A Study on an Effect of Olfactory Stimulation on Product Image by the Type of the Product
Focused on scent-related, fashion, and high technology products.

Hyojung Oh* Woohun Lee** Myung-Suk Kim***

*\ **\ *** Dept. of Industrial Design, KAIST, Daejeon, Korea
* oh011@kaist.ac.kr
** woohun. lee@kaist.ac.kr
*** mskim@kaist.ac.kr

Abstract: To verify factors of design and suggest more effective marketing way, I studied about an effect of olfactory stimulation on product image by the type of the product. I put the most favorite fragrance to a perfume, a scarf, and a camera, and then let experiment participants evaluate images of the products based on aesthetic, satisfaction, novelty, convenience, pleasance, and superiority. We gain the knowledge that fragrance generates positive feeling in the various aspects of emotion, and effectiveness of it is different from its sort.

Fragrance influences on buying intension of only scent related product, and on fashion goods in the widest variety of emotion. In addition, people's satisfaction was the highest on high technology product. Furthermore, people were in delight and thought the product is felt that the product is excellent with fragrance. These result can be helpful to design and business using scent.

Key words: olfactory stimulation, product image, product emotion.

1. Introduction

The factors that constitute product images can be divided into a form, material, color, package and logo and they are all tangible. Human has 5 senses. In order to give much satisfaction to people who use products, we had better help them to see, feel and satisfied fully in 5 senses. For that, not only tangible constituents, but also intangible constituents have to be designed. Scent, as olfactory stimulation is linked up with brains directly and it evokes stronger responses than other senses. That's why scent has been used to market on scent-related products, and also on fashion goods recently.

We started research in order to grasp emotion on which fragrance has an influence by its product type and apply of olfactory stimulation as an intangible constituent to design effectively by the product type

2. Related Studies

2.1. Principle of olfactory stimulation's influence on people's behavior

Consumers understand relation between specific product and smell by experiencing and learning. By this biological responses and the principle of classical conditioning that build through repetition, olfactory stimulation influences on people's attitude directly. And also, information from organ of smell can have an

influence o n peo ple's beha vior unc onsciously by hypothalamus whi ch c ontrol a n a utonomic ner ve an d t he endocrine system[1].

2.2. Olfactory stimulation's influence on people's behavior

Like t his p rinciple of olfactory st imulation's i nfluence on peo ple's be havior, ser veral case st udies were m ade since 1990's. Eunah Yoh presented that the emotional factor of fragrance has a positive influence on purchasing of Pe rfumes[2]. Span genberg et al st udied t hat pr oducts in fra grant s pace are t end t o be hi ghly eva luated by consumers[3]. In a ddition, there were t hose st udies t hat pu rchase i ntention was stronger when wom en's nightclothes a re in the c ondition of fresh and aromatic air[4]. F urthermore, preference, willingness to purchase and it's price of tennis s hoes can be higher when they a re in the places of scent of flowe rs. Knas ko said that consumers stay longer in the aromatic jewelry store that non-aromatic's[5].

2.3. An effect of olfactory stimulation on product image by the type of the product.

Almost st udies ab out i nfluences of fragrance were focused on s cent and fa shion-related p roduct. H owever, fragrance effect's difference as its product type was not studied yet. Under this present situation that we can find cases of scen t m arketing on scen t an d fash ion-related pr oducts easily we ca n expect that e ffects on products which looked never related to scent such as high technology products.

3. Objectives

3.1 Objectives

This stud y ai ms a t ap plying of olfactory stimulation as an in tangible constituent to design ef fectively b y th e product t ype t hrough grasping emotion on which fragrance has a n influence by its product t ype. I e xpect t hat these finding will be applied to design and marketing as a result of finding relation between scent and product type to which these are applied. Objectives of this study are these.

1. Effects of olfactory stimulation on product images.

2. Effects of olfactory stimulation on preference and willingness to purchase products

3. Effects of olfactory stimulation on product images by the type of product.

3.2 Hypothesis

The hypotheses that we want to prove are as follow.

1a. Fragran ce has po sitive influ ence on aesthetic, satisfaction, novelty, co nvenience, pleasance, and su periority of perfumes.

1b. . Fragrance has positive influence on aesthetic, satisfaction, novelty, convenience, pleasance, and superiority of scarves.

