How Consumers Perceive Product Appearance: *The Identification of Three Product Appearance Attributes*

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The appearance attributes of designed products noted in the literature often reflect what designers themselves perceive in a product design. This present research, however, provides knowledge on how consumers perceive product appearance by identifying appearance attributes that consumers use to distinguish the appearances of durable products. Descriptions of appearance were generated by consumers in a free categorization task. The descriptions were classified as the attributes Modernity, Simplicity and Playfulness. These attributes were confirmed in a separate rating-task performed by a second group of consumers. The attributes proved stable across different groups of consumers indicating that they are universal. Additionally, the attributes were validated across different product categories and are thus generalizable and not product category specific. The appearance attributes identified in this research provide knowledge of what consumers see in durable product appearance. Knowledge of what appearance attributes are perceived by consumers in a product design can help a designer to communicate certain pre-specified meanings in a product.

Keywords **–** Product Design, Consumer Appearance Perception, Appearance Attributes.

Relevance to design practice – Designers face the difficulty of how to incorporate intended meanings in product designs. Identifying what product appearance attributes consumers perceive in product design provides designers with guidelines on how to communicate a pre-specified meaning in product design. The identified appearance attributes can be used during briefings or in product evaluation studies.

Citation: Blijlevens, J., Creusen, M. E. H., & Schoormans, J. P. L. (2009). How consumers perceive product appearance: The identification of three product appearance attributes. *International Journal of Design, 3*(3), 27-35.

Introduction

Companies that are able to communicate a certain meaning (e.g. prestige) through the appearance of a product design can create a competitive advantage in the market and increase the product's chance of success (Lewalski, 1988; Bloch, 1995; Hertenstein, Platt, & Veryzer, 2005; Yamamoto & Lambert, 1994; Chang & Wu, 2007). According to Krippendorf (1989), the products of design should be understandable or meaningful to someone. The meaning the appearance of a product communicates helps consumers to assess the product on functional, aesthetic, symbolic or ergonomic motives. These motives play a role in the overall product appraisal. For example, when a product looks modern, it has a positive effect on product appraisal when consumers are motivated to assess a product on its aesthetics (Creusen & Schoormans, 2005). In practice, designers often face the difficulty of how to incorporate an intended meaning in a product design. When the product meaning that is communicated is not clear to the consumer, he or she will have difficulty assessing the product and will appreciate the product less. Therefore, it is valuable to provide designers with guidelines that can be used during briefings at the beginning of the design process or in product evaluation studies at a later stage of this process.

The whole process in which a meaning is derived from a product appearance can be summarized in two steps (Figure 1). First, when consumers see a product appearance, consumers perceive certain physical properties that together make up the design of the product (e.g., color, shape, and texture). For example, refrigerators are rectangular and have a smooth, shiny white surface. Second, certain combinations of colors, materials and other physical aspects give a product a look that can be described by a certain appearance attribute (Brunswick, 1952). For example, a DVD-player that is angular, metallic-looking and is made of a smooth material is perceived as modern. Attributes are considered to be more abstract than separate physical aspects (Kaul & Rao, 1994; Snelders, 1995; Veryzer, 1999; Geistfeld, Sproles, & Badenhop, 1977). The appearance attributes together provide the consumer with an overall impression of the product. Further, they are more actionable and informative than physical properties for designers to use in briefings or product evaluation studies. In briefings, these attributes can be a way of making clear to designers what is expected from them. In product evaluation studies, it can be assessed whether consumers do actually perceive the meanings that the designer intended to design in the product using appearance attributes.

Received December 12, 2009; **Accepted** August 08, 2009; **Published** December 28, 2009.

