Design Evaluation of Cars Taillights in India Based on Novelty and Typicality

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Abstract

This paper presents a design research case study examining user perceptions about novelty and typicality in product design. This work approaches the concepts of novelty and typicality in product design through two different case studies. The first case study is a preliminary case study to explore and collect the descriptors related to novelty and typicality in car taillight designs in India using primary research. Using a survey, inputs from 72 design students were also collected regarding the most novel and most typical designs from among 100 taillight models. The second case study was conducted to assess the subjective perceptions about the 5 most novel and 5 most typical car models using descriptors of novelty and typicality. Found from the first case study. Nissan Leaf car taillights were found to be most novel and Chevrolet SRV car taillights were found to be most typical.

Keywords: design methodology; design research; novelty; typicality; car taillights

1. Introduction

The practice of industrial design typically involves not just a focus on the form of the product to be designed but research and analysis of the different factors that lead to asthetic appeal as well. During such research, inputs may be acquired from consumer representatives, as well as subject matter experts. For customer inputs, user research could be conducted at different stages during product development. The results of such researches, given a specific product, could provide useful information on various actionable aspects of the product design that lead to qualitative excellence of product, enabling it to compete strongly in the market. The experts could provide valuable inputs coming from various perspectives of research and practice such as those of product utility, service, style and aesthetics, etc. Both, the users and experts could also provide valuable insights by evaluating new or existing product designs.

In literature, a few product design properties have been found to have significant impact on product evaluations. Specific research has also been conducted in the past regarding aesthetics related responses of users when considering the different product design properties. In this tradition, Loken & Ward (1990) make a claim that prototypically or typicality is a major design property which defines the degree to which an object represents a category. Hekkert et al. (2003) have discussed the joint effects of novelty and typicality on aesthetic preferences. They concluded that the design properties of typicality and novelty constitute two separate factors that are highly negatively correlated and tend to inhibit the effect of each other.

Several studies in the past have investigated the relationship between novelty and aesthetic preferences in product design. Hung & Chen (2012) employed three fundamental dimensions of product semantics – trendiness, complexity, and emotion –and explored how changes in product semantics affected the judgments of product novelty and, in turn, the judgments of aesthetic preferences. Mukherjee & Hoyer (2001) have studied the effects of 'complexity' in the 'novel' attribute during a product evaluation and found that novel attributes can be easily perceived as new technological innovations unknown to large number of customers. It was also found that the positive effects of novel attributes hold only in the case of low complexity products. Thurgood et al. (2014) have explored the combined effects of 'typicality' and 'novelty' on 'aesthetic pleasure' of product designs in terms of the influence of 'safety and risk' perception. Some other specific information on product evaluation given the perspective of novelty and typicality has been provided in the following sub-sections.

1.1 Novelty

Novelty is often defined as the quality of being something new, original or unusual. The term could be used to describe ideas, designs, methodologies, etc. In the context of industrial design, the term novelty could be used for describing an unusual or unique idea developed while developing a product, or a breakthrough in terms of functionality of the product or aesthetic appeal of the product. The novelty of a product could be applied in the context of its appearance, utility, mode of interaction, etc. Berlyne (1970) has classified novelty into two kinds: (i) absolute novelty – an object that has never been experienced before; and (ii) relative novelty – an object that consists of a new combination of previously experienced elements. Similarly, Mugge & Schoormans (2012) have classified novelty on the basis of apparent usability of the product as: (i) functional novelty - defines the technological and functional development of a product often with a focus on internal parts of product, and (ii) appearance novelty – brings the focus to the form of a product often described by the external parts of product. Novelty is also perceived in different manners by experts and non-experts [6]. Sluis-Thiescheffer et al. (2016) describe the involvement of children in the design process in order to study novelty during the process of obtaining design solutions. Novel design solutions could come from involvement of diverse groups of participants (children, adults, old people, etc.) with varying parameters like gender, group size, power structures, etc. Radford & Bloch (2011) found that products with high levels of visual product "newness" elicit more affective reactions than those with lower levels of newness.

