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AN EXAMINATION OF CONSUMERS’ NEEDS FOR
CUSTOMIZING CARS’ FACES

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Abstract

Recent studies on product design have proposed that consumers most prefer cars with headlights that resemble slanted eyes and a front grille that looks like an upturned mouth. However, these studies have three problems: (1) they only considered 2 (slanted and arched eyes) × 2 (upturned and downturned mouths) designs, (2) they only considered two dimensions of product images (aggressiveness vs. friendliness), and (3) they neglected heterogeneity in preferences for product designs/images. Thus, we expanded these studies by considering 4 (slanted, arched, squared, and round eyes) × 3 (upturned, downturned, and horizontal mouths) designs and four dimensions of images (vitality, warmth, intelligence, and uniqueness) as well as congruities between product image and actual/ideal self-image. We contribute to the research field of product design by indicating how firms can fit their anthropomorphized products to their customers and differentiate them from competitors.

Keywords: product design, anthropomorphism, brand personality, congruity between product image and self-concept.

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Introduction

In recent years, technological advancements have largely been taken for granted by consumers (Rubera 2015) and, thus, it is getting more difficult for firms to attract consumers’ attention through technological innovation alone. Given this backgrounds, product design is increasingly being recognized as an important source of competitive advantage by many firms (Noble and Kumar 2010).

“Anthropomorphism” is one recent research topic regarding product design. Anthropomorphism refers to seeing human features in non-human objects (e.g., Guthrie 1993). Automobiles are a good example. People interpret headlights as human eyes and the front grille as a human mouth. It has been proposed that anthropomorphism can enable firms to convey brand personality to consumers intentionally (Landwehr, McGill, and Herrmann 2011).

However, automobile manufacturers have not provided their customers with the chance to change the cars’ faces in their customization system. It is possible for customers to choose the ‘best’ car among various choices with different colors, engines, seats, and wheels; it is not possible to choose favored headlights and front grilles to “build your own car”. In this regard, previous research on anthropomorphism of products has suggested that cars with a particular face—slanted (aggressive) eyes and an upturned (friendly) mouth—are most preferred by consumers (cf. Landwehr, et al. 2011).

Is it really true? Is it necessary for automobile manufacturers to develop a customization system that enables customers to order their cars’ faces? In this study, we attempted to develop a consumer evaluation model of anthropomorphized products to address these questions.

Literature Review

Anthropomorphism and Consumer Preferences

Human brains have the ability to infer much information, such as age, gender, attitudes, and personality traits, by seeing others’ faces (cf. Wills and Todorov 2006) and they also have a tendency to see faces in everything, even in clouds, stones, and

cars (cf. Guthrie 1993). The tendency to attribute human characteristics to non-human objects is called anthropomorphism (Guthrie 1993).

The impacts of anthropomorphism on consumer preferences have been investigated, largely using the front of a car as an example. However, there are conflicting studies. Aggarwal and McGill (2007) found that consumers preferred cars with a “smiling” grille (*i.e.*, “friendly” expressions in the front of the car). On the other hand, Windhager, Slice, Schaefer, Oberzaucher, Thorstensen, and Grammer (2008) found that consumers preferred cars with slanted headlights (*i.e.*, “aggressive” expressions in the front of a car).

To integrate these seemingly conflicting findings, Landwehr, et al. (2011) used the pleasure-arousal theory of emotions (Russell 1980, 1989). According to the theory, emotional experience is adequately described by two bipolar and orthogonal dimensions, pleasure-displeasure and arousal-sleep, and the levels of these two dimensions determine a person’s responses. Thus, Reisenzein, (1994) suggested that an affective response of liking is maximized when pleasure meets arousal. Based on this suggestion, Landwehr, et al. (2011) claimed that consumers prefer cars with “slanted” headlights and an “upturned” grille. This is because perceived “aggressiveness” from the slanted headlights triggers arousal whereas perceived “friendliness” from an upturned grille triggers pleasure. As a result of their experiment, the hypothesis was supported.