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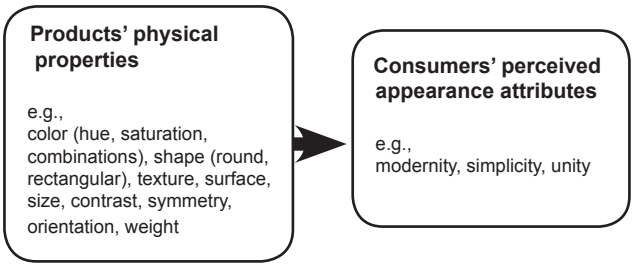

Figure 1. A two-step model of product appearance perception.

Appearance Perception by Consumers

A great deal of research has identified product appearance attributes that can be derived from product appearance, as well as from packaging, typefaces or logos (Ellis, 1993; Orth & Malkewitz, 2008, Henderson, Giese, & Cote, 2004). Appearance attributes that are mentioned in the literature include harmony, unity, symmetry (Ellis, 1993); proportion, typicality (Veryzer & Hutchinson, 1998); massiveness, naturalness and delicateness (Orth & Malkewitz, 2008). Tools have even been developed to guide designers in objectifying attributes in their product appearances (Hsiao & Wang, 1998). The attributes described in the literature provide knowledge on what attributes are derived from product appearance. However, a major issue is not covered. Namely, the attributes reflect how designers perceive product appearance and not how the consumer perceives it, since the attributes mentioned in the literature are mainly drawn from the aesthetic and industrial design literature. For example, Ellis's (1993) initial attribute set consisted of attributes derived from design literature. Also, Orth and Malkewitz (2008) initially gathered appearance meanings form literature, and then expanded that list with product specific meanings from trade and academic journals and experts. Krippendorf (1989) argues that we cannot just presume that the way a designer objectifies a certain meaning in the product appearance is the same as the meaning that consumers derive. This often forces companies to communicate the meaning of the product in high-cost marketing campaigns because consumers do not automatically derive the intended meanings from the product appearance (Krippendorf, 1989). In the same fashion, it can be questioned whether consumers will derive the same product attributes from product appearance as designers (Hsu, Chuang, & Chang, 2000). Indeed a possible difference between designers and consumers can be assumed given the extended literature on differences between non-professionals and experts in the perception and evaluation of a wide range of stimuli (e.g., Chi, Feltovich, & Glaser, 1981; Tanaka & Taylor, 1991).

Non-professionals are known to have a more shallow knowledge and see less communalities and differences between objects of interest than experts. Experts, therefore, can mention more abstract attributes of objects (Chi et al., 1981). Additionally, non-professionals distinguish fewer attributes than experts, which indicates further that consumers have less knowledge (Tanaka & Taylor, 1991). When one considers consumers to be the non-professionals in design, and the designers to be the experts, then one can conclude that consumers have less or qualitatively different knowledge of design than designers. There is at least one study in the design literature showing that these differences do exist between consumers and designers. Hsu et al. (2000) found that when scoring a number of products on attributes like mature, emotional and soft, consumers rate them differently than designers and are less able to differentiate between different appearances.

In light of the above, it may be expected that not all of the appearance attributes that consumers use correspond to the more esoteric ones mentioned in the literature (such as unified, balanced, up-to-date, dignified, conservative and powerful; Ellis, 1993; Orth & Malkewitz, 2008; Henderson et al., 2004). Out of the many appearance attributes described in the literature, most likely only a number are also perceived and used by consumers in the evaluation of product design. Therefore, some of the attributes found in this research that are used by consumers may overlap those used by designers. However, empirically based consumer appearance attributes are not found in the design literature. Furthermore, as consumers are less knowledgeable about design language, these terms may have no clear meaning for them. Consumers may find other attributes more descriptive of the appearance than attributes used by designers (e.g., playful instead of dynamic). As such, the appearance attributes that have been described in the literature might not give an accurate overview of what consumers themselves see in a certain product appearance. This limits the applicability of these attributes mentioned in the literature in testing designs with consumers. The contributions of this current research include adding consumer-based, empirically-grounded appearance attributes to the literature. Though it may be found that consumers use the appearance attributes from the literature as well as their own appearance attributes, the appearance attributes generated on their own will form a valuable addition to the attributes that are already described in the literature and will help contribute to an overall view on product appearance perception.

