

Analysis of Cognition Difference of Visual and Imagined Haptic Inputs on Product Texture

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Abstract. The rise of aesthetic economics is remarkable over the past few years and it also displays the culture and creative industry which would be outstanding in the world. The useful feature of the product is not the only reason to buy the product of the consumer. The interface of product aesthetics gives people a sense of beauty and impression; it also promotes people to consume and collect. However many products while similar in visual appearance, differ in their haptic characteristics affect people's willingness to buy. Based on the above reasons, the trend of product design is consumer-oriented. This study analyzes the cognition difference of visual and imagined haptic inputs based on product texture. We choose tea cups with different textures be the stimulus samples in this experiment to investigate the participants' psychological feelings. The purpose of this study is to discover the correspondence between product textures with consumers' feel and generate specific guidelines for design in the future. There are four findings suggested by this paper. The first one is that a product with an attractive visual appearance is not necessarily pleasing to the touch. The second one is people view the products through visual and describe the product bias in emotional thinking. The third one is antonym adjectives of the popular products are less which conform of people with normal mental state. The fourth one is most of visual and haptic adjectives have commonality. Hopefully, industries and multi-cultural style of products will continue to support the future development and growth of aesthetic economics.

Keywords: Texture, Visual, Imagined Haptic, Cognition.

1 Introduction

The experiential economy era has come to our life affecting many products with culture connotations and changing people's lifestyle. It also displays a culture and creative industry outstanding in the world. A product's useful features are not the only

reason for a consumer to buy it. Does the nice looking product also have a good touch? Are a product's visual and haptic sensations consistent? How do people describe visual and haptic sensations?

The purpose of this study was to analyze any cognition differences between visual and imagined haptic inputs on product texture with the goal of designing visually attractive as well as haptically appealing products so as to solidify the culture and creative industry. The significance of the results is manifested on the three specific aspects of industry, designer and consumer. In addition to providing guidance for designers here in Taiwan and, hopefully, industries and multi-cultural style of products, it is also hoped that they continue to support the development and growth of aesthetic economics in the future.

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2 Literature Review

2.1 Product Aesthetics and Perception

Human senses play an important role in people's understanding and experience of products. We see, hear, smell, and touch the artifacts around us in order to learn more about them, but also to experience the sensations per se [1]. In general, the sense of touch can only perceive one input at a time, whereas some other senses such as vision can simultaneously perceive a wide array of information [2]. The degree to which a perceptual system manages to detect structure, order, or coherence and assess a product's novelty/familiarity typically determines the affect that is generated [3]. Dagman, Karlsson, and Wikström [1] proposed that vision has often been described as the most important, dominant sense, but recent studies indicate that the other senses are as important in the way we experience products, or even more important. In addition attractiveness of the product is based on preferences of a person's feelings.

Aesthetic response can be defined as an experience (i.e., visual, emotional) that occurs in reaction to a specific stimulus [4]. At the aesthetic level, we consider a product's capacity to delight one or more of our sensory modalities [3]. The interface of product aesthetics gives people the sense of beauty. It also promotes people to consume and collection. However many products similar in visual appearance but differing in their haptic characteristics can affect people's willingness to buy. Base on the above reasons, the trend of product design is from consumer-oriented. This study analyzes cognition differences of visual and imagined haptic inputs on product texture.

2.2 Product Texture

Texture discrimination clearly relies on the detection of differences between adjoining regions, so in some sense elements must be compared with neighboring elements [5].

For example, the honeycomb is composed of a group of lattice modeling, and the lattice modeling must be orderly arrangement. Product texture is an explicit aesthetic property of product aesthetic attributes [6]. Product texture is one of the three factors of visual composition together with modeling and color. It can enrich the surface of the product and it also can be viewed and touched. Actually, texture is fundamentally tactile. People's visual experience of it is based on prior tactile experiences in feeling different texture previously [7].

2.3 Semantic Cognition of Product

Cognitive processing is based on people receiving messages by sensory stimulation, and making them into the experiences of knowledge and memory [8]. Sensory stimulation can encourage viewers to imagine how a product looks or feels when in use [4]. Most coders (designer) and decoders (user) have different humanistic backgrounds, education backgrounds and folk customs, and they have different results from the code (product). Therefore, the product's meaning from the designer is the potential factor affecting the user's cognition [9]. Semantic cognition of a product is from communication and combining cognitive engineering. It lets the user cognize products through "Design" and builds the interface between product and user [10]. As Norman [11] proposed, that what the product does for the user helps the user can understand the situation of the product.

