A Study on the Emotional Relevance between Fruit-Surface and Perception of Vision and Touch

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BACKGROUND

background and the purpose of this study
Texture is a key feature for the surface of products, and it is important for vision and touch.
Previous studies often research on the general texture like wood, steel and plastic for products.
With the advance of technology, several kinds of natural texture can be produced or imitated through the bionic technology. For instance, the product in the slide was designed through imitating the marine life.
Moreover, many texture of fruit-surface differ greatly from previous texture, and show unique feature. Therefore, the research of fruit-surface may provide some contribution to the new texture development.
Vision and touch are the most important perceptions for people to perceive the products, so most part of product experience is composed of visual and tactile experience.
In many situations, people only focus on visual perception and miss some finer and more delicate information.
VISION & TOUCH

On the basis of reserving the beautiful appearance, enriching the tactile experience may make it possible to enrich product experience.
PURPOSE

Therefore, this study aims to find out the texture which can enhance the dominance of tactile perception in terms of emotional response.

Besides, this study would also discuss the physical characteristics of the texture, so that the available industrial material which reveals similar feature can be applied to produce the similar effect.
LITERATURE REVIEW

introduction of emotion and circumplex affective model
EMOTION

According to ‘circumplex affective model’ (Russell, 1980), the space of emotion consists of two dimensions which are pleasure and arousal. Each emotion locates on the edge of the circle.

Circumplex Affective Model (Russell, 1980)
Desmet (2001) suggested dividing the circle into eight octants like cutting the pizza.
Moreover, Desmet (2001) utilized 16 depict facial expression to replace the emotion words. Each state of emotion was represented by two facial expression which are male and female.
METHODOLOGY

instrument, specimen, subjects, and statistic methods
INSTRUMENT

This study combined the dipict facial expression and Likert Scale to measure the emotional response of subjects.

1 2 3 4 5 6 7

1 2 3 4 5 6 7

1 2 3 4 5 6 7

1 2 3 4 5 6 7
SPECIMEN

The texture of fruit-surface was applied in the study as a specimen.
In order to reduce the influence of the form belonging to the fruits, the fruit which is too small should not be adopted like strawberry, cherry and grapes.
SPECIMEN

In order to unify the surface area, part of each fruit was cut off and placed in a white paper box with fixed size.
The area of fruit surface was restricted to $4 \times 4 \text{ cm}^2$
SPECIMEN

41 subjects were invited to the experiment separately, 18 males and 23 females.

\[ 18 + 23 = 41 \]
EXPERIMENT

The experiment could be divided into three stages which are tactile perception, visual perception, and the multi-perception respectively.

STEP 1
Tactile Perception
touching the specimen

STEP 2
Visual Perception
watching the specimen

STEP 3
Multi-Perception
watching and touching the specimen simultaneously
EXPERIMENT

The sequence of the fifteen specimens and the eight emotions in the questionnaire varied randomly across subjects.
MULTIDIMENSIONAL SCALING (MDS)

MDS was used to transform the dissimilarity matrix to a multi-dimensional map, and the distance between two stimuli on the map means the dissimilarity of them.

In this study, it was applied to analyze the emotional response of the subjects with each perception.
On the MDS map, this study used
‘T’ to represent the emotional response of tactile perception;
‘V’ to represent the emotional response of visual perception;
‘M’ to represent the emotional response of multi-perception.
MULTIDIMENSIONAL SCALING (MDS)

TV means the dissimilarity between tactile perception and visual perception;
TM means the dissimilarity between tactile perception and the multi-perception;
VM means the dissimilarity between visual perception and the multi-perception.
VM and TM were adopted in the Cluster analysis in order to classify the 15 textures.
The subjects would be invited again for qualitative interview to find out the correlation between the physical characteristics and emotional response.
RESULTS

results and discussion of the research
RESULTS OF MDS

The Kruskal’s Stress was 0.055 which means the MDS map could ‘well’ represent the original dissimilarity data
RESULTS OF MDS

Regression was adopted to specify the vectors of the 8 emotions on the MDS map.
RESULTS OF MDS

The direction and sequence of each emotion was similar to the circumplex affective model, hence this study also divided the space into eight parts, and each octant represents the closest emotion state.

emotional vectors derived by MDS method

Russell’s circumplex affective model
RESULTS OF CLUSTER ANALYSIS

According to Cluster Analysis of TM and VM, the 15 textures can be divided into four clusters
RESULTS OF CLUSTER ANALYSIS

Then, this study applied ANOVA to test the four clusters, and significant difference appeared between the four clusters.