The research process of identifying the product appearance attributes that consumers use for distinguishing products is divided into two parts. In the first part, appearance attributes will be identified on the basis of appearance description that consumers

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generate in a categorization task. In the second part, these results are confirmed using a Structural Equation Modeling process that provides the generally used appearance attributes and shows their relationships with the separate appearance descriptions. The underlying attributes are also validated across different groups of consumers and different groups of products for generalization purposes. This step is important, as in experimental research one runs the risk that results are applicable in the tested situation only. In addition, previous research done into objectifying attributes into product appearances involved product specific attributes (e.g., masculinity of whiskey bottles; Schoormans, van den Berge, van de Laar, & van den Berg-Weitzel, in press). However, these attributes used might not be applicable for other product categories. Our validation of the results in the second part assures that the findings are general instead of situation or product category specific.

Part 1: Generating Product Appearance Attributes

Because we can assume there are some differences between consumers and designers (Hsu et al., 2000), it was decided that the attributes should be generated by consumers as they will provide additional knowledge on what meanings are derived from product appearance. To do this, a categorization task was designed to generate the appearance attributes, as people naturally categorize objects they see to make sense of them (Rosch, Mervis, Gray, Johnson, & Boyesbraem, 1976). In any categorization process, groups are made based on perceived similarities and differences between objects. If experts and non-professionals derive the same meanings from an object of interest, then categorization of these objects would not differ between them. However, non-professionals are found to make fewer categories than experts, which suggests they have less related knowledge. Additionally, non-professionals seem to categorize on different abstraction levels than experts, also suggesting they have a more shallow knowledge of design vocabulary (Tanaka & Taylor, 1991). Consumer based appearance attributes, therefore, are identified that summarize different product appearances. To generate these attributes, a wide range of consumer durable products were included that are generally assessed and bought for different motives. Product appearance can appeal to aesthetic or symbolic motives as it may provide sensory appeal and pleasure and convey information about the owner and his or her relations to other people (see e.g., Bloch, 1995; Holbrook, 1980; Vihma, 1995). However, durable products can also be approached with the motivation to assess it on its functionality or ease-of-use (Bloch, 1995; Creusen & Schoormans, 2005; Dawar & Parker, 1994; Norman, 1988). Motives can influence perception (Barsalou, 1991; Olson & Reynolds, 1983). As such, when attributes are formed when a consumer is only motivated to assess the product on its aesthetics (e.g. paintings), appearance attributes appealing to functional motives are possibly neglected. The wide range of products used in this study should facilitate the inclusion of the full range of attributes that will arise due to different motives in the assessment of real durable product appearances. In this way, general appearance attributes that apply to different consumer purchase motives are identified, and as such are not situation or product category specific.

Method

Participants

A total of 58 participants (25 women and 33 men, mean age: 49, *SD*: 10) were selected from a consumer household research panel (1,700 consumers) affiliated with a Dutch university and received a small fee for participation. The research household panel is representative of the gender and age of the Dutch population.

Stimuli

Stimuli consisted of 80 laminated, equal-sized photographs (ten products from each of eight different durable product categories). The product categories used were CD-players, bathroom scales, desk lamps, wall clocks, microwaves, vacuum cleaners, cell phones and chairs. For generalization purposes, these products were selected to guarantee that the full range of possible buying motives was taken into account. For example, desk lamps are more likely to be bought for aesthetic reasons, whereas for vacuum cleaners the functional motives are considered more important. The different buying motives are also apparent within categories. For example, a flowery, colorful clock might be chosen for aesthetic reasons, while a plain, white clock might be chosen because of ergonomic reasons. For products for which the brand name was visible, the brand name was removed or made unrecognizable in order to prevent an influence of the brand name on the categorization process.