1.2 Typicality

A semantically opposite term to novelty which is often described in literature is typicality. Therefore, it could be claimed that, the more novel a product is, the less typical it is for the customer, and vice versa. Typicality provides an extent to which an object belongs to a category. According to Hung & Chen (2012), typicality could be approached in three ways: (i) similarity to the ideal of the category; (ii) similarity to the central tendency of the category; and, (iii) frequency of encounters with the object as

a category member. Typicality therefore decreased with the increased familiarity with an object. This was demonstrated in Leder & Carbon (2005) when studying aesthetic appreciation of car interiors. They found that participants changed from preferring a classical version to a more innovative version after repeated exposures to the different designs.

2. Methodology

The research work consists of two case studies. For the first study, a pilot survey was conducted using 72 design students who were asked to rate the most novel and typical stimuli presented to them. The stimuli provided were images of taillight models of a hundred motor cars (four wheeled light motor vehicles) available in the Indian market. Car names were not provided to avoid brand biases, and were numbered for identity. The survey was conducted in conformance to the protocols of the Institute Ethics Committee (IEC), NIT Rourkela (India). All the data collected was anonymized to ensure protection of participant identitites.

The participants were explained the concept of novelty and typicality prior to the survey. Then, they were asked to choose the top ten most novel car taillights and ten most typical ones, and to describe each selected taillight using a few adjectives. From the various adjectives collected, the top five most frequently used adjectives were identified for novelty as well as for typicality.

In the second case study, the results obtained from the first case study are used to conduct another survey in which participants were asked to rate each of the ten most novel and most typical car taillights on a descriptive scale. This scale was constructed using the top five adjectives of novelty and typicality. The descriptors were rated on a scale of 1 to 5 (1 = least; 5 = most) for the ten most novel and typical taillight stimuli.

2.1 Flow of the work

Figure 1 provides a systematic overview of the methodology followed during this research work using a flowchart.

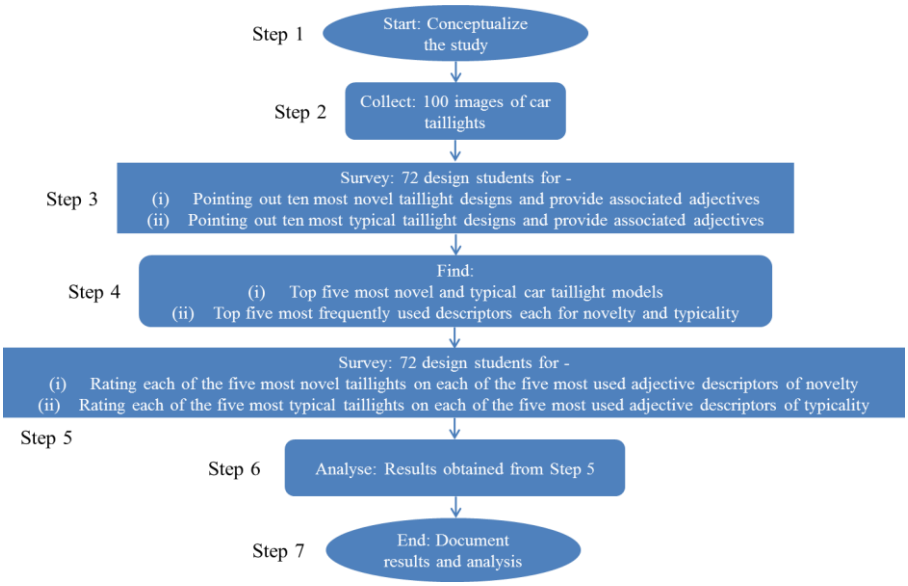

Fig. 1: Methodology followed during this research work

3. Results

On analyzing the survey results, Figure 2 and 3 show the top five most novel taillights and most typical taillights obtained from the user survey. Table 1 and 2 list the five most frequently cited descriptor adjectives related to novelty and typicality respectively, based on the analysis of user survey data. The top five descriptors for novelty were found to be attractive, sporty, modern, trendy, and futuristic. The top five descriptors for typicality were found to be boring, ordinary, compact, imitative, and common.