1c. Fragrance has positive influence on aesthetic, satisfaction, novelty, convenience and pleasance of cameras.

2a. Fragrance has positive influence on preference and willingness to purchase of perfumes.

2b. Fragrance has positive influence on preference and willingness to purchase of scarves.

2c. Fragrance has positive influence on preference of cameras.

3a. Fragrance has positive influence on aesthetic, satisfaction, novelty, convenience, pleasance, and superiority of perfumes, scarves, and cameras in order.

3b. Fragrance has positive influence on preference and willingness to purchase of perfumes, scarves, and cameras in order.

4. Research Design

4.1. Method

Independent variables of this experiment are presence of fragrance(with fragrance vs. without fragrance) and type of product(perfume vs. scarf vs. camera). Dependent variables are people cognition and emotion for products.

Table1. Independent variables and participants

Independent Variables	With fragrance	Without fragrance
Perfume	20 persons (male10, female10)	20 persons (male10, female10)
Scarf		
Camera		

Experiment participants answered given questions about images of 3types of product in an airy room. And presence of fragrance was not mentioned additionally.

4.2. Subjects

I recruited participants who don't have respiratory ailments, and limited participants to 20~30 aged people related with targeted age of products. Total amount of participants were 40 and the proportion of males to females were 1:1. They were distributed into 2group that observe product with fragrance and without fragrance. We didn't allow all participants to drink or smoke on the day of experiment in order to not being disturbed by bias.

4.3. Stimulus development

4.3.1. Fragrance

We collected and selected 10 kinds of different essential oil after market research. We conducted preliminary experimental research in order to choose everyone's favorite fragrance. We put 10kinds of essential oil on 10 tissues each in moderation and then, put them into each paper cup. Not the name of fragrance but just alphabet A to J was written on the cups. The concentration was controlled regularly for any essential oil.

Participants took a smell after holding the cup in random order and evaluated on a question [like, hate]. The question was consisted of 7 Likert scales. After participants evaluated a essential oil, they took a rest breathing air outside through windows for 3 minutes and then, the evaluation of next essential oil was conducted. After conducting all experiments and analyzing their result, Grapefruit White was appointed as an olfactory stimulation which will used in main experiment because it's preference was the highest and standard deviation was the lowest.

Table 2. 1 Essential oils and preference

	Essential Oil	Preference Average	Standard Deviation
A	Orange Sweet	5.2	1.12
B	Lemon	5.3	1.08
C	Peppermint	2.15	1.27
D	Tea Tree	3	1.34
E	Lime	3.7	1.41
F	Lavender	3	1.45
G	Pine	3.05	1.67
H	Eucalyptus Blue	2.5	1.24
I	Rosemary	3.25	1.55
J	Grapefruit White	5.6	1.05
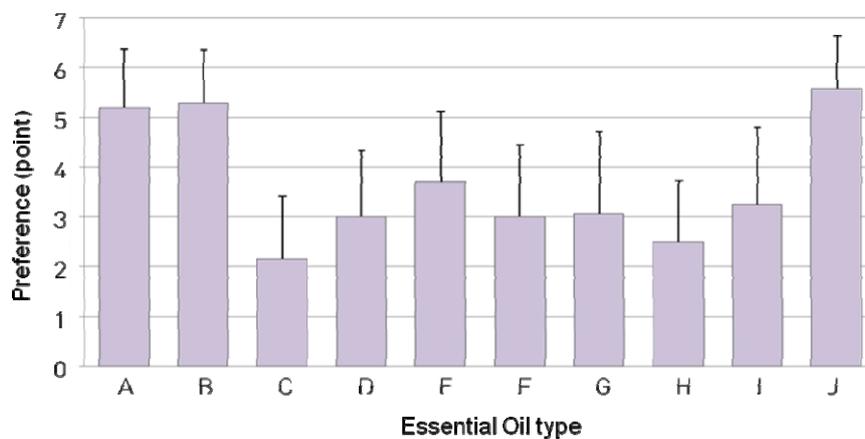
Figure1. Preference of 10 kinds of essential oil

4.3.2. Product

We selected a perfume from scent-related products, a scarf from fashion goods and a camera from high technology products. When we propose products with fragrance, we put Grapefruit White scented essential oil on them. We added appropriate amount of essential oil to products for not having negative feeling from highly concentrated scent. We selected products which lead users to hold near their face while trying products. This is for giving them opportunities for taking smells naturally and easily. Products were displayed on a table in a package as good as new. We asked participants to open packages, observe and touch each product.