Procedure

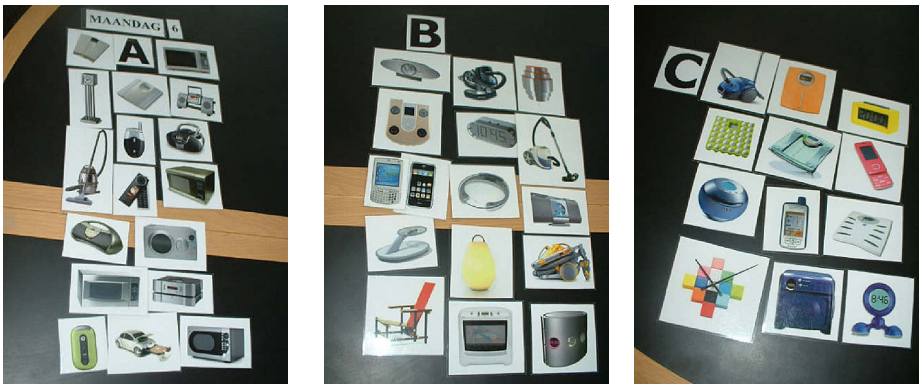
Participants were individually invited to an interviewing room. All participants received instruction informing them of the task, and then a practice task was introduced that asked participants to categorize photographs of houses based on appearance. Following that, the experiment leader provided the participant with the total set of stimuli and asked the participant to perform a free categorization task based on product appearance. During this task, participants were requested to categorize the set of stimuli into as many groups as they liked based on similarity in product appearance. In addition, the participants were instructed to form groups that consisted of products out of at least two product categories so that attributes would not be product specific (Figure 2). The experiment leader was present in the room the entire time, and the task was performed without time constraints. Following the free categorization task, the experimenter interviewed the participants asking them to describe similarities in product appearance for each group they formed. The interview was recorded and transcribed for further analysis.

Results and Discussion

After the individual tasks, appearance attributes were extracted from the descriptions that were ascribed to the groups that were

formed. To identify the appearance attributes several steps were taken. First, the participants' descriptions of the groups they made were collected. On average, consumers made eight groups with approximately two descriptions ascribed to each group (see Figure 2), resulting in 130 different descriptions in total. Second, a selection was made out of all descriptions that were mentioned. The descriptions mentioned by at least 10% of the participants were included in the analysis, deleting a total of 108 which were mentioned by very few people and assumed to not be generally used by consumers. They were discarded also because the aim of the research is to obtain attributes that are commonly used to provide a general overview of consumer perception, and such idiosyncratic attributes would only contribute to a low degree. A cut-off range of even 40% excludes these idiosyncratic attributes (Mugge, Govers, & Schoormans, 2009). Therefore, our criterion of 10% is quite conservative. This conservative criterion was chosen primarily because this part of the research is exploratory. The final step in narrowing down our appearance attributes out of the remaining descriptions (old-fashioned, classical, oldish, frilly, kitsch, retro, functional, simple, boring, plain, colored, playful, funny, unusual, round, oval, minimalistic, sleek, futuristic, modern, timeless and rectangular) was to omit the descriptions round, rectangular, oval, colored and frilly since they are physical properties of a product. Even though roundedness plays a role for consumers (Creusen & Schoormans, 2005) we can assume that the physical properties gathered in this research are underlying the attributes included in the analysis (Veryzer, 1999; Geistfeld et al., 1977). For example, then, a round colored frilly product is seen by consumers as playful.

The next step was to perform a Principal Components Analysis with a Varimax rotation to identify the underlying attributes of the appearance descriptions. The procedure was performed on a Product x Description frequency table in which each cell counted the number of times a certain product was described with a certain product description. This data proved suitable for factor analysis (Kaiser-Meyer-Olkin = 0.780 and



A: metallic, modern B: modern, futuristic C: playful, colorful

D: frilly E: simple, sleek

F: old-fashioned, plain G: old-fashioned

Figure 2. Example of the groups of products (A-G) with their descriptions made by one participant.