Landwehr, et al. (2011) succeeded in integrating two conflicting ideas. However, their study has three problems. *First*, they considered and compared four kinds of car fronts, with a 2 (arched and slanted headlights) × 2 (upturned and downturned grilles) design. However, some automobiles in the real world may not fall into any of their four faces. *Second*, they assumed only two personality traits, friendliness and

aggressiveness, which are perceived from the front of a car through anthropomorphism. However, some automobiles in the real world may have other kinds of car personality. *Third*, and most importantly, they neglected heterogeneity in consumer preferences of anthropomorphized products. While they suggested that a car with slanted headlights and an upturned grille is most preferred by consumers, some consumers in actual may prefer cars with other faces.

Assuming heterogeneity in consumer preferences of automobiles, the question remains as to why consumers choose different car faces. This question has not been answered by previous studies on product anthropomorphism.

Brand Personality

Brand personality is another concept related to product anthropomorphism, although previous studies on product anthropomorphism have not focused on it. Brand personality is defined as “the set of human characteristics associated with a brand” (Aaker 1997, pp. 347*n.*) and regarded as an important aspect of the brand image because it serves as a mechanism upon which managers can differentiate their products and services from competitors.

According to Aaker (1997), brand personality traits are mainly perceived in five distinct dimensions; sincerity, excitement, competence, sophistication, and ruggedness. To identify these dimensions, Aaker identified 309 candidate traits from psychology and marketing, and then asked respondents how descriptive each of the traits was, in general, to reduce the number of personality traits to 114 traits. Then, an exploratory factor analysis was conducted with a data set of consumer evaluations of 37 well-known brands for the 114 personality traits.

Congruity between Self Concept and Product Image

Self-concept is another idea that focuses on the heterogeneity of consumer preferences. A well-accepted definition of the self-concept is “the totality of the individual’s thoughts and feelings having reference to himself as an object” (Rosenberg 1979, p.9). Grubb and Grathwohl (1967) claimed that a consumer wants to behave in ways that protect and enhance his/her self-concept and, thus, chooses products or brands that could symbolize that self-concept. Based on this notion, it has been claimed that congruity between self-concept and product image/brand personality would affect the consumer’s preference for the product (cf. Sirgy 1982, 1985; Aaker 1999).

The self-concept can take two forms: the “actual self-image” and the “ideal self-image” (Sirgy 1985). The former is based on the individual’s realistic perception of himself/herself now, whereas the latter is related to how the individual would like to see himself/herself or how he/she would like to be seen. Sirgy (1985) indicated that both self-congruity (congruity between the actual self-image and the product image) and ideal congruity (congruity between the ideal self-image and the product image) affect the consumer’s preference for a product. The relationship between self-congruity and consumer preferences is derived from one’s need for self-consistency, whereas the relationship between ideal congruity and consumer preferences builds on the need for self-esteem.

Study 1: Identification of Personality Dimensions Perceived from the Front of a Car

As noted earlier, previous studies of product anthropomorphism have used a 2 (arched and slanted headlights) × 2 (upturned and downturned grilles) factorial design when they focused on the front or “face” of a car. Also, they have used only two

personality traits (friendliness and aggressiveness) based on the pleasure-arousal theory of emotions. Is this sufficient? The answer may be no. Thus, in Study 1, we investigated twelve (4×3) patterns of car faces with 114 personality traits based on Aaker’s brand personality (1997).

Methods

Landwehr, et al. (2011) investigated four (2×2) patterns of car faces with two personality traits. To expand their research, we prepare twelve (4×3) patterns of car faces and 114 personality traits.

First, four participants were asked to view pictures of all vehicles sold in Tokyo in the fall of 2014 and to judge the shapes of headlights and the front grilles. As a result, not only the previous two (arched and slanted) headlights, but also another two (rounded and squared) headlights were also identified. Additionally, not only the previous (upturned and downturned) grille shapes, but also an additional one (horizontal) was identified. Whereas the previous four (2×2) patterns of car faces covered only 42 of 232 Japanese vehicles (18.1%), our twelve (4×3) patterns of cars faces covered 205 Japanese vehicles (88.4%). Like Landwehr, et al. (2011), we prepared simple line-drawing illustrations of the twelve patterns of the car faces instead of pictures of real vehicles. By doing so, we controlled any possible effects of brands and colors of the vehicles.

Personality traits were from Aaker (1997). Respondents were asked to rate the extent to which the 114 personality traits described specific patterns of the car face. Each was asked to rate two of the 12 faces because it might be troublesome for respondents to rate all faces with 114 questions each.