4.4. Measures

We quoted emotional words by Hong[10] for evaluating participants' emotion.

   Among emotional words below, we deleted overlapping words and inappropriate words to representative words. We asked participants to answers on 7 Likert scales of total 23 lists (3~4 emotional adjectives per 1 representative word : total 21adjectives, general preference and willingness to purchase). Inconvenience of emotional words was changed to positive word such as 'convenience' when analyzing. The final lists of questionnaire are as follow.

Table3. Emotional words and their representative words

Aesthetic	advanced, refined, pretty, clean, matched, attractive
Satisfaction	sufficient, prudent, natural, efficient, useful, compatible, being to one's taste
Novelty	unique, striking, novel, unusual, magnificent, simple, superior
Inconvenience	stifling, vexed, confused, disappointed, complicated, regretful, uncomfortable
Pleasance	delightful, pleased, liked, joyful, superior, fun
Superiority	prominent, the highest, impressive, sensible, necessary

Aesthetic: refined, pretty, attractive

Satisfaction: sufficient, useful, being to one's taste

Novelty: unique, striking, magnificent

Inconvenience: vexed, disappointed, uncomfortable

Pleasance: delightful, joyful, fun

Superiority: prominent, impressive, sensible, necessary

Willingness to purchase: wanted to buy

Preference: liked

4. Result

4.1. Collecting and analyzing data

We gained the result about users emotional responses to products by questionnaire. We analyzed data through T-test, Mann-Whitney, and Anova. The results were listed in order of influence of fragrance on perfume, scarf, and camera each and then interaction between type of products and presence of fragrance.