Bartlett's test of Sphericity = 0.001). A three-attribute model with the attributes Simplicity, Modernity and Playful explaining 61.484% of the total variance (attribute-loadings > 0.4) was chosen as input for Part 2 of this research over a four-attribute solution as suggested by the scree-plot (eigenvalue = 1.353). This three-attribute solution showed a better fit than the four-attribute solution (χ^2/DF = 2.78 versus 2.90). Additionally, with the fourth attribute Timeless, the description 'minimalistic' had a very low explaining variance (0.245), and the description 'timeless' had a loading below 0.4, which is below the conventional cut-off for inclusion in a confirmatory analysis. The fourth attribute to be taken as input for Part 2 would then only exist in the description 'sleek'. Using the four-attribute model in the confirmatory phase of Part 2 of this research would automatically lead to rejection of that whole attribute. The factor loadings of the descriptions are shown in Table 1 (loadings < 0.4 are shown in italic font). Ultimately, three attributes were identified underlying the product descriptions generated by consumers in Part 1 of the research. These three attributes are Modernity (which contains the descriptions modern, old-fashioned, classical, oldish, sleek, futuristic, kitsch and retro); Simplicity (which is composed of the descriptions simple, functional, plain, boring, unusual and minimalistic); and Playfulness (explained by playful and funny).

Table 1. Loadings of the descriptions on the three attributes Modernity, Simplicity and Playfulness (all loadings below 0.4 in *italic blue* font).

Descriptions	Attributes		
	Modernity	Simplicity	Playfulness
Modern	-0.879	*-0.101*	*-0.048*
Old-fashioned	0.840	*0.019*	*-0.363*
Classical	0.828	*-0.135*	*-0.239*
Oldish	0.737	*-0.196*	*-0.213*
Sleek	-0.700	*0.258*	*-0.285*
Futuristic	-0.584	-0.438	*-0.323*
Kitsch	0.575	-0.491	*0.008*
Retro	0.478	*-0.087*	*0.168*
Simple	*0.065*	0.877	*-0.031*
Functional	*-0.023*	0.865	*-0.279*
Plain	*-0.198*	0.719	*0.138*
Boring	*-0.065*	0.701	*-0.185*
Unusual	*0.066*	-0.587	0.570
Minimalistic	*-0.306*	0.437	*-0.036*
Playful	*-0.043*	*-0.175*	0.846
Funny	*0.055*	*-0.319*	0.820

Part 2: Confirming and Validating the Product Appearance Attributes

The three appearance attributes Modernity, Simplicity and Playfulness which were identified in the first part of the research (58 participants), were confirmed by the second part of this research. This step was necessary to assure the generality of the appearance attributes. To do so, in Part 2 of this research, the three-attribute solution from Part 1 is tested on a second and larger sample of participants and a second group of product categories. Additionally, to validate the generality of the attributes, it is assessed whether these same attributes are used by different groups of consumers and applicable for different product categories.

Method

Participants

A second group of participants (N = 268) from the same consumer household research panel used for Part 1 of this research were used in Part 2. They were balanced in age (mean age: 46, *SD*: 13) and gender (146 women, 122 men), and they also received a small fee for participation.

Stimuli

Stimuli consisted of equal-sized pictures of 30 durable products with five products from six product categories (wall clocks, mp3-players, dining chairs, scooters, coffee-makers and electric toothbrushes). All products differed from the products used in Part 1 of the research. As in Part 1, a range of products were selected to guarantee that the full range of possible consumer motives was taken into account. For products for which the brand name was visible, the brand name was removed or made unrecognizable.

Procedure

Participants received one of two versions of an internet questionnaire differing in the sequence of descriptions to diminish possible order effects. The questionnaire took approximately fifteen minutes to complete. Each participant judged only one product category to avoid the task becoming too tedious. Participants were assigned to one of the questionnaires balanced on age and gender. All participants received instruction informing them of the task. They were then presented with pictures of all five products of one product category at the same time and were given time to look at the products. After that, participants were asked to rate to which degree they judged the remaining sixteen product descriptions generated in Part 1 (old-fashioned, classical, oldish, kitsch, retro, functional, simple, boring, plain, playful, funny, and unusual, minimalistic, sleek, futuristic and modern) to be true descriptions of the appearance of products on a 5-point rating scale. Each product was rated on all sixteen descriptions before the next product was introduced.