3 Research Method

Does a visually appealing product have a haptically appealing touch? Are visual and haptic sensations consistent for the same products? How do people describe visual and haptic sensations? Based on a literature review, the trend of product design is consumer-oriented. This study analyzed cognition differences of product texture based on visual and imagined haptic inputs. The authors determined consumer preferences and emotional reactions through a product instance survey. The study tried to explore the aesthetic interface from a product's form in order to help industry produce products which touch the consumers' heart more strongly. In this paper, a combined Kansei engineering method with a survey of images and data analysis was used to analyze the cognition difference of visual and imagined haptic inputs on product texture.

The overall aim of this explorative study was a preliminary investigation of users' product experiences of visual and imagined haptic sensations and how they are verbalized. The participants were 81 college students, and they evaluated the same products at two different points in mode. There were two phases (i.e., visual and imagined haptic) in the questionnaire survey. We investigate and discuss two issues in this paper. The process of this questionnaire survey is shown on Fig. 1.

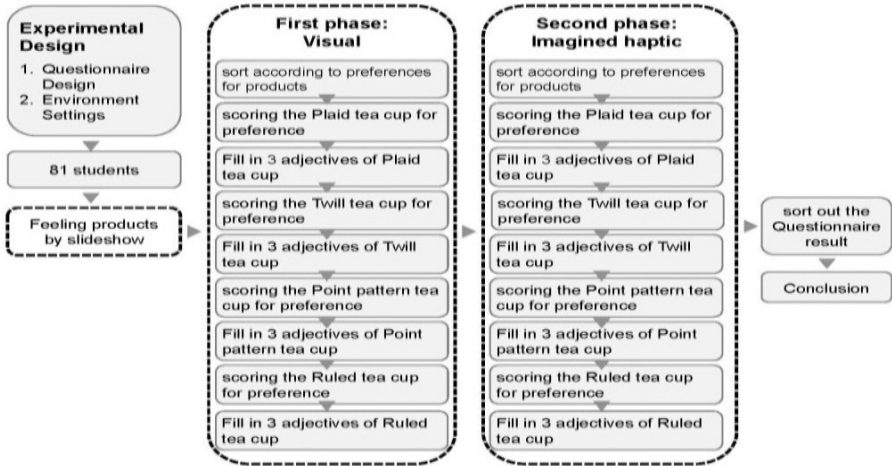










Fig. 1. The questionnaire survey process of visual and imagined haptic tests

The stimuli for the questionnaire are four porcelain cups of JIA Inc [11]. The cups colors were white and with the same form but differed in texture. These stimuli are described in table 1.

Table 1. The description of the stimuli

Image				
Name	JIA Inc. Persona tea cups			
Designer	Office for Product Design			
Background Story	A family of simple teacups which initially seem identical but soon show their own subtle personality. The basic silhouette of ‘Persona’ is a contemporary reinterpretation of the traditional Chinese tea cup with lid. Closer inspection reveals a series of individual texture like patterns which are almost more haptic than visual. The true qualities of these cups are only fully appreciated once held in the hand or up against the light, when the translucency of the delicate porcelain accentuates the patterns.			
Texture				
Material	Porcelain	Porcelain	Porcelain	Porcelain
Size	Ø7.2x9.5cm (180ml)	Ø7.2x9.5cm (180ml)	Ø7.2x9.5cm (180ml)	Ø7.2x9.5cm (180ml)
Code of this Research	Plaid	Twill	Point pattern	Ruled

4 Results and Discussion

There were four major results of this questionnaire study. First: the smooth senses of textures (i.e., Twill and Ruled) are more popular than the rougher senses of textures (i.e., Point pattern and Plaid) of visual and imagined haptic. Second: (1) there were many emotional adjectives in the first phase (i.e., visual) (Fig. 2); (2) there were many appearance adjectives and emotional adjectives in the second phase (i.e., imagined haptic) (Fig. 3). Third: the haptic adjectives have positive and negative feelings (e.g., smooth with rough, good touch with bad touch). Fourth: positive adjectives of products decrease with a decline in the product's preference (Fig. 4 and Table 3). There were two types of product adjectives: emotional (e.g., unlovely, comfortable or pretty), and appearance (e.g., smooth, streaked, lumpy or plaid) (Table 3). So the results show that people usually use emotional adjectives to describe products, and they do not use the negative adjective to describe the product which they prefer.

