Aesthetic Appreciation of Tactile Unity-in-Variety in Product Designs

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Abstract

The principle of unity-in-variety has recently been shown to affect visual aesthetic appreciation of product designs. We investigated whether this principle can also account for tactile aesthetic appreciation of products. Design students rated nine car keys on unity, variety and aesthetic appreciation through tactile exploration only. Results revealed that unity and variety, while negatively correlated with each other, both positively influence aesthetic appreciation. This implies that there is an optimal balance between tactile unity and variety that is aesthetically preferred. These results replicate results found in the visual domain and provide evidence for unity-in-variety as a multisensory aesthetic design principle.

Keywords: aesthetics; unity; variety; product design; tactile; design principles

Introduction

Aesthetic appreciation of product designs often involves the use of multiple sensory modalities. While vision has received a large amount of attention in the past (Blijlevens, Carbon, Mugge, & Schoormans, 2012; Bloch, 1995; Chang & Wu, 2007; Hekkert, Snelders, & van Wieringen, 2003; Veryzer, 1993), tactile features of products can become more important over time and can even outweigh the importance of vision (Fenko, Schifferstein, & Hekkert, 2010). Despite this, the domain of tactile aesthetics is still largely undiscovered and little knowledge exists on the aspects that influence the appreciation of touching and feeling products (Carbon & Jakesch, 2013). In this research, we aimed to explore some of this uncharted territory by assessing whether the design principle of unity-in-variety can explain part of tactile aesthetic appreciation of products.

Unity-in-Variety

The principle of unity-in-variety states that people appreciate the perception of variety, but for this variety to be enjoyed, we also need to see the unity in this variety (Berlyne, 1971; Fechner, 1876; Hekkert, 2006). Hekkert (2014) developed an evolutionary based Unified Model of Aesthetics which, amongst others, discusses unity-in-variety as an important principle explaining aesthetic appreciation for product designs. In this model, two evolved motivational drives are argued to underlie peoples' preferences for a balance between unity and variety: a need for safety and a need for accomplishment. The perception of unity can fulfil a need for safety by facilitating perceptual understanding. Detecting properties in objects (whether it is a product, landscape, or painting) that help perceive the whole, order, and coherence, aid in making perceptual sense of the environment. Consequently, this sense making is aesthetically appreciated. On the other hand, the perception of variety can fulfil the need for accomplishment because it satisfies the natural urge to explore and engage in new experiences. Detecting variety in an object helps individuals to broaden their horizons and acquire new perceptual sensations and this perception of variety is therefore aesthetically appreciated. Hence, it is argued that both unity and variety positively influence aesthetic appreciation. Recent research on the principle of unity-in-variety has indeed shown that people aesthetically appreciate the visual perception of both unity and variety in product designs (Post, Blijlevens, & Hekkert, 2013a, 2013b). Even though theorized, it has not been empirically verified whether the principle unity-in-variety explains aesthetic appreciation of product designs in the tactile domain as well. In the current research, we aim to fill this gap in the literature.

Tactile Aesthetics and Unity-in-Variety

Literature on tactile aesthetics is limited (Ekman, Hosman, & Lindstrom, 1965; Essick, James, & McGlone, 1999; Essick et al., 2010; Grohmann, Spangenberg, & Sprott, 2007). Results of these researches, in summary, show that people appreciate soft and smooth tactile sensations, while disliking rough and sharp tactile experiences. However, most research was performed using simple objects (e.g. sanding paper, cloth, brushes) that could not be freely tactually explored. Whenever more complex objects or actual products were used as stimuli, aesthetic appreciation was not explicitly measured. Moreover, many more tactile properties, besides

roughness and sharpness, can be thought of to influence aesthetic appreciation of product designs. For example, it has recently been theorized that the Gestalt laws of proximity, similarity, good continuation and closure may also influence tactile perception and its aesthetic appreciation (Gallace & Spence, 2011). Because these Gestalt laws influence the perception of unity and variety in the visual domain (Eysenck, 1942; Kellett, 1939), we argue that people can tactually perceive unity and variety in product designs as well.

In order to determine whether people can indeed form impressions of unity and variety through their tactile senses, and to assess whether these unity and variety impressions can influence tactile aesthetic appreciation, we performed a study using car keys as stimuli. We hypothesize that, similar to the visual domain, tactile unity and variety are negatively correlated. Furthermore, we hypothesize that unity and variety positively influence aesthetic appreciation.

Method

Participants

Students of the Automotive Design minor at the faculty of Industrial Design Engineering (Delft University of Technology, Delft, The Netherlands) were enrolled to participate in a study on the tactile perception of car keys. All of the 26 participants completed the study and were used for the analyses (mean age = 21.54, SD = 1.42, 21 male).

