The influence of unity-in-variety on aesthetic appreciation of car interiors

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Product designers can use a wide range of design principles to influence the appearance of new product designs. One of these principles, 'unity-in-variety', states that product designs combining a maximum of unity or order with as much variety as possible are the most aesthetically pleasing. Even though designers are thought to intuitively use the principle of unity-in-variety during the design process, it has never been empirically assessed whether they, similar to lay-men, also positively appreciate product designs that adhere to this principle. We show that for automotive design students both unity and variety can simultaneously and independently positively influence aesthetic appreciation of car interior designs. Furthermore, automotive design students attribute much more of the aesthetic appreciation of car interiors to unity, than they do to variety. We suggest that this difference arises because they are trained to attach more weight to the unifying aspects of a car interior design.

Key words: Aesthetics, product design, unity, variety, design principles

1. Introduction

During the creation of a product design, designers, consciously and unconsciously, apply a wide variety of learned aesthetic principles (e.g., repetition, harmony, balance, symmetry). These principles can aid the designer in enhancing the aesthetic appeal of the product [18]. And they use these principles for good reason, as the benefits of increased aesthetic appreciation by users are widespread [7, 20, 26, 29]. Knowing how to incorporate aesthetic principles in a design is thus considered to be one of the central aspects of the designers' practices [27].

One of the principles that influences aesthetic appreciation is 'unity-in-variety'. Previous research with lay-men showed that both unity and variety, although negatively correlated, equally and positively attributed to the aesthetic appreciation of product designs [25]. Hence, people prefer product designs that maximise both the levels of unity and variety. However, it is unclear whether designers, who are taught to use these aesthetic principles, also prefer a balance between levels of unity and variety in product designs. Therefore, we contribute by investigating this principle with automotive design students.

1.2. Unity-in-variety

The age-old principle of unity-in-variety, already known to the early Greek philosophers and with a long tradition in art education [16, 24], states that people like to perceive as much variety as possible, but only when they also perceive unity in this variety [9]. Unity is experienced when one is able to detect orderly patterns, perceive the whole and find coherence between and within elements. One way of influencing unity is by applying the well-known Gestalt laws of grouping, as is taught in many design books [16-18]. Research showed that unity positively influences preference for visual patterns [4, 5, 21], product drawings [30], simple polygonal

figures [8] and artistic and non-artistic images [22]. Variety, on the other hand, implies a differentiation between elements and a lack of it results in a feeling of boredom or monotony [3, 9, 28]. People appreciate perceiving variety in paintings [10], patterns [2, 4, 5, 21, 31], music [6], novel products [15, 32] and even in gardens [19]. Both unity and variety thus play a large role in creating a well-balanced and aesthetically pleasing percept.

An evolutionary view of aesthetics can provide an explanation for why people appreciate unity and variety in product designs [13]. As a result of natural selection our brains have evolved to derive pleasure to stimuli that were beneficial for our survival [14]. Whether it was the ability to selectively listen to a single sound in a noisy environment, or the detection of small berries in a wide variety of flora, the perception of elements that are perceived as a whole make it possible to group things together and separate others. This allowed humans to efficiently process the world around them, which in turn was highly beneficial for their survival. Because of its importance for survival, the perception of unifying properties became pleasurable [1]. At the same time, evolutionary advantages can be attributed to the perception of variety. A preference for variety drove exploration and stimulated the search for new information. However, if we do not see the unity in this variety, what we perceive will be regarded as dispersed, incoherent or fragmented. Hence, a perceptually pleasurable balance between unity and variety was highly beneficial for survival and therefore objects adhering to the principle of unity in variety provided aesthetic pleasure. As a by-product of evolution, the positive appreciation of certain patterns and features in our environment that facilitated perception or promoted searching for new information is so ingrained in people's brain that in modern times it still influences people's aesthetic appreciation of product designs [12, 23]. Therefore, we argue that people aesthetically appreciate unity and variety in product designs. Moreover, a certain trade-off has to exist between unity and variety where an increase in one automatically results in a decrease of the other [13]. Hence, people aesthetically appreciate the product designs with an optimum balance of unity and variety.

In this study we investigate the trade-off between unity and variety for automotive design students' aesthetic appreciation of car interiors. A previous study with lay-men showed that the trade-off between unity and variety resulted in a balance where both equally and positively influenced aesthetic appreciation of product designs (lamps and espresso machines) [25]. However, it is unclear whether experts similarly appreciate unity and variety in relation to product design aesthetics.. Hekkert, Snelders and van Wieringen [11] performed a comparable study investigating the balance between the principles of novelty and typicality on the aesthetic appreciation of cars. Although they found that experts perceive different cars as being novel or typical, both variables were equally important in explaining aesthetic preference for laymen and experts. Based on these two findings, we predict our experts to aesthetically prefer car interiors that optimally and to a similar degree balance unity and variety. In line with those findings, we also expect to find a negative correlation between unity and variety, as both are theoretical opposites.

2. Method

2.1 Participants

Students of the minor Automotive Design at the faculty of Industrial Design Engineering (Delft University of Technology, Delft, The Netherlands) were approached to fill out an online questionnaire on car interior designs. A total of 27 participants completed the questionnaire and these were used for the analyses (mean age = 21.19,

SD = 1.33, 19 male). Because the respondents are automotive design students, the participants were expected to have ample experience in perceiving design principles used for car interior designs.

2.2 Stimuli

Car interiors were chosen as stimuli, as they have a great variety in elements influencing unity and variety. Stimuli selection was done by two design experts familiar with the principle of unity-in-variety. The design experts were instructed to reduce a selection of 30 different car interiors down to 12, while maintaining as much difference in unity and variety in the visual domain as possible. The detailed (250.000 pixels) colour photographs of production and concept cars were taken from a drivers' perspective. Photo editing software was used to remove brand logos and generate similar backgrounds.