4.2 An effect of olfactory stimulation on product image

4.2.1 Perfume

We analyzed the evaluation result on emotional image to perfume with fragrance/ without fragrance. Perfume with fragrance has positive effects on 9 kinds of emotion <pretty($t=2.156$, $df=38$, $p=0.038$), attractive($t=2.252$, $df=38$, $p=0.030$), sufficient($t=4.179$, $df=38$, $p=0.000$), useful($t=4.179$, $df=38$, $p=0.006$), being to one's taste($t=4.582$, $df=38$, $p=0.000$), delightful($t=3.808$, $df=38$, $p=0.000$), impressive($t=3.939$, $df=38$, $p=0.000$), sensible($t=4.588$, $df=38$, $p=0.000$), necessary($t=2.939$, $df=38$, $p=0.006$)>. They were significant level at the 0.005. So hypothesis 1a is partially supported. Fragrance has positive influence on aesthetic, satisfaction, pleasance, and superiority of perfumes. However, It doesn't have effect on novelty, convenience of perfume.
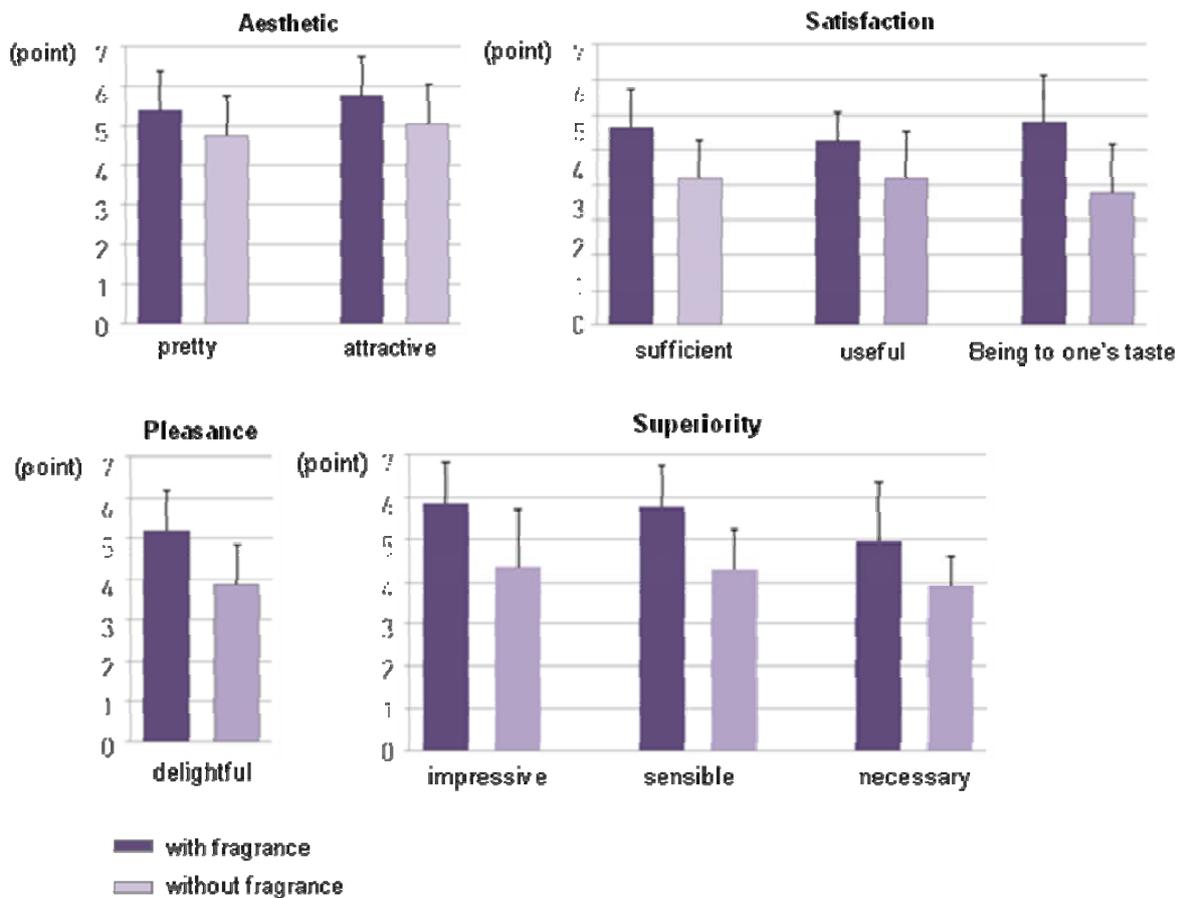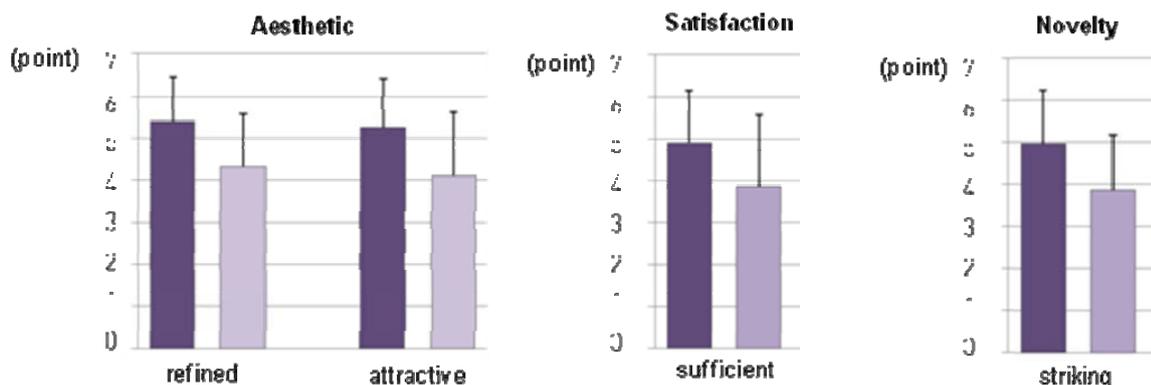
Figure2. An influence of fragrance on images of perfume

