

# THE RELATION OF PREFERENCE AND EMOTION IN METAPHORICAL IMAGES: AN APPROACH TO DESIGN EDUCATION

**SuKyoung KIM<sup>1</sup>, Kazuhisa NIKI<sup>2</sup> and Toshimasa YAMANAKA<sup>1</sup>**

<sup>1</sup> Graduate School of Comprehensive Human Sciences, University of Tsukuba, Japan

<sup>2</sup> Neuroscience Research Institute, National Institute of Advanced Science and Technology, Japan

## **ABSTRACT**

In design education community, it is important issue how to help designers develop skills in design problem - solving. How can designers be taught to use relevant prior knowledge to solve new design problem? To answer the question, we researchers in design field must propose more efficient methods regarding the use of prior knowledge to solve ill - defined problems. This research formulated a design research method based on Kansei engineering in the aim of supporting design education. In the research, it investigated that the relationship between preference and emotional value of individuals considering their sensitivities to features in the human face using car fronts. In the first session, the subjects made a decision - making within the limited time in regards to their preference. In the second session, the subjects evaluated the stimuli with SAM (Self Assessment Manikin), which is an efficient measurement of emotional responses: valence, arousal, and dominance. The results showed that the preference affected emotional values with metaphorical product images. In detail, (1) there was affective relationship between preference and the emotional values, even though the interruption was with time limit: (2) arousal was the most important emotional value in relation to its preference.

*Keywords: Engineering and design methods, perceived activity, affective*

## 1 INTRODUCTION

While design refers to pattern, arrangement of parts, process of planning, drawing, and intention to make or built something, research refers to serious study of a subject that is intended to discover new fact or test new idea. While designer makes plans or patterns for cloths, furniture, equipment, researcher does investigating phenomena, acquiring new knowledge, or correcting and integrating previous knowledge. The point is that proficient research knowledge could strengthen pure design skills. Due to the consumer's latent desires are various, the association gives better idea for designer to accurately understand what the consumers desire for product. This research was built on product design, and addressed an issue how can designers formulate design problem in the relation to the consumers' latent desires. Also, it connected to the added value for industry in hiring designers with research proficiency, rather than purely design skills. This research showed a design method in the aspects in Kansei engineering focused on preference, which related to human's desires to product depending not only on its functional aspect but also on the emotional value of its user. Previous studies in this field achieved this objective by considering interview, behaviour observation, or self-evaluation. However, these approaches were limited in its ability to accurately reflect the consumers' latent desires, or its generalization. Accordingly, the authors considered an approach based on inherent sensibilities, which can accurately reflect the consumers' latent desires, and its generalization: face perception and emotion.

- 1) Why automotive fronts? This research based on the face perception evoked activation in a distributed network that included regions in the visual cortex, limbic system, prefrontal cortex, and reward circuitry [1]. It has been noted in many face perception researches that people reliably and automatically make personality inferences from facial expression despite little evidence for their accuracy. Because of that a facial expression is a silent social signal, influencing mate

choice and other social judgment. Also, it has been noted in many face perception researches that people reliably and automatically make personality inferences from facial expression despite little evidence for their accuracy. Because of that a facial expression is a silent social signal, influencing mate choice and other social judgment. The human face is a complex multi-signal system from which we can infer a great deal of information at no more than a glance—in other words, after only 100 ms of exposure [2]. Such information is encoded and perceived in car fronts [3]. The idea that cars have faces has been proposed [4], and has been investigated systematically [5]. It found that a happy or angry face influenced the likeability of a visual target only when the face was displayed subliminally [6]. Also, it is widely accepted that unconscious process can modulate judgments and behaviour. The stimuli, in this research, were metaphorically related to the human face, also hypothesized that affected emotional reaction similar to human facial. These ideas based on the metaphor theory. Metaphor is a device for seeing something in terms of something else [7]. In other words, metaphor is the way we understand new things is to conceive of them in terms of things we already know. Therefore, metaphor within products can be a powerful tool for conceptualizing, orienting, and personifying products [8].

- 2) The relation between the preference and emotion: Emotional aspects of human have, feeling states can be described by their position on at least two fundamental dimensions: arousal and valence [9], [10], [11]. The distinction between dimensions is important because each dimension may influence consumer behaviour in different ways. In the research, the authors purposed to investigate the effects of each feeling state on the car fronts in subliminal level. Subliminal perception is characterized by perception without awareness. This characteristic is also emphasized in the definition of “subliminal message” [12]. He defined it as “an situation in which unnoticed stimuli are perceived.” Also, however, the previous choice-related researches have not addressed the crucial issue of whether subliminal choice can affect subsequent emotional values. Further, in Kansei research, which considers both rational also emotional aspects the human have, emotional values are important issue on its process. Kansei is usually described as a mental function, and more precisely as being a higher function of brain. Among the literature indicates, Kansei process gathers the functions related to emotion, sensitivity, feelings, experience, and intuition, including interactions between them [13]. In this research, the authors focused on emotional values: **Valence**, **Arousal**, and **Dominance**, which affect the Kansei process.