Results and Discussion

Confirmatory Analysis

Structural Equation Modeling was used to assess whether the input model was structurally confirmed with the results of the sample of Part 2. In other words, the same appearance attributes should underlie the descriptions of the second sample as in the input model based on the sample of Part 1. The three-attribute model from Part 1 was used to test the data obtained in the second part by means of the two-step approach of Structural Equation Modeling described by Anderson and Gerbing (1988). All estimates were produced using AMOS 16 (Arbuckle, 1995).

The output file generated through Structural Equation Modeling performed by AMOS provided fit measures and suggested some modifications to the model. After intensive analysis of the modification indices and fit measures, the three-attribute model shown in Table 1 is considered to be best fitting the data[1]. The three-attribute model from Part 1, however, needed some modifications to achieve a good fit. The descriptions kitsch, retro, functional, boring and unusual were deleted from the solution due to low factor loadings (cut-off loading <0.5) with very low explained variances: 0.34 (0.11), 0.26 (0.07), 0.38 (0.14), 0.29 (0.08), and 0.15 (0.02), respectively (Schmidt & Heyder, 2002). Further, the descriptions sleek, classical and old-fashioned were deleted due to the numerous significant residual correlations (Schmidt & Heyder, 2002). The three-attribute model has at least three descriptions explaining a significant amount of variance for each of the attributes Simplicity and Modernity, and two for Playfulness as was the case in Part 1 of this research. The amount of descriptions per attribute is sufficient for the three-attribute model to provide a generic view on durable product appearance perception of consumers.

Theoretically, this three-attribute model depicts appearance perception of consumers, which is confirmed by the goodness of fit measure (GFI) of 0.98; an adjusted goodness of fit (AGFI) of 0.95; a normed fit index (NFI) of 0.97; and a comparative fit index (CFI) of 0.97. Additionally, the root mean square error of approximation (RMSEA) shows an acceptable fit (0.068) (acceptable: 0.05<RMSEA>0.08; Jais, 2006). All descriptions have statistically significant loadings on their attributes that vary between 0.65 and 0.88 which is consistent with the three-attribute model taken as input from Part 1 of the research. The average variance extracted (AVE) for each attribute is higher than 0.5 (0.53 for Modernity, 0.6 for Simplicity and 0.61 for Playfulness). The explained variances (EV) of the descriptions vary between 0.42 and 0.77, which is an acceptable range (Schmidt & Heyder, 2002). Additionally, the three-attribute model's discriminate validity is good since a chi-square test between the model in which the attribute correlations were constrained to be 1.0 and the unconstraint model proved to be significant (Jöreskog, 1971). Composite reliability of the attributes was assessed with the Fornell and Larcker criterion (1981). All attribute reliability measures were high (0.77 for Modernity, 0.82 for Simplicity and 0.76 for Playfulness).

As can be seen in Table 2, the three-attribute model contains the expected attributes Modernity, Simplicity and Playfulness. Modernity is composed of the descriptions modern, oldish and futuristic; Simplicity is composed of the descriptions simple, plain and minimalistic; and Playfulness contains the descriptions of funny and playful. This means that one can get an insight of, for example, the general level of Modernity of a product appearance by getting the product rated on the three descriptions modern, oldish and futuristic. The fact that Modernity and Playfulness are negatively correlated ($r = -0.49$, $p < 0.05$) shows that the attributes cannot be viewed as separate in the sense that when a product appearance is high on Modernity it is most likely not very high on Playfulness.

Table 2. The three-attribute model representing the attributes Modernity, Simplicity and Playfulness with the descriptions' loadings and explained variances in parentheses (EV).