4.2.2 Scarf

Next, we analyzed the evaluation result on emotional image to scarf with fragrance/ without fragrance. Among 21 emotional words, 11 kinds of emotion <refined(t=2.914, df=38, p=0.006), attractive(t=2.688, df=38, p=0.011), sufficient(t=2.229, df=38, p=0.032), striking(t=2.691, df=38, p=0.011), not disappointed(t=-2.147, df=38, p=0.038), delightful(t=3.543, df=38, p=0.001), joyful(t=2.332, df=38, p=0.025), joyful(t=2.445, df=38, p=0.019), prominent(t=2.845, df=38, p=0.007), impressive(t=4.417, df=38, p=0.000), sensible(t=3.755, df=38, p=0.001) > were positively affected by fragrance. They are also significant at the 0.05 level. This result fully supported hypothesis 1b; Fragrance has positive influence on aesthetic, satisfaction, novelty, convenience, pleasance, and superiority of scarves.
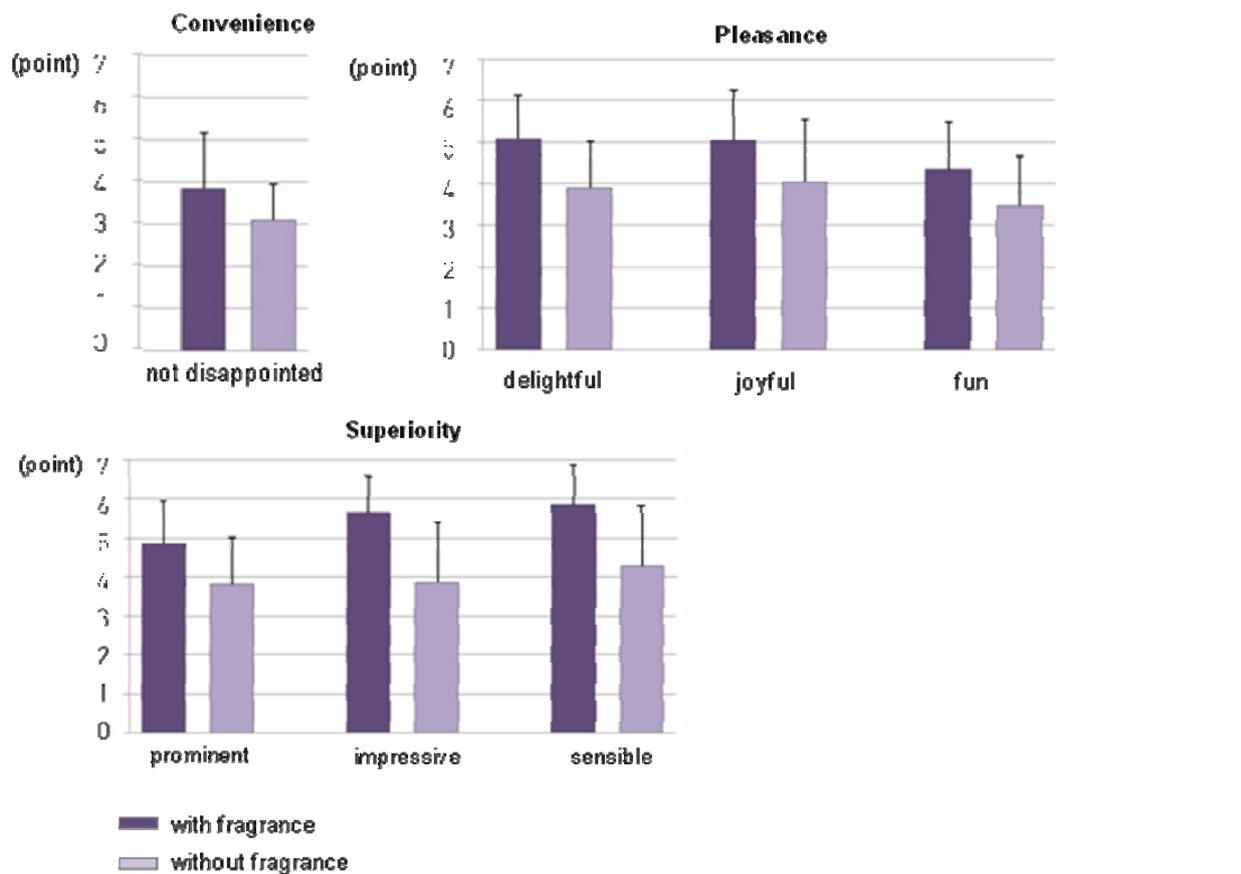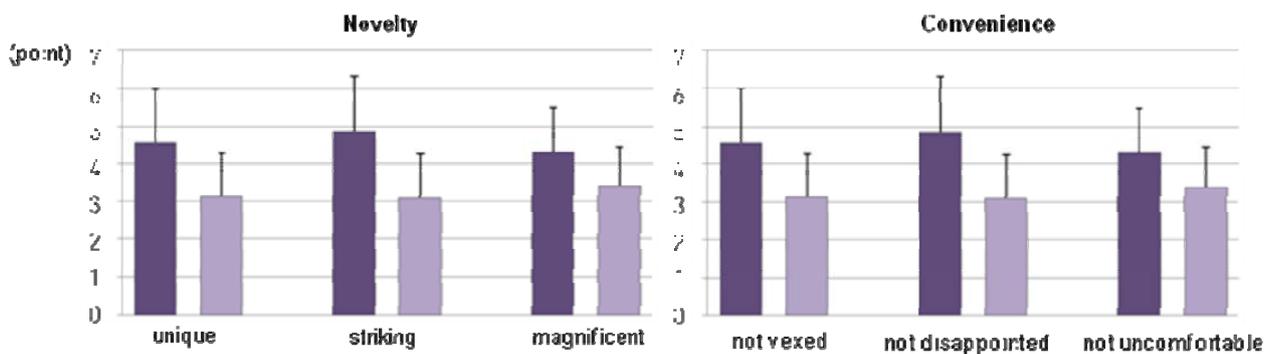
Figure2. An influence of fragrance on images of scarf

