The development and testing of a product personality scale

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Product personality refers to the set of personality characteristics that people use to describe a specific product and to discriminate it from other products (Govers, 2004). For example, a Volkswagen Beetle has a cheerful and friendly personality, whereas a Volkswagen Touareg is dominant and tough. Thus, different products, even belonging to the same brand, can be described to have diverse personalities. For designers, it is interesting to study product personality for two reasons. First, Janlert and Stolterman (1997) discussed that product personality can have consequences for the user’s interaction with the product. The product’s human-like characteristics serve as an analogy for their behaviour and capabilities (Janlert and Stolterman, 1997; Aggarwal and McGill, 2007). Product personality can thus help users to anticipate how to interact with a product. For example, a user will handle a product with a delicate and sensitive personality with a great deal of care and consideration. Second, product personality may affect user preference. People prefer products with a personality that is similar to their own, probably, because these products help them to confirm and express their self-concept (Govers and Mugge, 2004; Govers and Schoormans, 2005).

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Past research showed that designers can purposely facilitate a particular personality in the product design based on their expertise (Govers et al., 2002). Furthermore, people tend to agree on the personality characteristics of a particular product (Govers et al., 2002). However, a potential problem for the use of product personality is that designers and users may perceive the meaning of products differently (Hsu et al., 2000). Such a mismatch can negatively affect users’ product evaluation. To ensure an intended product personality, it is essential that the particular product personality that designers aim for during the design process is correctly understood by users. A possible means to achieve this is by systematically assessing the way users perceive the personality of a new product during the design process. The objective of the present research is to develop a product personality scale that can be used for this purpose.

1 Personality and product design

Research shows that physical appearance features of humans (e.g., facial characteristics, hair colour, beardedness, clothing, and wearing of glasses) have a strong impact on the perception of a person’s personality (Jones, 1990; Borrenau and Lieber, 1992a, b, 1995). In analogy, the appearance of a product is a major determinant in the perception of product personality (Govers et al., 2002; Jordan, 2002; Brunel and Kumar, 2007). Brunel and Kumar (2007) indeed found evidence that visual aesthetic characteristics, such as simplicity, harmony, balance, unity, dynamics, timeliness/fashion, and novelty are linked to perceptions of product personality.

Whereas product appearance is important for a product’s personality, other aspects of the product design, such as sound, texture, and smell may be relevant as well (Janlert and Stolterman, 1997). A car that has a tough appearance, such as a Land Rover, may also sound tough while starting the engine or closing the door, and feel tough when holding the steering wheel. Person–product interaction (e.g., forces, movements) may influence and enhance the personality of a product as well (Desmet et al., 2008). The same Land Rover may bring about a tough person–product interaction if opening its door requires a relatively great deal of force. In addition, computers can have personalities (e.g., dominant, submissive) as a result of variations in their communication style with the user (Nass et al., 1995; Moon, 2002).

2 Assessing product personality

To assess product personality, several scales have been used in the past. First of all, during the product development process companies have used a-theoretical, ad hoc scales, consisting of a set of personality characteristics that are intuitively selected for the purpose of a particular study. Accordingly, key personality characteristics may be missing in these scales, resulting in an incomplete and unsatisfactory impression of the product’s personality. Several scholars have used standardized human personality scales to assess the person-
ality of products and brands (for an overview, Kassarjian, 1971; Sirgy, 1982; Malhotra, 1988). This approach has been criticized, because these tests have been developed and validated for measuring the personality of humans. Though some personality characteristics may be mirrored in products, others might not. As a result, the validity of such personality scales to study product personality is questionable. In this respect, Kassarjian (1971) argued that ‘consumer behaviour researchers must develop their own definitions and design their own instruments to measure the personality variables that go into the purchase situation’. Wells et al. (1957) and Malhotra (1981) both described scales that should measure the personality of a product. However, both scales are only tested on brands and have not been validated in the context of physical products. Furthermore, the stimuli in these studies are drawn from only one product category (i.e., cars), which limits the scale’s generalizability across product categories. As a result, these scales may not be appropriate to assess the personality of all products. Jordan (2002) also presented a scale for studying product personality. The main goal of this study was to show that product personality is a meaningful concept for designers rather than scale development. As a result, no quantitative tests were performed during the selection process of the personality characteristics, which casts doubts on the scale’s reliability and validity.

In this paper, we present the development of a generalizable, comprehensive, reliable, valid, and easy to use product personality scale to assess the personality characteristics of individual products. In developing this scale, we applied the following principles. Firstly, the scale needs to comprise the full scope of relevant personality characteristics. Secondly, the scale should allow us to efficiently assess how people evaluate the product personality of products that belong to different categories of durable products. In the next paragraphs, we describe how we developed and tested the product personality scale.

3 Developing a product personality scale
To establish validity, several steps were taken during the development of the scale to ensure that the final set of personality characteristics in the product personality scale is comprehensive and representative.

