.	.	92	.	4
23	.	.	93	1	.
24	1	1	94	1	1
25	2	.	95	2	1
26	.	.	96	.	1
27	.	1	97	.	.
28	.	.	98	1	1
29	1	1	99	.	.
30	1	1	100	.	.
31	2	.	101	.	3
32	.	1	102	1	.
33	1	.	103	.	1
34	1	1	104	.	.
35	.	.	105	.	.
36	3	.	106	1	.
37	.	1	107	1	.
38	3	.	108	1	2
39	1	.	109	1	1
40	1	.	110	2	.
41	.	1	111	1	.
42	.	.	112	.	.
43	1	2	113	.	1
44	.	.	114	1	1
45	2	2	115	1	.
46	3	1	116	.	.
47	.	1	117	1	.
48	2	.	118	.	2
49	.	1	119	1	.
50	2	.	120	.	.
51	1	2	121	.	1
52	2	1	122	1	.
53	.	3	123	1	3
54	1	4	124	.	.
55	4	1	125	2	1
56	.	.	126	3	.
57	.	3	127	1	2
58	.	1	128	.	.
59	.	1	129	.	1
60	.	1	130	.	.
61	.	.	131	1	.
62	.	1	132	2	.
63	.	2	133	1	1
64	.	.	134	2	.
65	1	2	135	1	1
66	.	1	136	1	.
67	.	.	137	.	1
68	.	1	138	.	.
69	.	.	139	1	1
70	.	.			

dependent variables.

Stimuli were displayed differently per subject to avoid order effects. Subjects evaluated on three emotional states: arousal, valence, and dominance. Figure 6 shows the condition of the affective-scale evaluation.

If subjects felt completely happy while viewing the photo, they could indicate their emotional state by placing a mark over the figure at the left. Also, if subjects felt completely arousal, or in-dominance, while viewing the photo, they could indicate their emotional state by placing a mark under the figure on the left. The other end of the scale was when subjects felt completely unhappy (or calm or controlled). The figures also allow the subjects to describe intermediate feelings by placing a mark under any of the other figure. They should mark on all emotional states to show how they felt while looking at the photos.

2.2 Experiment 2

The aim of this experiment was to elicit inherent parameter from the 139 car front face stimuli, and consider the relationship between intuitive preference and inherent parameters of the stimuli.

2.2.1 Subjects

Two university students (1 male and 1 female, 25.5 years old in average) recruited from University of Tsukuba. They didn't participate in experiment 1.

2.2.2 Stimuli

One hundred thirty nine photos, the same images as in the experiment 1, were used. The difference between experiment 1 and 2 was a stimuli type; while in the experiment 1 the stimuli were shown on the screen, in the experiment 2 the stimuli were presented as images on the cards.

2.2.3 Procedure

Subjects dichotomized 139 stimuli cards with subjective scale, which could separate the stimuli into two groups. After dichotomizing, they reported the scale. It conducted

Figure 6: Affective-scale evaluation session

five times per subject due to the fact that more than five dichotomizing made subjects to use similar scale to applied before.

3. RESULTS

3.1 Experiment 1

One-way ANOVA was used to investigate whether or not there were statistical significant differences between like and dislike in emotional responses (i.e., arousal, valence, and dominance). Since there was wide statistical dispersion in subjects [Table 1], the averages of valence, arousal, and dominance by a subject adapted as dependent variables.

The difference in evaluation scores with subjects' average for valence is presented in Figure 7. The average score between like and dislike is clearly different. Both show a statistical significant difference in an evaluation for valence. ($p < 0.0002$).

The difference in evaluation scores with subjects' average for arousal is presented in Figure 8. The average score between like and dislike is doubled. Also, Like and dislike didn't show a statistical significant difference in an evaluation for arousal. ($p = 0.1062$).

The difference in evaluation scores with subjects' average for dominance is presented in Figure 9. The average score between like and dislike is almost doubled. Like and dislike didn't show a statistical significant difference in an evaluation for arousal. ($p = 0.5491$).

Overall results reveal that valence was the most affective value to intuitive preference.