Table 2. The code of each feeling

	Visual	Haptic	Visual and Haptic	Other
Appearance	1	4	7	10
Interactive	2	5	8	
Emotional	3	6	9	

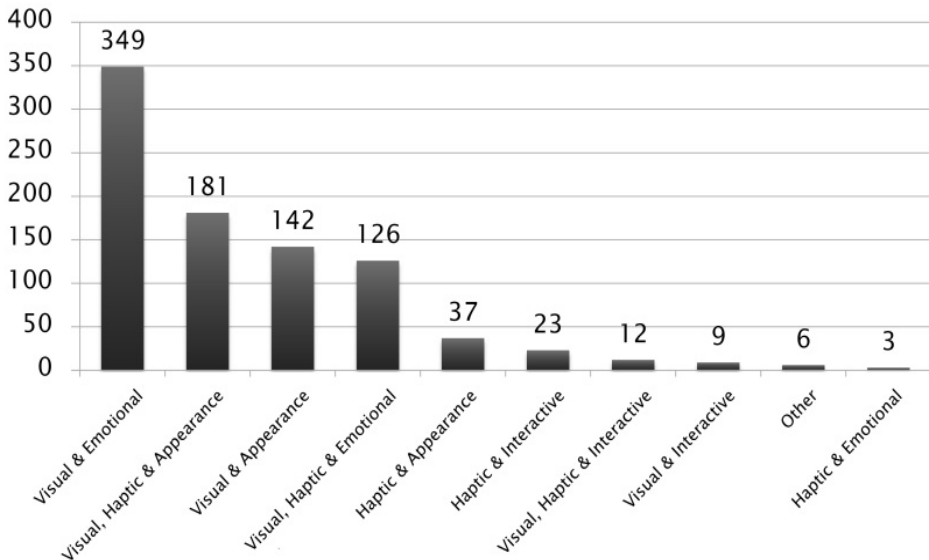


Fig. 2. Phase 1: Proportional distribution of "Visual" test (total 888)

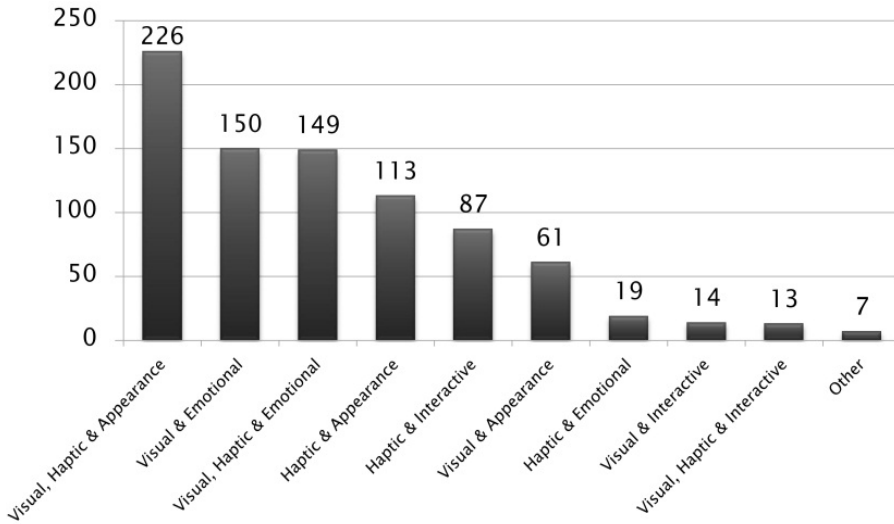


Fig. 3. Phase 2: Proportional distribution of "Imagined Haptic" test (total 839)