Descriptions	Attributes		
	Modernity	Simplicity	Playfulness
Modern	0.88 (0.77)		
Oldish (reversed)	0.65 (0.42)		
Futuristic	0.74 (0.55)		
Simple		0.78 (0.60)	
Plain		0.88 (0.77)	
Minimalistic		0.67 (0.44)	
Playful			0.73 (0.54)
Funny			0,82 (0.68)

Group Comparisons

In order to assess whether differences exist between different groups of consumers and different groups of products, group comparisons were done. These comparisons show that the three-attribute model, that was found in Part 1 of the research and was confirmed in Part 2, fits for men and women separately (GFI = 0.97, AGFI = 0.94, NFI = 0.96, CFI = 0.97, RMSEA = 0.05). For different age groups (21-48, 49-70), there is also a fit (GFI = 0.97, AGFI = 0.93, NFI = 0.96, CFI = 0.96, RMSEA = 0.05). Additional analyses showed that the differences in ratings of the stimuli were not influenced by gender or age. The stimuli rated as the most or least playful, modern or simple by the female or younger participants were also rated the most or least playful, modern or simple by the male or older participants. Finally, a group comparison was done for all six product categories together and a good model fit was again indicated for all groups (GFI = 0.95, AGFI = 0.90, NFI = 0.93, CFI = 0.96, RMSEA = 0.04 and χ^2/DF = 2.66). These cross-validations indicate that the three product appearance attributes identified in this research are generalizeable to different groups of consumers and different product categories. This indicates that, generally, our three-attribute model is used by all consumers to differentiate between different product appearances.

General Discussion

In this research, the attributes Modernity, Simplicity and Playfulness were identified as the appearance attributes that consumers in general use to distinguish between different product appearances. These attributes underlie product appearance descriptions that consumers themselves use to describe product appearances (oldish, modern and futuristic; simple, plain and minimalistic; funny and playful). The three attributes provide a general view on how consumers perceive durable product appearances and differentiate between different appearances. They form a valuable addition to the attributes described in the literature that are more expert-based and as such contribute to an overall view on product appearance perception.

Due to the research approach we used, we were able to identify the attributes that consumers themselves use to

distinguish different product appearances. The product appearance descriptions being generated by consumers and the underlying attributes being validated for different groups of consumers guarantee that these are indeed the attributes that consumers themselves generally use to distinguish product appearances. A quick glance seems to show fewer attributes were identified than found in the literature, where often six or more attributes are distinguished. This can be the result of the fact that designers are able to see more differences in products than consumers (Hsu et al., 2000). Another reason could be in the method of this research that was set out to produce generic appearance attributes that could easily be put into practice in briefings or product evaluation studies. Two of the attributes that consumers use are similar to attributes mentioned in the literature. Complexity is a design attribute that is used by designers (Veryzer, 1995; Ellis, 1993) which is opposite (and therefore correlated to) the attribute Simplicity identified in this research. Modernity is also described by designers in the literature as an important appearance attribute upon which product appraisal is based (Creusen & Schoormans, 2005; Ellis, 1993). We can conclude from this that consumers and designers show communality in what attributes they perceive from product appearance. This research now provides empirical evidence that these two attributes that are used by designers are indeed also used by consumers. However, one of the attributes found in this research, Playfulness, is qualitatively different from the attributes mentioned in the literature, indicating that designers might have deeper knowledge than consumers. The attribute Playfulness serves as an addition to the attributes described in the literature. In future research, it would be interesting to look at the categorization processes used by designers and users to gain insight into how the differences in product attributes that are generated by designers and consumers originate.

The use of many different product groups in the first part of the research and the validation with different groups of products in the second part assures that the attributes found in this research are not product specific and therefore informative on the appearance of many sorts of product categories in general. Moreover, the products used reflect the variety on the market place and thus a broad range of motives that consumers use (Bloch, 1995; Creusen & Schoormans, 2005). In the literature, the attributes that are used as guidelines for incorporating meaning into a product appearance are assumed to be applicable for different product categories (Hsiao & Wang, 1998). However, as far as we know, this assumption has no empirical basis until now. The generalizabilty of our three attributes make it possible for designers to actually use these attributes in the design process of new products for different product categories.