4.2.3 Camera

Fragrance also has positive influences on images to the camera. Differences between a camera with fragrance and a camera without fragrance were appeared on emotion <unique(t=3.425, df=38, p=0.001), striking(t=4.188, df=38, p=0.000), magnificent(t=2.559, df=38, p=0.015), not vexed(t=-2.885, df=38, p=0.006), not disappointed(t=-3.417, df=38, p=0.002), not uncomfortable(t=-4.271, df=38, p=0.002), delightful(t=3.527, df=38, p=0.001), joyful(t=2.284, df=38, p=0.028), fun(t=2.663, df=38, p=0.011), prominent(t=2.190, df=38, p=0.035), impressive(t=2.333, df=38, p=0.025)> at the significant level. This result partially support hypothesis 1c; Fragrance has positive influence on aesthetic, satisfaction, novelty, convenience and pleasance of cameras. Fragrance has positive influence not on aesthetic and satisfaction but on novelty, convenience, and pleasance.
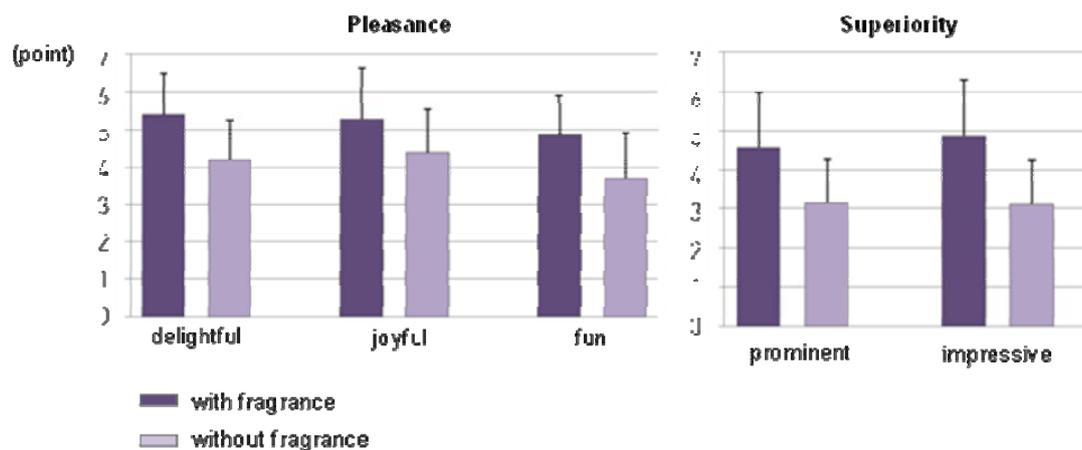
Figure3. An influence of fragrance on images of camera

4.3 An effect of olfactory stimulation on preference and willingness to purchase of products

4.3.1 Perfume

We can draw reliable result that consumers have higher willingness to purchase (t=3.717, df=38, p=0.001) and preference (t=2.202, df=38, p=0.034) on perfume with fragrance than perfume that people cannot smell the scent. This supports hypothesis 2a.