Stimuli

Nine car key designs that varied as much as possible in the tactile aspects of unity and variety were chosen as stimuli (Figure 1). All car keys were duplicates of original car keys (WVO Trading BV, Nunspeet, Netherlands). Several important differences between the duplicates and original car keys exist. The materials used in the duplicates (e.g. rubber, plastic and metal) were highly similar between all the car keys, while there is a higher variety in materials used in actual car keys. This decreased confounding effects on aesthetic appreciation due to variances in material qualities. Another difference between the car keys and duplicates was that there were no electronics in the duplicates. The lack of electronics made the car keys and button presses feel fake. Therefore, the different parts were glued together to increase their rigidity. The use of glue also made it impossible to press down the buttons in the car keys, minimizing the influence of interaction behaviour. Moreover, metal weights were added to the car key duplicates to increase both the rigidity and weight of the car keys.

Procedure

Participants rated all nine car keys on 7-point scales (1: fully disagree, to 7: fully agree) measuring tactile unity, variety and aesthetic appreciation. This questionnaire was an adaptation of a questionnaire measuring the same factors in the visual domain (Post et al., 2013b). Unity was measured using the items: ‘This design feels unified’, ‘This design feels orderly’ and ‘This design feels coherent’ (Cronbach’s α = .840). Variety was measured using the items: ‘This design conveys variety’, ‘This design is made of different parts’ and ‘This design is rich in elements’ (Cronbach’s α = .670). Aesthetic appreciation was measured using the items: ‘This product is attractive to touch’, ‘This product is pleasing to touch’ and ‘I like touching this product’ (Cronbach’s α = .920). Both the item order and stimuli order were fully randomized to eliminate order effects.

Respondents were situated in front of a table on which nine adjacent trays were placed that each contained one key. A large cloth was suspended in the air so that participants could not see the car keys, yet holding the car keys would be possible without the cloth touching their hands. Participants could sit at the table and were informed that the products were duplicates of car keys and had limited functionality. Instructions explicitly mentioned to rate the tactile appearance of the products and not the expected functionality or quality. Participants were instructed to take their time to tactually explore all the car keys at least once before they started rating them. Final rating of the car keys was done using a paper-and-pencil questionnaire, feeling the different car keys from left to right in successive order. Participants were free to use either one or two hands when feeling the car keys.

Figure 1. Example of two stimuli used in the study. The left car key was regarded as more unified than the right car key. This is likely because of its more symmetrical and continuous shape

Results

Pearson correlations were calculated for unity, variety and aesthetic appreciation. In line with our predictions, unity and variety correlated negatively with each other ($r = -.391$, $p < .001$). Also as expected, unity correlated positively with aesthetic appreciation ($r = .610$, $p < .001$). Variety did not correlate significantly with aesthetic appreciation ($r = -.064$, $p >. 05$). However, similar to the studies on unity and variety for visual aesthetics, partial correlations showed that unity and variety suppress each other’s effect on aesthetic appreciation, because the partial correlation of variety with aesthetic appreciation was significant and positive ($r = .239$, $p < .001$). The partial correlation between unity and aesthetic appreciation was slightly higher than the bivariate correlation ($r = .637$, $p < .001$). In order to determine the amount of variance the predictors of unity and variety can explain for the dependent variable of aesthetic appreciation we

performed a linear regression analysis. The regression model explained 40.8% of the variance on aesthetic appreciation for the predictors of unity ($p < .001$, $\beta = .691$) and variety ($p < .001$, $\beta = .206$).

Discussion and Conclusion

In this research, we contributed by investigating whether the principle of unity-in-variety, known to influence visual aesthetic appreciation, influences tactile aesthetic appreciation of product designs as well. Our results show that both tactile unity and variety positively influence aesthetic appreciation, while unity and variety are also negatively correlated. This indicates that, similar to the visual domain, there exists an optimum balance between tactile levels of unity and variety that is aesthetically preferred.

Although a small start, with this study we hope to have opened up a way to investigate tactile aesthetic sensations and give vocabulary to talk about them in terms of unity and variety (Gallace & Spence, 2011). The principle of unity-in-variety is common language in visual aesthetics and makes it possible to study and comprehend the appreciation of complex visual stimuli in a holistic manner. By applying the this principle to tactile aesthetics, it can function as a bridge to better understand the similarly complex relation between the perception of material properties (e.g. hardness, elasticity or temperature) and Gestalt properties (e.g. symmetry, closure or proximity), and their subsequent aesthetic appreciation (Gallace & Spence, 2011; Sonneveld & Schifferstein, 2008). The development of such knowledge on the interplay between product design properties and unity-in-variety can provide guidelines for designers that will help them design products that are even more aesthetically pleasing to touch.

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