## 2 METHODS

### 2.1 Subjects

20 graduates participated in the experiment. The age range of the samples was from 21 to 29 yr (mean= 24.1, SD±2.69), which have been showing consumption declines in Japan.

### 2.2 Materials

One hundred thirty-nine models that varied in car front faces were selected from thirty-five brands. All categories; sedan, coupe, convertible, pickup, SUV, hatchback, minivan, wagon, full-sized van, and classic, were included. The perspective of automotive front pictures was the same: the front of its car. All images were filtered in gray scale to avoid from colour effect. And license plates erased, although brand logos were retained. Finally, all the pictures rendered at 580\*370 pixels. Experiment screen was at 550\*500 pixels.

### 2.3 Procedure

This research linked the perceptions gained with the subjects' preference and with their emotions. The purpose of the session 1, the *Preference task*, aimed at selecting the car front images on the scale, like or dislike. The purpose of the *Preference task* was to filter the stimuli that used in the *Evaluation task*. In the *Evaluation task*, subjects instructed that this was a study about choice and emotional values with car front images. They carried 2 times of pre-test before conducting main experiment. Pre-test stimuli were different to main-experiment's. All instructions were in Japanese. The subject was instructed to make the ratings using the subjective states, which are: Make your choice on the images within 5 sec. At the same time while the session 1 conducted, the results were analyzed as +1 (Like),

or as -1 (Dislike) [Figure 1]. Also, the selected image which from the first to fifth were prepared as the stimuli for the session 2, the **Evaluation task**. The selections based on the length of taking time to choose. The aim of the time limit was at interrupt rational thinking process of its rater.

Before conducting the session 2, the subjects were instructed in detail to make the ratings using the subjective states, i.e., the happy-unhappy scale: You can see that each SAM figure varies along each scale. In this illustration, the first SAM scale is the happy-unhappy scale, which ranges from a smile to a frown. At one extreme of the happy vs. unhappy scale, you felt happy, pleased, satisfied, contented, and hopeful. If you felt completely *happy* while viewing the picture, you can indicate this by placing a mark over the figure at the left, like this (demonstrate with SAM on the screen). The other end of the scale is when you felt completely unhappy, annoyed, unsatisfied, melancholic, despaired, bored. You can indicate feeling completely *unhappy* by placing a mark on the figure at the right, like this (demonstrate with SAM on the screen). The figures also allow you to describe intermediate feelings of pleasure, by placing the slider over any of the other pictures. If you felt completely neutral: neither happy nor unhappy, place a mark over the figure in the middle. If, in your judgment, your feeling of pleasure or displeasure falls *between* two of the pictures, then place a mark between the figures, like this (demonstrate with SAM on the screen). This permits you to make more finely graded ratings of how you feel in reaction to the images...

They carried 2 times of pre-test before conducting main experiment. Pre-test stimuli were different to main-experiment's. We used an event related design also, in which images were displayed in counter-balanced. Therefore it was unpredictably. The subjects should mark all 3 dimensions to show how they felt while looking at the picture. Also, the subject was reminded that there are no right or wrong answers.

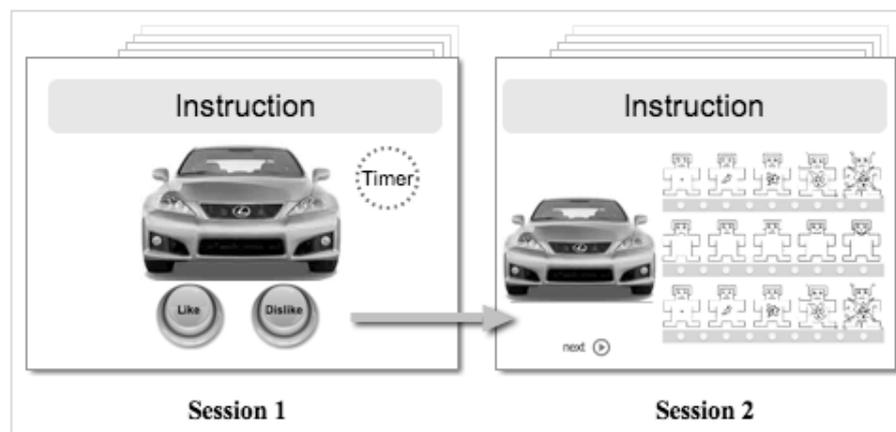


Figure 1. The flow of the experiment: **Preference and Evaluation tasks**

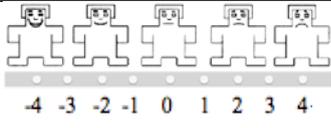
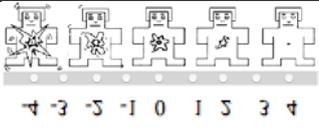
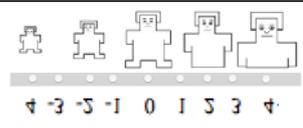
### 3 RESULTS