3.1 Step 1: collecting an extensive pool of personality descriptions
Our first step in developing the product personality scale was to collect an extensive pool of personality descriptions. Existing scales that measure personality associations in psychology, marketing, and design literature provided 348 descriptions to the pool (Asch, 1946; Wells et al., 1957; Norman, 1963; Rosenberg and Sedlak, 1972; Cattell et al., 1977; Malhotra, 1981; Anderson and Klatzky, 1987; Zebrowitz, 1990; Carver and Scheier, 1996; Aaker, 1997; Eysenck, 1998; Jordan, 2002). To ensure that the pool of descriptions was
complete, we also collected personality descriptions in a qualitative user study. For this study \( n = 48, 50\% \) male, mean age = 46), respondents were randomly selected from a consumer household panel. Accordingly, this allowed us to gain an overview of all personality characteristics that laymen use to talk about products. All respondents were asked to describe 12 products belonging to four product categories (three bottles of wine, three screwdrivers, three soap dispensers, and three coffee makers) ‘as if they were a person’. To enhance the generalizability of the resulting scale, we selected a variety of product categories that have different value to consumers. Accordingly, the product categories were chosen based on Ratchford’s (1987) think-feel dimensions and have either symbolic (bottles of wine), utilitarian (screwdrivers), or both symbolic and utilitarian value (soap dispensers and coffee makers) for consumers. Furthermore, all product categories are mundane products that many people use frequently. To generate substantial differences in product personality, two experts (scholars at a faculty of industrial design engineering) selected those product variants within each product category that represented the greatest variety in appearances. In total, 953 descriptions were collected and added to the pool. This resulted in a comprehensive pool of 1142 descriptions that were all candidates for the final set of personality characteristics in the product personality scale. Because this is a substantial number of descriptions, we assume that it represents the full spectrum of personality characteristics. For comparison, Aaker’s (1997) brand personality scale was based on an initial sample of 309 descriptions.

All 1142 items were formulated in single adjectives. Adjectives are traditionally seen as the primary terms of personality and are frequently used as items in personality scales (Hofstee, 1990). Single adjectives were preferred over adjective pairs representing two opposites, because when using the latter the meaning of the continuum may differ depending on the combination of the adjectives. For example, the meaning of an item scale ranging from ‘friendly’ to ‘reserved’ differs from the meaning of an item scale ranging from ‘friendly’ to ‘hostile’. This issue may become a problem with respect to personality characteristics, because not every personality characteristic has a clear negative counterpart (Hofstee, 1990). In addition, we decided to use single adjectives (‘friendly’) rather than unipolar adjective pairs (‘friendly’ vs. ‘not friendly’). Although unipolar adjective pairs assume to represent the absence or presence of one personality characteristic, ‘not friendly’ does not represent the absence of ‘friendly’. In fact, it represents its negative counterpart: the presence of ‘unfriendliness’. In conclusion, we believe that the use of single adjectives that can be rated as either ‘descriptive’ or ‘not descriptive’ for a target product is least open to bias.

3.2 Step 2: reducing the number of personality descriptions

During the second step, we needed to reduce the 1142 descriptions to a manageable number. In this reduction process, we used four procedures that
succeeded each other. As recommended in the literature, we used expert judgement in the early stages to reduce the number of items, and lay judgement in the final stages to make the definitive selection (Hofstee, 1990; Devellis, 1991).

Firstly, six judges independently evaluated all the descriptions and selected only those that were considered without any doubt to be human personality characteristics. All judges were scholars in marketing and consumer behaviour at a faculty of industrial design engineering. Consequently, these experts possessed the required knowledge of psychology and design to complete this task well. Hundred and fifty-four descriptions were not categorized by any of the judges as a personality characteristic. Because redundancy was considered to be an asset rather than a liability in the current stage, it was decided to use the most conservative elimination strategy possible. Consequently, we only eliminated these 159 descriptions. Secondly, the remaining pool of 988 descriptions was reviewed by the same judges (excluding one judge) with respect to similarity of meaning. Descriptions that described the same personality characteristic were grouped together. For every group, one item was selected that represented the personality descriptions of this group best. In doing so, we kept the comprehensive character of the pool. This second reduction resulted in a pool of as many as 458 descriptions.

The pool was further reduced by isolating the most relevant personality descriptions with respect to both people and products. In this third procedure, respondents (n = 156, 51% male, mean age = 21) were asked to indicate for a subset of 76 descriptions whether they did or did not use a description to explain the personality of a person or a product. Because we wanted to reduce the chance of falsely excluding personality characteristics that are used to describe products, all respondents were students at the faculty of industrial design engineering. Design students are trained to put their impression of products into words and have developed a much broader vocabulary for describing products than ordinary people. The chance that a personality characteristic was wrongly identified as irrelevant for describing products was thus minimized.