Respondents were 227 university students in Tokyo; 216 (95.15%) responses were valid. Before answering the questionnaire, they were instructed to think of each car as if it was a person. This instruction was to make the level of respondents’ anthropomorphism equal. We used a five-point Likert scale (1 = not at all descriptive, 5 = extremely descriptive).

Results

To identify a set of personality dimensions perceived from car faces, we conducted an exploratory principal factor analysis with a promax rotation. A four-factor solution resulted on the basis of the following criteria: (1) eigenvalues (greater than one), (2) the shape of the scree plot, and (3) the amount level of variance explained by factors (73.59%). All traits had adequate loadings (>0.40) on one of the four factors, except seven traits (erotic, patriotic, predictable, romantic, small town, sophisticated, and with it). We conducted the factor analysis again without these seven traits with lower loadings (cf. Nunnally 1978). As a result, we found a readily interpretable four-factor solution (Table 1) in which the eigenvalues of Factor 1 to 4, were 25.211 (34.62%), 15.781 (21.67%), 9.129 (12.54%), and 3.463 (4.76%), respectively. All Cronbach’s α values were above 0.70 (ranging 0.80 to 0.96), indicating that the four factors had high reliability (cf. Nunnally 1978).

Factor 1 was defined mainly by “active”, “confident”, “aggressive”, and “athletic”, which are associated with energy and strength of mind and body. Thus, we named this factor “vitality”. Factor 2 was defined mainly by “friendly”, “smooth”, “corporate”, and “happy”, which are associated with amiability and affability. Thus, we named this factor “warmth”. Factor 3 was defined mainly by “intelligent”, “technical”, “mature”, and “responsible”, which are associated with intelligence and thoughtfulness. Thus,

we named this factor “intelligence”. Finally, factor 4 was defined mainly by “surprising”, “unique”, “special”, and “tasteful”, which are associated with uniqueness and originality. Thus, we named the factor “uniqueness”.