2.3 Procedure

Participants rated all 12 products on the items measuring aesthetic appreciation, unity and variety on 7-point scales (1: Fully disagree, to 7: Fully agree). Aesthetic appreciation was measured using the items: 'Visually, this is a beautiful object', 'Visually, this is an attractive object', 'This object is pleasing to see', and 'I like to look at this object'. Unity was measured using the items: 'is an orderly design', 'is a unified design', 'is a coherent design' and 'the elements of this design belong together'. Variety was measured using the items: 'design is made of different parts', 'design conveys variety', 'is a diverse design' and 'design is rich in elements'. Factor analysis identified three components explaining 79,1% of the total variance. Average scores were calculated for each component and reliability was calculated using Cronbach's alpha for aesthetic appreciation ($\alpha = .970$), unity ($\alpha = .906$) and variety ($\alpha = .778$). Two versions of each condition were created with two different stimuli presentation orders to eliminate order effects.

3. Results

Pearson correlations between the three variables showed that unity highly and positively correlated with aesthetic appreciation ($r = .669$, $p < .001$). However, variety did not show a significant correlation with aesthetic appreciation ($r = -.008$, $p = .890$). In line with our hypothesis, unity and variety showed a significant negative correlation with each other ($r = -.148$, $p < .01$). This negative correlation could indicate that the relation between variety and aesthetic appreciation was suppressed by the effect of variety, and vice versa. Partial correlations confirmed these expectations as variety now positively correlated with aesthetic appreciation when controlling for unity ($r = .124$, $p < .05$). The correlation with unity increased only slightly ($r = .676$, $p < .001$).

To determine how much variance unity and variety explained, both were entered as predictors for aesthetic appreciation in a linear regression model. The model explained 46% of the variance on aesthetic appreciation scores ($F(2, 321) = 134.9$, $p < .001$) and revealed significant positive effects for the coefficients of unity ($p < .001$, $\beta = .683$) and variety ($p = .025$, $\beta = .094$).

Figure 1 shows the unity and variety scores of all products with their corresponding aesthetic appreciation scores. Products rated a 3.5 or higher on aesthetic appreciation are coloured red. This figure clearly illustrates the importance of both unity and variety in explaining aesthetic appreciation of car interiors.

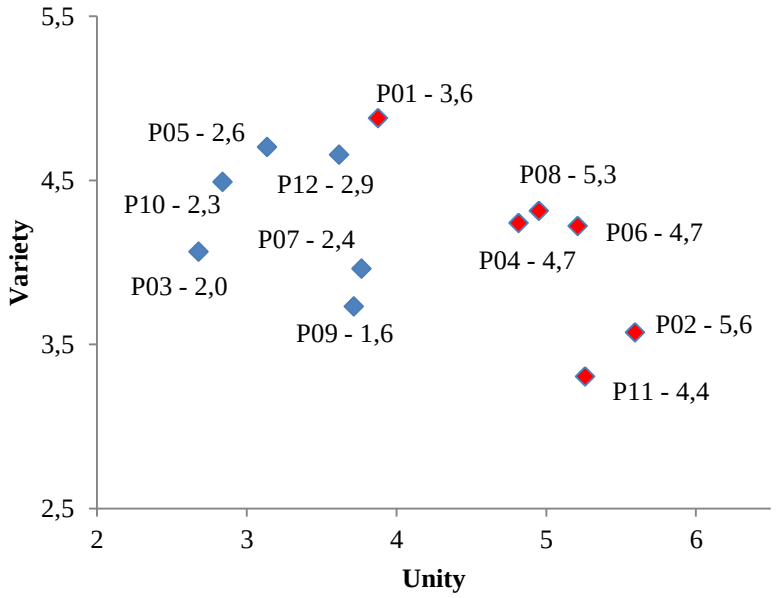

Fig.1. Average aesthetic appreciation scores plotted against those of unity and variety. Car interiors rated higher than a 3.5 on the 7-point scale of aesthetic appreciation are displayed in red.

4. Discussion

We investigated the principle of unity-in-variety on aesthetic appreciation of car interior designs with automotive design students. Results revealed that both unity and variety, although negatively correlated, positively predict aesthetic appreciation of car interior designs. Hence, we were able to replicate previous findings that, as a result of a trade-off, there is a preferred balance between levels of unity and variety in which maximization of both is aesthetically preferred. However, in this study we find that for design students unity influences aesthetic appreciation more than variety. An explanation for this might be that, as a result of their education, they attribute more importance, and therefore aesthetic appreciation, to unifying aspects. The role of a designer is more often than not to create order, instead of disorder [12, 18]. They can do so by means of applying unifying design principles such as the Gestalt laws, in which the whole must predominate over the parts [17]. The use of car interiors could have emphasised this focus on unity because car interiors are often full of buttons, dials and lights that need to be structured into a coherent design. Design students are being taught to integrate and order these in the car interiors as much as possible. Hence, they are taught to create unity and thereby learned to appreciate it even more.

Future research on how certain factors moderate the effects of unity and variety on aesthetic pleasure is needed. Concluding from our research, expertise and product category could serve as possible moderators. Empirically investigating such moderating effects will provide more insights into the effects of unity and variety on aesthetic appreciation of product designs. In addition, such research can inform designers in creating better products for their intended audience, and thereby benefit from the advantages that aesthetically pleasing products give. Summarizing these results; while both unity and variety are determinants of product design aesthetics appreciation, the importance of unity in a design deserves special attention in education when trying to design a comprehensible and perceptually enjoyable car interior.

6. Citations

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