Additionally, due to the fact that consumers were asked to categorize a wide range of product categories, the attributes described in this research are of an abstract nature. This approach makes the attributes less easy to physically objectify as designers may wish. On the other hand, it gives a generic overview of what consumers perceive which enables researchers to focus on translating these attributes into guidelines for designers to attune product appearances to consumer preferences. As design is an important source of differentiation from other products in the market place (Hammer, 1995; Kotler & Rath, 1984; Löbach, 1976; Lorenz, 1986; Pilditch, 1976; Veryzer, 1995), the attributes defined in this research give the opportunity to more validly assess consumer reactions to product designs and can give a company a competitive edge. For example, the attributes attached to a company's brand values and product specific attributes (e.g., masculinity for whiskey bottles; Schoormans et al., in press), can be used to assess the degree in which a specific product appearance suits the tastes and wants of the target group of consumers or the attributes a company wishes to communicate to the consumers (Mugge et al., 2008). To assess the value of a product appearance to consumers, ratings on the product appearance attributes can be gathered. The intended product appearance can then be compared to the assessed one, and the attributes on which the intended and actual appearances differ can be identified. This is more actionable for product designers than just knowing which one of several concepts appeals the most to consumers, as in this way there is some indication of how to improve the appearance to make it better aligned to target consumers' preferences.

It is commonly known that consumers appreciate appearances that are unified, in balance and harmonized (Ellis, 1993). These attributes should not be neglected in designing a product. Therefore our three-attribute model should not replace the attributes already mentioned in the literature. We submit that the attributes identified in this research are a valuable addition and should also be taken into account when designing a product's appearance. These attributes can be used in briefings to gain a better understanding of what meaning a new product design should express. The attributes can also be used when gathering consumer feedback on product concepts.

Physical properties underlie the appearance attributes (Veryzer, 1999; Geistfeld et al., 1977). A next step in research would be to identify what physical properties of a product underlie the different appearance attributes, in order to make the attributes more objectifiable for designers. That way a designer that, for example, wishes to adapt a product to look more simplified to consumers will have a better idea of how to achieve such a result. Contrarily, since current trends and fashion influence views on the attributes, the direct relationship between the attributes and the physical properties will change over time which will make the applicability of these relationships unstable over time (Jernigan & Easterling, 1990). For example, in the 1980's angular products were modern, while now organic forms are more contemporary.

Conclusion

The aim of this research was to provide knowledge on the consumer perception of product appearances by identifying appearance attributes that consumers use to distinguish durable product appearances. The attributes attained proved stable across different groups of consumers indicating that they are universal. Additionally, the attributes were validated between different groups of products and are therefore generalizeable and not product category specific.

The attributes Modernity, Simplicity and Playfulness provide insights into what consumers perceive when assessing

product appearance as opposed to the appearance attributes described in the literature that are mostly expert-based and generated with artificial stimuli (e.g., Orth & Malkewitz, 2008; Henderson et al., 2004; Ellis, 1993; Veryzer & Hutchinson, 1998). The three attributes were generated by consumers and were based on durable product appearances. These attributes should not be regarded as replacing the attributes described in the literature. However, this research has provided insights into consumer perceptions of durable product appearances, and these attributes can provide valuable guidelines to designers wanting to attune their designed product appearances to consumer preferences.

Endnotes

[1] Before a confirmatory model was tested, it was assessed through 24 different repeated measures ANOVA's (six product categories and four motives), whether the products used varied in the importance of the aesthetical, functional, symbolic and ease-of-use motives which was also measured during the task. The products within a product category differed from each other on all factors (p<0.1) except for ease-of use of coffee-makers, mp3players and scooters which seems more category dependent than product specific.

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