Table 1. Factor loadings of each personality traits

Personality	Vi	Wa	In	Un	Personality	Vi	Wa	In	Un
Active	0.80	-0.01	-0.16	-0.17	Helpful	0.07	0.69	0.23	0.07
Confident	0.80	-0.09	0.00	-0.13	Healthy	0.32	0.67	0.11	-0.05
Aggressive	0.77	-0.08	-0.17	-0.12	Real	0.03	0.65	0.22	0.03
Athletic	0.75	-0.23	0.08	-0.16	Wholesome	0.13	0.63	0.24	-0.07
Leader	0.74	-0.07	0.34	0.01	Feminine	-0.05	0.62	-0.16	0.10
Cool	0.72	-0.15	0.34	0.01	Sentimental	0.02	0.59	0.22	0.13
Adventurous	0.72	-0.05	-0.18	-0.05	Outgoing	0.46	0.59	-0.16	0.03
Outdoorsy	0.71	0.00	-0.15	-0.08	Carefree	0.15	0.56	-0.47	0.04
Daring	0.70	-0.19	-0.07	0.07	Dependable	0.21	0.56	0.39	-0.11
Lively	0.70	0.23	-0.13	0.02	Fun	0.54	0.56	-0.23	0.11
Motivated	0.70	0.14	0.16	-0.09	Basic	-0.07	0.55	0.20	-0.25
Young	0.70	0.16	-0.28	-0.06	Average	-0.08	0.55	0.15	-0.23
Spirited	0.69	0.34	-0.27	-0.06	Ethical	-0.17	0.53	0.37	0.07
Strong	0.65	-0.28	0.27	0.06	Secure	-0.03	0.52	0.41	-0.07
Influential	0.65	-0.15	0.05	0.14	Trustworthy	0.21	0.52	0.48	-0.01
Flashy	0.65	-0.25	-0.17	0.14	Caring	-0.17	0.51	0.22	0.14
Masculine	0.63	-0.45	0.36	-0.15	Conventional	-0.21	0.50	0.23	-0.20
Up to date	0.62	0.03	-0.20	0.14	Imaginative	0.23	0.50	-0.17	0.36
Good looking	0.62	0.33	0.24	0.05	Sincere	-0.03	0.50	0.46	-0.10
Fashionable	0.61	0.09	0.01	0.24	Honest	-0.04	0.49	0.33	-0.13
Exciting	0.61	-0.32	-0.01	0.15	Simple	0.24	0.45	-0.09	-0.27
Innovative	0.60	-0.31	0.04	0.19	Provocative	0.48	-0.50	-0.01	0.13
Urban	0.60	0.03	0.01	0.15	Nonconforming	0.16	-0.63	-0.03	0.11
Successful	0.58	0.20	0.28	0.17	Intelligent	0.02	-0.05	0.71	0.20
Cheerful	0.56	0.51	-0.35	-0.06	Technical	0.15	-0.07	0.66	0.33
Trendy	0.55	0.00	-0.15	0.23	Mature	0.27	-0.30	0.66	0.11
Charming	0.54	0.26	-0.02	0.09	Responsible	0.22	0.15	0.62	-0.09
Blue collar	0.53	-0.30	0.16	-0.15	Hard working	-0.22	0.27	0.60	0.08
Contemporary	0.53	0.09	-0.02	-0.03	No nonsense	-0.16	0.23	0.59	-0.03
Clean cut	0.52	0.27	0.18	-0.07	Sensible	-0.18	0.38	0.59	0.07
Western	0.49	-0.12	0.13	0.29	Down to earth	-0.25	0.33	0.58	0.00
Reliable	0.48	0.26	0.45	-0.06	Efficient	0.47	0.07	0.57	0.13
Proud	0.48	-0.36	0.35	0.06	Consistence	0.29	0.03	0.56	-0.16
All-American	0.48	-0.22	0.08	0.06	Old-fashioned	-0.36	0.01	0.56	0.09
Interesting	0.47	0.29	-0.25	0.23	Serious	0.18	0.15	0.55	-0.07
Glamorous	0.47	0.24	0.21	0.33	Traditional	-0.14	0.21	0.55	0.00
Tough	0.46	-0.07	0.35	-0.08	Independent	0.41	-0.05	0.53	0.08
Preentious	0.45	-0.25	-0.14	0.11	Practical	-0.21	0.05	0.53	0.00
Sexy	0.43	-0.04	0.16	0.29	Careful	-0.37	-0.14	0.52	0.18
Loud	0.42	-0.32	-0.13	0.16	Loyal	-0.11	0.45	0.50	0.00
Humorous	0.42	0.37	-0.29	0.32	Thoughtful	-0.26	0.21	0.49	0.37
Ageless	0.41	0.25	0.04	-0.27	Rugged	0.14	-0.29	0.48	-0.08
Friendly	0.03	0.80	-0.17	0.03	Conservative	-0.38	0.25	0.43	0.08
Smooth	-0.01	0.79	-0.18	0.00	Classic	-0.24	0.12	0.42	0.08
Corporate	0.01	0.77	0.13	0.05	Upper class	0.31	-0.01	0.41	0.33
Happy	0.30	0.77	-0.18	0.10	Surprising	0.14	-0.09	-0.09	0.62
Warm	-0.01	0.77	0.01	0.05	Unique	0.25	-0.14	-0.14	0.57
Domestic	0.01	0.77	0.04	0.02	Special	0.29	-0.09	0.14	0.55
Gentle	-0.24	0.76	0.03	0.06	Tasteful	-0.01	0.17	0.26	0.54
Family-oriented	-0.12	0.75	0.05	-0.03	Original	0.18	-0.24	0.01	0.50
Nurturing	-0.02	0.73	0.15	-0.04	Off beat	-0.01	-0.35	-0.07	0.49
Genuine	-0.16	0.72	0.04	-0.05	Versatile	0.39	0.08	0.10	0.42
Big	-0.03	0.70	-0.05	-0.03	Artistic	-0.06	0.12	0.23	0.41
Flexible	0.04	0.69	-0.23	0.14					

Note: Vi=vitality, Wa=warmth, In=intelligence, and Un=uniqueness.

In short, we identified four personality dimensions—vitality, warmth, intelligence, and uniqueness—whereas previous studies have used only two, aggressiveness and friendliness. It can be said that vitality and warmth correspond to aggressiveness and friendliness, respectively. However, intelligence and uniqueness are two dimensions that have not been considered in previous research.