Figure 7: Valence (happy vs. unhappy)

Figure 8: Arousal (excited vs. calm)

Figure 9: Dominance (controlled vs. in-control)

3.2 Experiment 2

Chi-square static was used to investigate whether distributions of categorical variables differ from one another. In this experiment, it aimed at proving into whether or not there were statistical significant differences between like and dislike in the categorical variables, such as cute or non-cute, luxury or non-luxury, and so on. A male subject used word representing such categories: cuteness, luxury, speed, modernity, and strength to dichotomize, whereas a female subject used word representing to luxury, cuteness, litheness, dominance, and comfortableness to dichotomize. In this analysis, preference (like-dislike) and subjective parameters (i.e., cuteness, luxury, litheness, and so on) were applied as category variables. Table 2 shows that nine categorical variables don't show any statistical significant difference whereas cuteness that was applied as a parameter by a female subject shows a statistical significant difference in preference ($p = 0.0379$). Only "cuteness" was elicited inherent category for analyzing the 102 car front face photos.

4. DISCUSSION & CONCLUSION

The goal of this study was to investigate the relationship between intuitive preference and emotional responses with experiment 1, and to elicit inherent categories that subjects saw in the stimuli with experiment 2. This study showed that valence was the most affective value to intuitive preference. It also elicited "cuteness" that was applied as a category by a female subject, and was used to understand what subjects saw from the 102 car front face photos. These findings provide

experimental evidence for understanding the relationship between intuitive preference and emotional states: if the product is preferred, it has positive effects on valence.

Both designer and marketer want the users choose what they suggest, and make them happy. However, are users really able to choose what is the best for them? Since failed choices could be more related to cognitive process, i.e., prediction or memory [7], Many psychologists suspect that individuals do not make choices that maximize their happiness. A study conducted by Shimojo et al. showed a clue to understanding how people feel "like" and to be "like" objects. Their research revealed that conscious recognition is not needed to prefer something, and conscious recognition leads to visual exposure determines modulate degree of preference, that leads to seeing enhances liking, liking leads to more seeing, and so on [8]. Since preference already built-in by thousands of modulation through seeing-liking, and liking-seeing cycles, conscious recognition does not work with preference. The findings, which were revealed in the present study, are consistent with built-in preference mechanism. The authors hypothesized that inherent categories of the products affect people's preferences intuitively (H1) more than consciously, and the results showed that valence was the most affective value to intuitive preference. As a contrary to these findings, there is a study that focused on the effect of recognition in choice. Bornstein questioned whether subliminal mere exposure effects could generalize to structurally related stimuli or not. The results revealed that the structural relationship between training and test items prevents the mere exposure effect when subjects are unaware of the exposure status of stimuli, and therefore provide no evidence for the existence of implicit learning [9]. In other words, the preference-increase effects are actually stronger when preference comes before careful recognition than when subjects recognize the objects [9-11]. However, the findings of the current study showed another evidence for the existence of intuitive preference that is built-in through over and over "seeing-liking and liking-seeing" experiences. Then, why valence showed a statistical significant difference in intuitive preference? Psychologist Jerome Bruner gives a considerable note that perception involves an act of categorization, and that all perceptual experience is necessarily the end product of a categorization process [12]. His findings were applied to the present study: by categorization, subjects prefer and choose car front face photos that evoke a happy feeling. In other words, intuitive preference along with the attitudes that are associated with happy-giving had been categorized through lots of experiences on objects.

This study is on the process to explore the relationship

Table 2: Elicited categories and the analyzed results

Category	A Male Subject		A Female Subject	
	Chi-sq	p value	Chi-sq	p value
Cuteness	0.099	0.7528	4.310	0.0379*
Luxury	1.087	0.2971	2.607	0.1064
Speed	0.385	0.5348	.	.
Modernity	0.287	0.5924	.	.
Strength	0.363	0.5469	.	.
Litheness	.	.	0.064	0.7998
Dominance	.	.	1.846	0.1742
Comfortableness	.	.	0.117	0.7328

between preference and emotion in psychological response to keep people interested in targeted objects that are products for designers, or are in marketing plans for marketers, although it should be noted that the generalizability of the current findings is limited. All subjects were students who did not possess cars. Also, whether the color has its effects on preference should be considered like reality-sets or not when people choose products. Incorporating proves based on neuroscience with our research would allow even more interesting conclusions, such as related to the reports that face perception evoking activation in a distributed network that included lobes in the visual cortex, limbic system, prefrontal cortex, and reward circuitry [13].

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