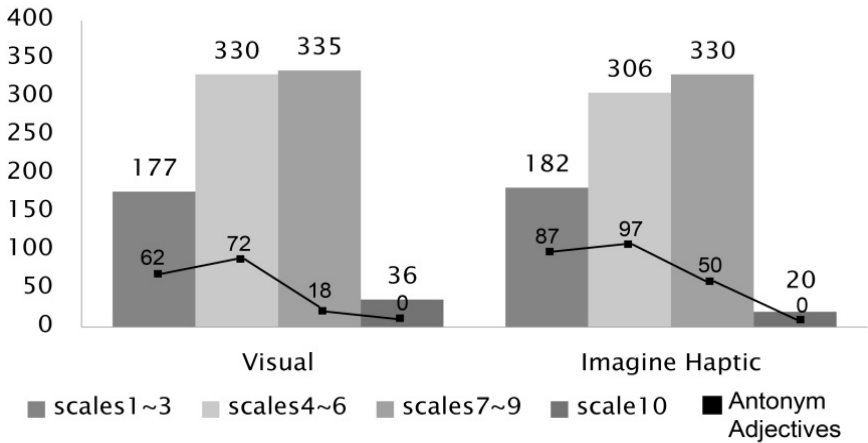


Fig. 4. Numbers of different preference of adjectives and numbers of opposite adjectives (black line)

Table 3. Sort rankings of stimuli and the three top adjectives (The list is to take single adjectives' quantity more than ten)

Rank 1. Twill						
Visual and Imagined Haptic	Smooth	33	Comfortable	27	Slippery	26
	Visual	Pretty	20	Smooth	13	Tilted
		Comfortable	10			
Imagined Haptic	Slippery	26	Smooth	20	Lovely	18
		Comfortable	17	Easy to take	10	

Table 3. (Continued)

Rank 2. Ruled						
Visual and Imagined Haptic	Common	33	Streaked	30	Slippery	24
Visual	<i>Common</i>	<i>16</i>	Neat	13	<i>Streaked</i>	<i>13</i>
	Simple	11	Lovely	10		
Imagined Haptic	<i>Slippery</i>	<i>24</i>	Smooth	21	<i>Streaked</i>	<i>17</i>
	<i>Common</i>	<i>17</i>	Comfortable	14		
Rank 3. Point pattern						
Visual and Imagined Haptic	Lumpy	35	Unlovely	30	Common	26
Visual	Pretty	19	<i>Lumpy</i>	<i>15</i>	<i>Common</i>	<i>13</i>
	<i>Unlovely</i>	<i>13</i>	Ugly	12		
Imagined Haptic	<i>Lumpy</i>	<i>20</i>	Granulous	17	<i>Unlovely</i>	<i>17</i>
	<i>Common</i>	<i>13</i>	Comfortable	13		
Rank 4. Plaid						
Visual and Imagined Haptic	Lumpy	33	Plaid	26	Granulous	19
Visual	Neat	16	<i>Plaid</i>	<i>14</i>	Common	13
	Ugly	12	Upright and Foursquare	11		
Imagined Haptic	<i>Lumpy</i>	<i>33</i>	<i>Granulous</i>	<i>19</i>	Crude	13
	<i>Plaid</i>	<i>12</i>				

5 Conclusion

In this paper, the authors attempted to understand people’s different sense of product texture in a preliminary way and as a basis for the future implementation of follow-up study. It could help the future study that research about the Haptic of touch entity products, and provide recommendations for follow-up research. The results could help industries and designers understand the meanings and feelings of product texture so that they can consider such factors in future design, and also help in product design and marketing in the future.

There are four findings suggested by this paper. First: a visually attractive product does not necessarily have a pleasant to the touch. Visual and imagined haptic sensation of product texture do not have an absolute relationship but these senses of products and people's past experience have an absolute relationship. People like that products have a smooth sense and the same directional line, and the directional line can be expected both of visual and imagined haptic. Second: people view the products through visual and describe the product bias in emotional thinking. In addition, peopled view the products through imagined haptic sensations and described the product bias based on their thinking about the product modeling and the sense of touch. Third: the popular products have less opposite adjectives (i.e., unlovely, ugly) that conform of people with normal mental state. People described the product with adjectives which having both positive and negative feelings description. For example, rough corresponding slippery and good touch corresponding bad touch. Fourth: most

of the visual and haptic adjectives have a commonality. There are two types of product adjectives, one type is emotional (e.g., unlovely, comfortable or pretty), and the other one is appearance (e.g., smooth, streaked, lumpy or plaid). Further research is needed to provide more theoretical underpinnings and cases. Hopefully, industries and multi-cultural style of products will continue to support the development and growth of aesthetic economics in the future.

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