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Prediction of future car forms based on historical trends[☆]



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KEYWORDS

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Summary Cars are one of the most important products that affects our daily life. Manufacturers of cars are inclined to know factors that affect the sales of cars and how to influence them. Car is a very competitive product whose technology is already matured. Thus, purchase decisions of a car depend on factors such as, aesthetics, ergonomics, features available and price. Exterior form and colour of a car are the most important factors that influence likeness of the car. We did a case study on car aesthetics (form, colour, shape, and user focus) with more than 500 car advertisements over the past 70 years, appearing in various car magazines. Results show that form of cars has changed from sharp to smooth over the years, and white colour cars are becoming more popular. Additionally, car size is becoming smaller and increasingly focused towards family. Thus, manufacturers are recommended to develop compact, efficient and hybrid cars.

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Introduction

Car is a product that influences our daily life. Now we are in the era where gentle lifestyle and aesthetics are important. People are more inclined towards new looks of a product and want products matching to their lifestyles. Now-a-days, people are aware that most available midrange priced cars have similar efficient engines, delivers similar mileage and often have comparable features as the technology of a car

is already in its matured stage. Thus, the major differentiating factor that affects the sales of a car is its aesthetics. Form and colour of a car are the most important factors that influence the aesthetics or likeness of the car in the mind of its potential users.

The car form has evolved over time replicating the culture and car designers have been acclimating the semantic frame for cars ever since they attached the first engine to a horseless carriage (Jaafarnia and Bass, 2011b). However, the form and features of designed products noted throughout the literature normally reveal that products designed by designers are affected by their own likeness (Blijlevens et al., 2009) and preferences, especially of the form. To eliminate biasness, often customer surveys are used to determine the most likable form, colour and other aesthetic

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Table 1 Categorization of advertisements.

S. No.	Years	Adv./year	Total adv.	S. No.	Years	Adv./year	Total adv.
1	2011–15	20	100	8	1976–80	5	25
2	2006–10	10	50	9	1971–75	5	25
3	2001–05	8	40	10	1966–70	5	25
4	1996–00	8	40	11	1961–65	5	25
5	1991–95	8	40	12	1956–60	5	25
6	1986–90	8	40	13	1951–55	5	25
7	1981–85	5	25	14	1946–50	5	25

requirements of a new car, since designers have always been in search for the best form and suitable colour of a car that would be liked by many potential buyers.

Capturing consumer expectation for next-generation product design is important. For instance, a methodology was developed by Tucker et al. (2011) can capture consumer’s preference over time and allows designers to make required modifications to the product to make it suitable for the next generation. Tucker et al.’s framework captures customer liking trends generated from publically available product review data, and designers can control the product feature according to consumer preferences as it changes according to season or lifestyle trends. Jaafarnia and Bass (2011a) expressed that each of the five senses that human have are used not only to receive information, but also contains unique values that consumers perceive while looking at a product and thus, understanding of each of the sense functions helps designers to create more satisfying products for the consumers.

Aim and methodology

Our aim is to predict future car form based on the historical trend data available in the form of car advertisement. To achieve this aim, we followed the methodology as described below.

We used Google’s image search site to search for car advertisements with a year as a search function, which provided search results for car advertisements that appeared in various car magazines, and car design sites. We have gone through these sites individually and confirmed the year of appearance of these advertisements.

Next, we have collected, categorized, and analyzed 510 car advertisements over the last 70 years, imparting more importance to the recent years. We took the car images in the sequence as they appeared in the Google search and fulfilled the required number of advertisements considered for each specific period considered. The data sets are available online (Kumar and Sarkar, 2015). Table 1, shows the categorized and number of car designs that we considered.

Next, we used ‘trend analysis’ to quantify and explain changes to a system over a period of time (Chandler and Scott, 2011). Additionally, we try to find various relationships to predict the requirements of future car forms and colours that would be liked by most users.

Next, we created a spreadsheet and for each car, we noted the followings (i) form: sharp and smooth; (ii) colour: white, red, black, others; (iii) shape: large, medium and

short; (iv) user focus: family and individual. Additionally, we also noted the year range in which the car advertisement has appeared. The decisions on sharp/smoothness of the form and colour are based upon visual inspection. The shape considerations are based on length of a car, such as short, medium and large. User focus was considered based on seating capacity, number of doors, other features of car and text on the advertisement. Next, we calculate the percentage of all these above features and did ‘trend analysis’ using Microsoft Excel.

Results and discussion

The result from spreadsheet analysis containing car colour, form, shape and user focus is described here. Analysis shows that total percentage appearance of smooth form (51.6%) of a car is more compared to sharp form (48.4%), and this number is increasing. For instance, in 1940, there were more number of car with sharp form; however, in 1960, production of a car with smooth form increased and since then, it is increasing, as shown in Fig. 1, possible because manufacturing processes has advanced and allows creation of smoothly formed cars. We envisage that, based upon the trend as shown in Fig. 1, manufacturing of cars with smooth form would increase in the future, in comparison to cars with sharp form.