Table 2. Averaged factor scores (and standard deviations)

Headlights	Grille	Vitality	Warmth	Intelligence	Uniqueness
Arched	Upturned	0.25 (0.93)	-0.04 (0.98)	-1.29 (1.06)	0.72 (0.78)
	Downturned	-0.96 (0.75)	0.16 (0.55)	-0.04 (0.61)	0.54 (0.86)
	Horizontal	0.29 (0.76)	-0.19 (0.74)	-0.60 (0.64)	0.66 (1.00)
Slanted	Upturned	1.07 (0.75)	-0.46 (0.57)	-0.31 (0.48)	0.07 (0.67)
	Downturned	0.85 (0.73)	-1.05 (0.53)	-0.06 (0.63)	0.23 (0.72)
	Horizontal	0.98 (0.56)	-1.15 (0.73)	-0.15 (0.64)	0.04 (1.01)
Round	Upturned	0.49 (0.60)	1.01 (0.72)	-0.48 (0.69)	-0.31 (0.82)
	Downturned	-0.89 (0.79)	0.64 (0.70)	0.30 (0.65)	-0.51 (0.92)
	Horizontal	-0.45 (0.40)	1.02 (0.66)	0.35 (0.64)	-0.24 (0.81)
Squared	Upturned	-0.05 (0.57)	0.48 (0.65)	0.23 (0.87)	-0.39 (0.74)
	Downturned	-0.80 (0.94)	-0.86 (0.62)	0.74 (0.90)	0.09 (0.85)
	Horizontal	-0.74 (0.49)	-0.03 (0.62)	1.41 (0.90)	-0.83 (0.70)

Factor loadings are summarized in Table 2. As shown in the table, the car front with slanted headlights and an upturned grille was high in “vitality”. The car front with the rounded headlights and a horizontal grille was high in “warmth”. The car front with the squared headlights and a horizontal grille was high in “intelligence”. Finally, the car front with arched headlights and an upturned grille was high in “uniqueness”.

Generally, these results indicated that the shape of the headlights strongly affected the levels of the four personality dimensions: arched headlights caused a higher level of “uniqueness”, slanted headlights caused a higher level of “vitality”, rounded headlights caused a higher level of “warmth”, and squared headlights caused a higher level of “intelligence”. Regarding the shape of the front grille, while an upturned

grille increased “vitality” and “warmth” as suggested by previous studies, downturned and horizontal grilles did not appear to have great impacts on the levels of personality dimensions.

Study 2: Relationship between Congruity and Preference

As noted earlier, previous research on product anthropomorphism has neglected heterogeneity in consumer preferences of anthropomorphized products. Those studies suggested cars with slanted headlights and an upturned grille were most preferred. However, in the real world, some consumers prefer cars with such “faces” while others prefer cars with other “faces”. Thus, in Study 2, we assumed heterogeneity in consumer preferences and investigated whether congruity between self-concept and product image affected preferences for the product.

Methods

The questionnaire was designed to measure (1) actual/ideal personalities of the respondent, (2) personality dimensions of each of the twelve (4×3) patterns of car faces, and (3) preferences among those faces.

In the first section of the questionnaire, we asked respondents to rate actual personality with the following item: “Each of the following personality dimensions (vitality, warmth, intelligence, and uniqueness) properly describes your personality.” Similarly, we asked respondents to rate their ideal personality as follows: “Each of the following personality dimensions properly describes your ideal personality.”

In the second section of the questionnaire, we asked respondents to evaluate the twelve (4×3) patterns of the car faces with the four personality dimensions (vitality, warmth, intelligence, and uniqueness). The following item was used: “Each of the

following personality dimensions (vitality, warmth, intelligence, and uniqueness) properly describes the car face.”

The last section of the questionnaire was designed to measure preferences among the twelve (4 × 3) patterns of car fronts. We used the following item: “To what extent do you like each of the twelve car faces?”

Respondents were 59 university students in Tokyo; 58 (98.31%) responses were valid. They were asked to answer the questions in the first two sections by using a seven-point Likert scale with 1 = strongly disagree and 7 = strongly agree. They were asked to answer the questions in the last section using a semantic scale with 1 = dislike and 7 = like. Unlike Study 1, we asked each respondent to evaluate all of the twelve car faces because the total number of question items had been decreased through the factor analysis conducted in Study 1. The sample size was, therefore, 696.