Fig. 2: Images of the five most novel car taillights

Fig. 3: Images of the five most typical car taillights

Table 1: Top 5 descriptors for novelty obtained from the survey

1. Attractive	2. Sporty	3. Modern	4. Trendy	5. Futuristic

Table 2: Top 5 descriptors for typicality obtained from the survey

1. Boring	2. Ordinary	3. Compact	4. Imitative	5. Common

3.1 Relationships among the car tail lights and novelty descriptors

Figure 4 provides the mean rating scores using five most cited novelty specific descriptors, for the five most novel car taillights indicated by the users. It can be interpreted that Nissan Leaf taillight is 41% more “attractive” than Chevrolet Beat taillight, 26% more “sporty” than Hyundai Elite i20 taillight, 25% more “modern” than Volkswagen Tiguan taillight and 32% more “futuristic” than the Hyundai Elite i20 taillight. Also, Renault Lodgy taillight is 24% more “trendy” than Nissan leaf taillight. It is evident that Nissan Leaf taillight is the most novel design as four out of the five novelty descriptors have scored highest for this design. Hyundai Elite i20 taillight has been found to be the least novel among the top five most novel car tail lights. When discussing the rating scores in each of the top five novelty descriptors, it was found that in the case of descriptor “attractive”, Nissan Leaf car taillight scored the highest and Chevrolet Beat taillight the lowest. In the case of descriptor “sporty”, Nissan Leaf car taillight scored the highest and Hyundai Elite i20 taillight scored the lowest. In the case of descriptor “modern”, Nissan Leaf car taillight was found to be the most modern and Volkswagen Tiguan taillight was the least modern. For the descriptor “trendy” Renault Lodgy car taillights was rated as the most trendy and Nissan Leaf car taillight was rated least trendy. For the descriptor “futuristic”, Nissan Leaf car taillight was rated as the most futuristic and Hyundai Elite i20 taillight was the least futuristic.

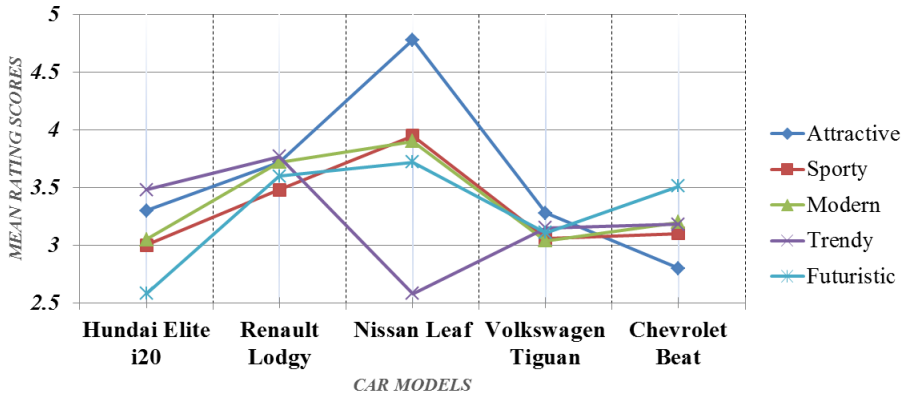

Fig. 4: The average ratings of most novel taillight designs using novelty descriptors