Next, we find that in vintage era (1940–1960), red colour was the most likable colour as it has appeared most often in the car advertisement as compared to write, black, blue or

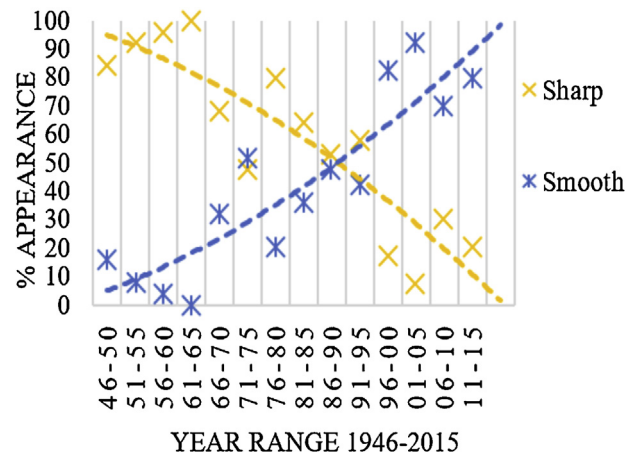


Figure 1 Historical trend of form of a car.

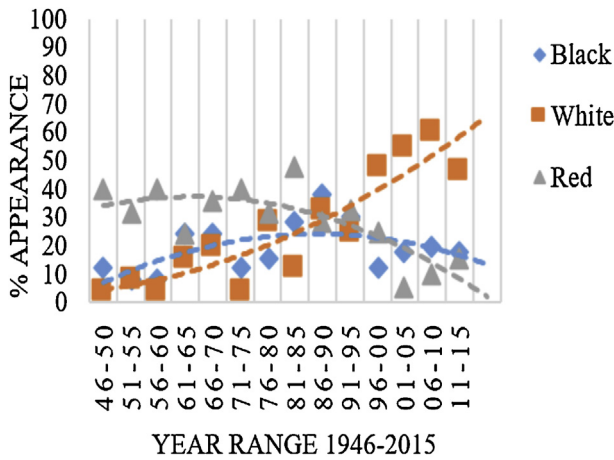


Figure 2 Historical trend of colour of a car.

other. However, we also find that in the modern era white colour (32.2%) cars appeared more often, and people started liking white colour to red (25.3%) or black (19.6) as shown in Fig. 2.

Next, we analyzed the trend of shape of cars and user focus. We found that in vintage era car shape was large and user focus was towards individual. Later, manufacturers started to develop cars focusing on the family needs and thus, the percentage of family-focused cars have increased since 1980s. In the modern era, individual focused cars have decreased drastically, indicating that designers should now focus more on providing features that address the needs of a family. Additionally, we found that, the total percentage of family (60.6%) focused car appearance is more as compared individual focused (39.4%) as shown in Fig. 3.

Interestingly, we also found that the number of medium shape car (65.9%) has increased and then slowly decreasing since 1990s and number of large cars have reduced till 1990s and then they are slowly increasing as shown in Fig. 4. However, the focus of these cars has changed. During the past, both large and medium-size cars are advertised as cars for individual usage, however, recently medium-size cars have been focused towards individual and small family needs, and large-size cars are designed as per the requirements of a large family or a group. Production of the small size cars

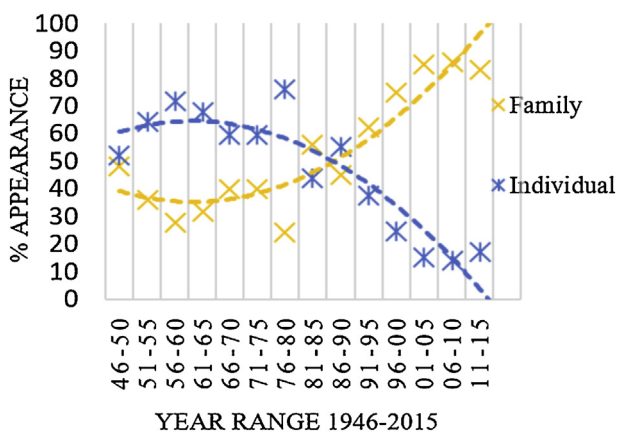


Figure 3 Historical trend of user focus.

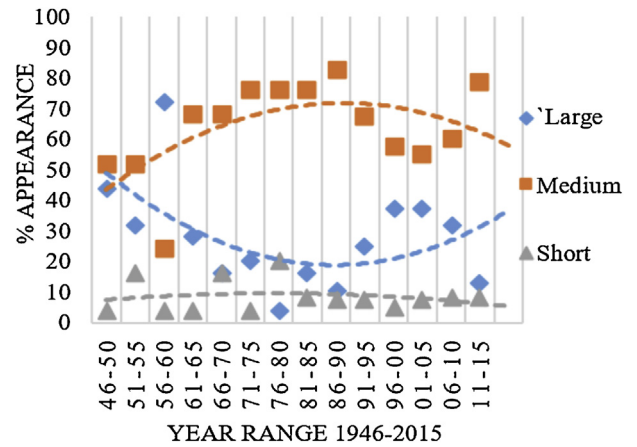


Figure 4 Historical trend of shape of a car.

seems to have been constant over time. We believe that during 1980s was the era when people have been started thinking towards sustainability, and since then, manufacturers produced more medium and family-focused cars. Since, the size of the family is decreasing and governments are predominately putting a lot of empathises on reduction of emissions, we believe that the production of medium and small size cars would increase, and production of large-size cars would remain constant.

Conclusion

Our aim was to find the future trend of car aesthetics based on the historical trends of car aesthetics. In this work, we took 510 car advertisements over the past 70 years and assessed these for their form, colour, shape, and user focus. From trend analysis, we predict that future car will be more compact in shape that is, either they would be short or medium sized, and focused more towards a family needs. The cars would be with smooth form and preferably painted with white or any light colour. Future research could be carried out to understand why people prefer a certain colour or shape.

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