After we collected the data set, self-congruity and ideal congruity were calculated with the following formulae, based on Sirgy (1985):

$$SC = -(\sum_{i=1}^n | PP_i - AP_i |) / n$$

$$IC = -(\sum_{i=1}^n | PP_i - IP_i |) / n$$

where SC = self-congruity, IC = ideal congruity, i = each of personality dimensions, PP = product personality, AP = consumers’ actual personality, IP = consumers’ ideal personality, and n = the number of dimensions (4).

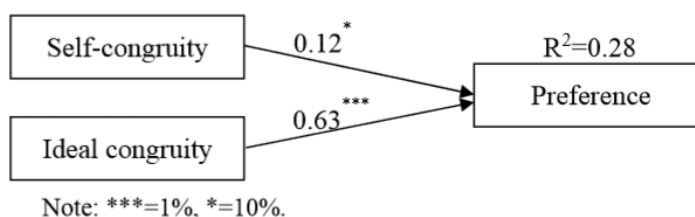
Results

To examine the relationship between congruity and preference, we conducted a multiple regression analysis. The results are summarized in Figure 1.

The coefficient of determination, R^2 , of the regression model and the adjusted R^2 were 0.284 and 0.282, respectively. Standardized coefficients were 0.122 ($t = 1.70$, $p < 0.10$) and 0.627 ($t = 12.12$, $p < 0.01$) for self-congruity and ideal congruity,

respectively. They indicated that consumer preferences for the car face are higher, if self-congruity and/or ideal congruity between self-concept and the product images are higher. They also indicated that ideal congruity has a stronger positive effect on consumer preference than self-congruity.

Figure 1. Estimation results of regression analysis



Discussion

The findings of Study 1 imply that a car with slanted eyes and an upturned mouth is most advantageous in relation to the trait of vitality. However, some other “faces” are advantageous in other personality dimensions. A car with round eyes and an upturned mouth is more advantageous in relation to warmth; a car with squared eyes and a horizontal mouth is more advantageous in relation to intelligence; and a car with arched eyes is advantageous in relation to uniqueness.

So, which is the most preferred face? As suggested by previous research, consumers may prefer cars with slanted eyes and an upturned mouth, if they are or want to be a vital or aggressive person. However, the findings of Study 2 indicate that consumers choose cars that have high congruity with their ideal or actual self-image. Thus, consumers who are or want to be a warm or friendly person prefer cars with round eyes and an upturned mouth; consumers who are or want to be an intelligent person prefer cars with squared eyes and a horizontal mouth; and consumers who are or want to be a unique person prefer cars with arched eyes.

Theoretical Implications

While previous research considered only four patterns of car faces and two kinds of car personality, we considered twelve patterns of car faces and four kinds of car personality. Also, while previous research assumed homogeneity in preference for the product design, we used the construct of congruity between product image and self-concept and assumed a relationship between congruity and preference. By doing so, we have contributed to developing the research field of product anthropomorphism.

Managerial Implications

Unlike previous research on product anthropomorphism, our study indicates that there is no single “face” that is preferred by all consumers. Instead, we suggest that firms should differentiate their anthropomorphized products from competitors and tailor the products to better match their customers’ needs.

In particular, automobile manufacturers should offer cars with a “face” that have high congruity with ideal or actual self-images. They should investigate which dimensions (vitality, warmth, intelligence, and uniqueness) are the most important ideal/actual self-images for their customers, and design their new cars with particular shapes of headlights and front grilles that represent the important dimensions of product personality. Because self-images are heterogeneous even among customers of a single brand, it might be a good idea for manufacturers to provide a customization system in which customers can choose the ‘best’ car among various choices with different shapes for headlights and front grilles and, therefore, different product image.

Limitations and Future Research

This study has some limitations. First, we considered only twelve patterns of “faces”. Although these twelve patterns cover 88.4 % of Japanese vehicles, some cars on the market in the world may not be included in any of these patterns. Therefore, it might be better to include other patterns of “eyes” (headlights) and “mouth” (front grille). Second, we limited the respondents to university students in Tokyo at a specific point in time. Consumers with different demographics, in different countries, and/or at different points in time may perceive different product images of a particular car face. Respondents should be widened in order to compare their perceived personality traits. Third and finally, while we suggested car manufacturers should provide their customers with cars with various faces and match product personality to their self-image, we did not discuss the possibility that providing various faces of cars results in brand delusion. Future research should investigate how manufactures can provide various faces of cars and, therefore, various product image and, at the same time, maintain a single brand image.

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