The values in the 3 dimensions were as follows:

- 1) In **Valence** - happy vs. unhappy - **value**: The preferred automotive front images made the subjects happier. It did not show the significant ( $p < 1.138$ ) [Table 1].
- 2) In **Arousal** - excited vs. calm- **value**: The preferred automotive fronts made the subjects more exciting. It showed the significant ( $p < 0.009$ ) [Table 1].
- 3) In **Dominance** - controlled vs. in - control **value**: The preferred automotive fronts gave more in-control feelings to the subjects. It did not show the significant ( $p < 0.562$ ) [Table 1].

Accordingly, only **Arousal** - excited vs. calm - value showed the significant. In the emotional value, the means of not - preferred car front images showed much stronger arousal (0.4) than the preferred (-0.23). Also, the subjects preferred the exciting car fronts than the calmative [Table 1].

Table 1. The means of the SAM rating in the 3 dimensions, and the p values of the choice

	The happy vs. unhappy scale	The excited vs. calm scale	The controlled vs. in-control scale
			
<b>The means of</b>	<b>Like (prefer): -1.26</b> <b>Dislike (not-prefer): 0.28</b>	<b>Like: -0.23</b> <b>Dislike: 0.4</b>	<b>Like: 0.15</b> <b>Dislike: 0</b>
<b>p value</b>	<1.138	<0.009	<0.562

#### 4 DISCUSSIONS & CONCLUSIONS

Are consumers really able to choose what is best for them? Many psychologists suspect that we do not make choices that maximize our happiness. Consumers fail to choose optimally, either because they fail to predict accurately, or to base their choice, or both [14]. It inferred that failed choices could be more related to cognitive process, i.e., prediction or memory, than subliminal. Based on the inferences, the authors investigated the relationship between choice and subsequent emotional values, such as pleasure, arousal, and dominance. The results of this research can be discussed in two parts: choice of automotive fronts and attitude towards that. In the *Preference task*, the subjects interfered cognitive process in their choosing behaviour on automotive fronts. And, in the *Evaluation task*, they showed the significant in **Arousal value**.

The results showed that (1) there was affective relationship between preference and the emotional values, even though the interruption: time limit, (2) also, arousal value showed the significant in preference on car front images [Table 1]. It inferred that the arousal value is more considerable to understand individual' preferences with "silent social signal," even though it was not clear whether the Wundt curve worked in this research. Considering the results, just little exciting (not neutral arousal like as in the Wundt curve) car front images were preferred, and little calmatives did not preferred. It could be further research to confirm whether the research chase the Wundt curve.

According to previous research, arousal influence recall in a positive way by its increasing the secretion of epinephrine. In turns, the epinephrine will "push" short-term memory into long-term memory in brains [15]. In this condition, the assumption is that there is already something existing in the short-term memory area of the brains. Therefore, high arousal consumers will remember the subliminal message better than lower arousal consumers. On the contrary, researchers who argued that arousal interfere with message recall based on the mechanism that the high arousal condition distracts consumers' attention [16]. So that individual can't contemplate and remember well without enough cognition resources. Several researchers in psychology [17], [18], [19] have examined the relationship between arousal and subsequent processing of information and decision-making. Their results suggest that higher arousal levels in individuals would lead to lower approach behaviours (or increased avoidance behaviours) in subsequent tasks. Mano (1992) found that subjects experiencing higher levels of arousal spent less time deliberating on subsequent decision tasks, examined less decision-related information and employed simpler decision strategies. These researchers accounted for this effect with a cognitive processing explanation that more arousing stimuli elicit more attention and more elaborate network encoding in memory than less arousing stimuli [e.g., 18]. This restricts the amount of attention and processing resources that can be allocated to subsequent tasks, so that more aroused subjects tend to simplify future decisions and avoid more stimulating contexts compared to less aroused subjects. Also, emotions represent motivational phenomena with characteristic neurophysiological, expressive and experiential components [20]. Emotive response is both psychological and physiological in nature, generating altered states in both the mind and body [21]. It includes but extends beyond the affect or preference variables often studied by marketing researchers. Arousal is defined as the level of alertness or activation on a continuum ranging from extreme drowsiness to extreme wakefulness [22], [23].