Figure4. An influence of fragrance on willingness to purchase and preference of perfume

4.3.2 Scarf

There was no difference of willingness to purchase and preference toward scarf between with fragrance and without fragrance. The hypothesis2b was not supported at significant level 0.05.

4.3.3 Camera

We thought that fragrance has positive influence on preference of cameras as hypothesis 2c. However, fragrance doesn't have any influence on either willingness to purchase or preference.

4.4 An effect of olfactory stimulation on product image by the type of product.

We analyzed the effect of interaction between presence of fragrance and type of product in order to clarify an effect of olfactory stimulation on product image by the type of product. Interaction effect was significant only in the emotion of being to one's taste (F (2,114)=3.760, p= 0.026) and striking(F(2,114)=3.760, p=0.026) at 0.05level. Fragrance has an effect on satisfaction in the order of perfume> camera> scarf. In addition, fragrance affected novelty in the order of camera> scarf> perfume and this is opposite to hypothesis 3a; Fragrance has positive influence on aesthetic, satisfaction, novelty, convenience, pleasance, and superiority of perfumes, scarves, and cameras in order.
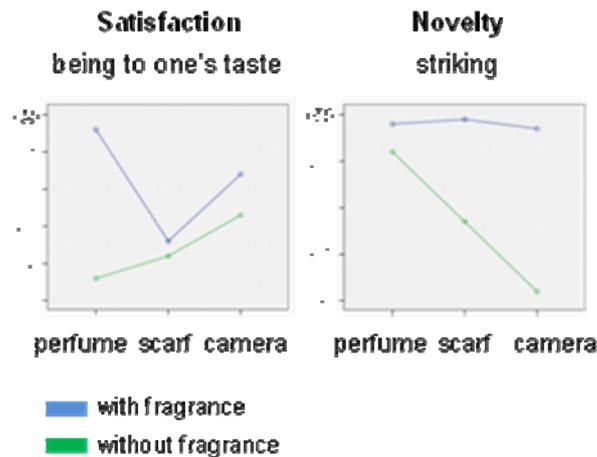

Figure5. An effect of olfactory stimulation on product image by the type of product.

4.5 An effect of olfactory stimulation on preference and willingness to purchase of products

There wasn't interaction effect to find out the influence of olfactory Stimulation on preference and willingness to purchase of products at the significant level.

To synthesize the result of this experimental study,

1. Fragrance has positive effects on pleasance and superiority of scent-related, fashion, and high technology products.

2. Fragrance has positive effects on aesthetic and satisfaction of scent-related products and fashion goods.

3. Fragrance has positive effects on novelty and convenience of fashion goods and high technology products.

4. Product type, among scent-related, fashion, and high technology product, that fragrance has the most positive effects on satisfaction is scent-related product.

5. Product type, among scent-related, fashion, and high technology product, that fragrance has the most positive effects on novelty is high-technology product.

5. Conclusion and further studies

This study aims at applying of olfactory stimulation as an intangible constituent to design effectively by the product type. It is appeared that fragrance brings about various positive emotions, and the effects are different each other as its product type to which fragrance applied.

In the case of perfume solely, fragrance has an influence on willingness to purchase. Fragrance can create various kinds of positive emotion but the positive emotion cannot directly influence on willingness to buy in other product types. However, fragrance can be used for motivating buy scent-related product. In addition,

fragrance results in a wide variety of positive emotion on fashion goods. Fragrance can be used on marketing strategy as each product's concept. Moreover, in the case of high technology product, satisfaction was the highest. And also, Consumers feel pleased and impressed from products with fragrance regardless of its product type. These results can be applied on concept of design and marketing

The limitation of this study is that we use just one general preferred fragrance. The reason why we use same fragrance is to clarify interaction effects between presence of fragrance and product type. However, to be specific, it is better that each different fragrance is applied on each product because each product may have its own harmonious scent and also in actual case, not only preferred but also harmonious scent with each product should be used to do designing and marketing.

These studies can be followed as further studies:

1. Effects of olfactory stimulation on product image by more various type of product
2. Preferred and harmonious scent to each product type, and its influence on the product

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