3.2 Relationships among the car tail lights and typicality descriptors

Figure 5 provides the mean rating scores using five most cited typicality specific descriptors, for the five most typical car taillights indicated by the users. It can be interpreted that Mahindra Verito taillight is 35% more "boring" than Nissan Micra taillight. Mahindra Verito taillight is 23% more "ordinary" than Chevrolet SRV taillight. Nissan Micra taillights is 21% more "compact" than Chevrolet SRV tail light. Maruti Suzuki Eco taillight is 22% more "imitative" than Chevrolet SRV tail light. Mahindra Bolero taillight is 34% more "common" than Nissan Micra tail light. It was found that Mahindra Verito taillight is the most typical design out of the five designs. When discussing the rating scores in each of the top five typicality descriptors, it was found that in the case of descriptor "boring", Mahindra Verito taillight was rated as most boring and Chevrolet SRV taillight, the least boring. In case of the descriptor "ordinary", Mahindra Verito taillight was rated as the most ordinary and Chevrolet SRV taillight was the least ordinary. For the descriptor "compact", Nissan Micra car taillight was rated the most compact and Chevrolet SRV tail lights was rated the least compact. For the descriptor "imitative", Mahindra Bolero car taillight was rated as the most imitative and Chevrolet SRV car taillight, the least imitative. In the case of descriptor "common", Mahindra Bolero car taillight was rated as the most common and Chevrolet SRV taillight was rated the least common.

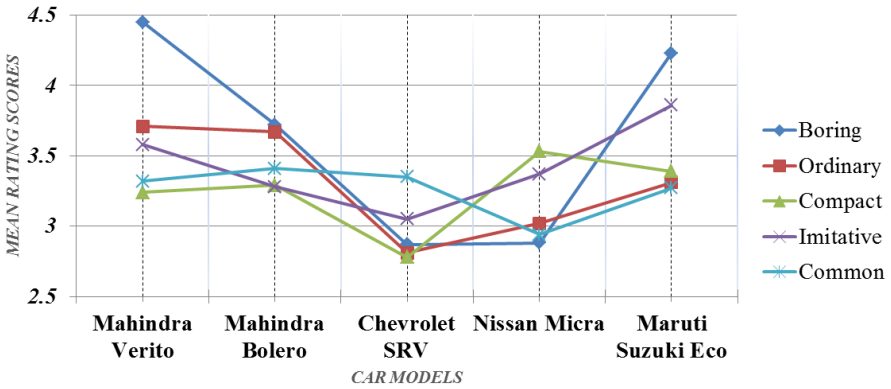

Fig. 5: The average ratings of most typical taillight designs using typicality descriptors

4. Discussion and conclusions

4.1 Discussion

Based on the results summarised in Figures 4 and 5 some interpretations can be made about the decisions made the users. Nissan Leaf tail light was rated more "attractive" possibly because it has a unique design in the form of horizontal V-shape which is not available in any other car taillight's design. This design can be claimed to be "sporty" as compared to others because of the abundance of sharp edges in its design, and probably also because it occupies lesser space. This taillight shows a lot of variation in terms of shape and curvatures as compared to the other existing taillights which perhaps makes it is appear "modern" and "futuristic". Hyundai Elite i20 taillights are possibly one of the most easily visible designs due to the popularity of the model, and it being in the market for a long period of time. Probably, that is why these taillights have been rated as the least novel design among the five most novel designs. As Hyundai Elite i20 has been found to be least novel, it possibly could be considered as a relatively typical design among the most novel designs.

Mahindra Verito and Mahindra Bolero models have been in the market for a long period of time and it may be possible that many have become too familiar with this design, which contributes to make it the most typical among all 100 designs. Based on the user preferences data from Figure 5, it could be seen that the average ratings of these designs across the different descriptors of typicality are similar. Chevrolet SRV taillight seems to occupy much space, appears attractive, and seems to have distinct appearance and a kind of royal essence which makes it relatively uncommon, or the least typical when compared to the other taillights. As Chevrolet SRV taillight has been found to be least typical, it can be considered as a relatively novel design among the most typical designs.

4.2 Conclusions

Based on the results it can be concluded that taillights which have more sharp edges, and with unique shapes have been rated as more novel, such as in the case of Nissan Leaf taillights. Taillights having more concave and convex shapes have been rated as less novel, just like most of the other taillights among the top five most novel designs. The tail lights which have traditional shape, like a variant of a square or a rectangle are likely to be seen as more typical, just like the case with Mahindra Verito. Taillights having different colour contrasts and contrasting shapes within a typical design, could be perceived lesser typical, just like the case with Chevrolet SRV taillight. It was also observed that if a design is perceived as strongly novel, it is less likely to be considered be strongly typical, and vice-versa.

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