This research is on the process to propose new design method to support design education methods with both learned and inherent sensibility. In the research, the authors focused on the inherent sensibilities, which related to subliminal choice. With the research, the prospect for future research is to look closer; arousal is considerable value to understand what individuals' desire in automotive design with their inherent sensitivities. The remained questions are; whether cognitive choices make differences like as this experiment: whether the research chases the same "law" by Wundt curve. Further, incorporating proves based on neuroscience with our research would allow even more interesting conclusions, such as related to the reports that face perception evoked activation in a distributed network that included regions in the visual cortex, limbic system, prefrontal cortex, and reward circuitry [1].

## REFERENCES

- [1] F. Karants, A. Ishal, Face perception is modulated by sexual preference. *Current Biology*, 2006, 16, 63-69.
- [2] Willis, J., & Todrov, A. First impressions: Making up your mind after a 100-ms exposure to a face. *Psychological Sciences*, 2006, 17, 592-598.
- [3] Desmet, P. M. A., Hekkert, P., & Jacobs, J. J., When a car makes you smile: Development and application of an instrument to measure product emotions, In S. J. Hoch & R. J. Mayer (Eds.). *Advances in Consumer Research*, 2000, 27, 111-117.
- [4] Erk, S., Spitzer, M., Wunderlich, A. P., Gally, L., & Walter, H., Cultural objects modulate reward circuitry. *Neuro Report*, 2002, 13, 2499-2503.
- [5] S. Windhager, D. E. Slice, K. Schaefer, E. Oberzaucher, T. Thorstensen, & K. Grammer, Face to face: The perception of Automotive Designs. *Human Nature*, 2008, DOI 10.1007/s12110-008-9047-z.
- [6] Murphy, S.T., & Zajonc, R.B., Affect, cognition, and awareness: Affective priming with optimal and suboptimal stimulus exposures. *Journal of social Psychology*, 1993, 64, 723-739.
- [7] Burke, K., *A Grammar of Motives and a Rhetoric of Motives*. University of California Press, 1945.
- [8] Saffer, D., The Role of metaphor in Interaction Design (Unpublished Master thesis), Carnegie Mellon University, 2005.
- [9] Russell, J. A., A circumplex model of affect. *Journal of Personality and Social Psychology*, 39(6), 1980, 1161-1178.
- [10] Russell, J. A., Core affect and the psychological construction of emotion. *Psychological Review*, 110, 145-172, 2003.
- [11] Russell, J. A., & Barrett, L. F., Core affect, prototypical emotional episodes, and other things called emotion: Dissecting the elephant. *Journal of Personality and Social Psychology*, 76(5), 1999, 805-819.
- [12] Merikle, P. M., Subliminal perception, In A. E. Kazdin (Ed.). *Encyclopaedia of psychology*, 2000, 7, 497-499. Oxford University Press.
- [13] Pierre Levy & Toshimasa Yamanaka, Kansei studies Description and Mapping through Kansei Studies Keywords, in *the processing of the International Symposium of Emotion and Sensitivity*, 2008.
- [14] Hsee, C. K., & Hastie, R., Decision and experience: why don't we choose what makes us happy? *TRENDS in Cognitive Sciences*, 2006, 10, no. 1, 31-37.
- [15] Clore, G. L., & Schnall, S., The influence on affect on attitude, In Albarracin, D., Johnson, B. T., and Zanna, M. P. (Eds). *The Handbook of Attitudes*, 2005, 437-489. Mahwah, N. J.: Lawrence Erlbaum Associates.
- [16] Singh, S., & Hitchon, J., The intensifying effects of exciting television programs on the reception of subsequent commercials. *Psychology and Marketing*, 1989, 6, 1-31.
- [17] Kahneman & Daniel, *Attention and effort*, 1973, Englewood Cliffs, NJ: Prentice Hall.
- [18] Mano & Haim, Judgments under distress: assessing the role of unpleasantness and arousal in judgment formation. *Organizational Behavior and Human Decision Processes*, 1992, 52, 216-245.
- [19] Sanbonmatsu, David M. & Frank R. Kardes, The effects of physiological arousal on information processing and persuasion, *Journal of Consumer Research*, 1988, 15, 379-385.

- [20] Izard, C. E. & S. Buechler, Aspects of Consciousness and Personality in Terms of Differential Emotions Theory, in Emotion: Theory, In Robert Plutchik & Henry Kellerman (Eds.). *Research and Experience*, New York: Academic Press, 1980.
- [21] Orstein, R. E., *The Psychology of Consciousness*, 2nd ed., New York: Penguin Books, Inc., 1977.
- [22] Duffy & Elizabeth, *Activation and Behavior*. 1962, John Wiley. Easterbrook, J.A.
- [23] Humphreys, Michael S., & William Revelle, Personality, Motivation, and Performance: A Theory of the Relationship Between Individual Differences and Information Processing, *Psychological Review*, 1984, 91, 153-184.