<table>
<thead>
<tr>
<th>Cluster 1 (n=4)</th>
<th>Cluster 2 (n=5)</th>
<th>Cluster 3 (n=2)</th>
<th>Cluster 4 (n=4)</th>
<th>F (Sig.)</th>
<th>Multiple Comparisons</th>
</tr>
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<tbody>
<tr>
<td>Tm</td>
<td>1.79</td>
<td>0.71</td>
<td>0.84</td>
<td>1.12</td>
<td>28.608***</td>
</tr>
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(*P<.1, **P<.05, ***P<.01)
RESULTS OF CLUSTER ANALYSIS

**Cluster 1:** visual perception was closer to the multi-perception, so it was named ‘**Vision-oriented.**’

<table>
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RESULTS & DISCUSSION

Cluster 2: tactile perception was closer to the multi-perception, so it was named ‘Touch-oriented.’

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RESULTS OF CLUSTER ANALYSIS

**Cluster 3:** visual and tactile perception both were close to the multi-perception, so it was named ‘Aggregation-oriented.’

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RESULTS OF CLUSTER ANALYSIS

Cluster 4: visual and tactile perception both were far from the multi-perception, so it was named ‘Diversion-oriented.’

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(*P<.1 , **P<.05 , ***P<.01)
In terms of vision-oriented, emotional response of visual perception was closer to multi-perception.
For instance, the emotion states of vision and the multi-perception both were pleasure for orange, but touch was sleepiness;
VISUAL ONETHED

The emotion states of vision and the multi-perception both were excitement for hami melon, but touch was depression.
TOUCH-ORIENTED

In terms of touch-oriented, emotional response of tactile perception was closer to multi-perception.
TOUCH-ORIENTED

For instance, the emotion state of touch and multi-perception both were displeasure for pineapple, but vision was distress.
TOUCH-ORIENTED

Touch and the multi-perception both were distress for sugar apple, but visual perception was arousal.
RESULTS & DISCUSSION

AGGREGATION-ORIENTED

In terms of aggregation-oriented, the coordinates of the three perceptions were closed to each other. The examples were carambola and tomato.
In terms of diversion-oriented, the coordinates of the three perceptions were located on different emotion states.
DIVERSION-Oriented

For pitaya, the emotional response of vision was excitement, touch was depression, and multi-perception was pleasure.
DIVERSION-ORIENTED

For guava, the emotional response of vision was pleasure, touch was displeasure, and multi-perception was sleepiness.
The main physical characteristic of ‘Vision-oriented’ was the apparent grain on the surface, and uniform grain might evoke excitement and pleasure; in contrast, irregular grain might evoke displeasure and depression.
The main characteristics of ‘Touch-oriented’ were either strongly uneven or perfectly flat, and perfectly flat texture would evoke pleasure; in contrast, strongly uneven texture would evoke displeasure or distress.
The main characteristics of ‘Aggregation-oriented’ was the flexible, refined and translucent surface. Perfect evenness and warm color might evoke pleasure; strong unevenness and cool colors might evoke distress.
RESULTS & DISCUSSION

Unobvious feature was the common characteristic of ‘Diversion-oriented.’ Besides, warm and bright color might evoke pleasure, in contrast, dark or cool color might evoke displeasure or sleepiness.
CONCLUSION

collection and design implication
CONCLUSION

Uniform grain might evoke pleasure or excitement; warm and bright color might evoke pleasure; perfect evenness might evoke pleasure or relaxation. The opposite of the features might evoke the opposite emotion.
CONCLUSION

Some texture of fruit-surface indeed enhance the dominance of tactile perception in terms of emotional response, and there are two important physical characteristics of them:

(1) either strongly uneven (pineapple, sugar apple) or perfectly flat (apple, pear, banana);

(2) flexible, refined and translucent (tomato, carambola)
DESIGN IMPLICATION

‘Touch-oriented’ and ‘aggregation-oriented’ texture might enhance the dominance of tactile perception. These textures are suitable to be applied on the products which tends to express the feeling of touch.
Thank You for Attention

the end of this presentation