For each description, we calculated the percentage of respondents that used this description to describe either people or products. Different cut-off percentages were set for people and products, because these criteria differ in importance. Including descriptions that are not used to describe the personality of people would undermine the validity of the product personality scale. The measure would not measure what was intended: the personality of products described with personality characteristics that are also used to describe people. The inclusion of items that are not used to describe the personality of products does not affect the scale's validity (because these items would be rated as 'not descriptive' in the final scale), but would make the scale needlessly long. Because the first criterion is more important than the second, the cut-off percentages were set at 85% and 60%, respectively. The resulting selection of descriptions meets the defining component of product personality in that...
they are used with respect to people and products. However, these criteria do not rule out the possibility that descriptions, though used with respect to both people and products, do not measure the personality of a product. Some descriptions can be interpreted literally when used with respect to products. For example, ‘strong’ is a personality characteristic that can be used to express that a person is not easily upset. Yet, its primary interpretation becomes ‘not easily broken’ when it is applied to a product. Three judges (scholars at a faculty of industrial design engineering) checked whether these descriptions could be interpreted literally. This resulted in the elimination of seven descriptions. Our item reduction process resulted in 78 personality characteristics.

### 3.3 Step 3: defining and testing the product personality scale

In most cases, the product personality scale will be used to test the personality of several products simultaneously. Comparing multiple products helps designers to understand why certain products are perceived as having a particular personality and enable them to select the best alternative. However, this will constrain the number of descriptions that can be included in the scale. Rating a number of products on 78 items will take respondents substantial amounts of time and effort. For this reason, other personality scales that are constructed to measure the personality of products or brands consist of fewer items. For example, Malhotra’s (1981) personality scale consists of 15 items, Jordan’s scale to measure the personality of products consists of 17 items, and Aaker’s brand personality scale consists of 42 items. Accordingly, it would be worthwhile to perform another reduction procedure.

Past research on human personality showed that the presence of certain personality characteristics almost always go together with the presence of other personality characteristics (Zebrowitz, 1990). For example, a person that is perceived as ‘cheerful’ is often also perceived as ‘happy’. If these personality characteristics are always perceived together, then ‘happy’ does not provide much extra information. In a sense, the two characteristics describe more or less the same thing. The same might hold for describing the personality of products. This suggests that it is possible to further reduce the set of characteristics without loosing valuable information. To decrease the number of descriptions, we explored to what degree certain descriptions co-occur in the perception of product personality. Based on the groupings of descriptions, the final set of personality characteristics can be determined. An extensive quantitative study was developed to achieve this goal. Furthermore, we used this study to check the scale’s reliability and validity. The following paragraphs describe this next study in detail.

### 3.3.1 Stimuli and procedure

To enhance scale generalizability, the stimuli for this quantitative study were selected from two product categories with either high or low symbolic value. To choose these product categories, a pre-test was performed in which
students \((n = 14)\) were asked to specify several publicly consumed products with high symbolic value and several privately consumed products with low symbolic value. Cars were listed most frequently as a good representative of a highly symbolic, publicly consumed product \((93\%)\). Scissors \((43\%)\), staplers \((43\%)\), and vacuum cleaners \((29\%)\) were listed most often as examples of privately consumed products with low symbolic value. We selected cars and vacuum cleaners, because these products can be bought in a great variety of appearances, which is essential for a reliable scale development. The stimuli were selected from the assortment of cars and vacuum cleaners at a mid-range price in the market. Two experts (scholars at a faculty of industrial design engineering) selected those cars and vacuum cleaners that represented the greatest variety in appearances, while still providing a realistic picture of the alternatives within the price range. This variety was necessary to ensure that our scale can be applied to different products. Furthermore, lack of diversity in appearance could cause items to be paired together for the wrong reasons, because they are consistently rated as ‘not descriptive’. In total, eight cars and eight vacuum cleaners were selected. All stimuli were illustrated with a high-quality colour picture of the product: the pictures of the cars showed the front and side of the cars and the pictures of the vacuum cleaners showed the whole vacuum cleaner, including the tube and nozzle. Because rating each of the 16 stimuli on 78 personality characteristics would be too time-consuming, the stimuli were divided into four sets, each containing four stimuli belonging to the same product category. Respondents rated the stimuli of one set. Within each set, the stimuli were presented in four balanced orders (Maxwell and Delaney, 1990). Students from 38 different BSc and MSc programs \((n = 125, 34\% \text{ male}, \text{ mean age } = 24)\) filled out the questionnaire, resulting in a total of 28–33 respondents for each of the sets. Because lay judgement is preferred for the last step in scale development, students of industrial design engineering were excluded from participation. The respondents were asked to rate the extent to which the 78 personality characteristics describe the four stimuli (products) in their set using a five-point scale \((1 = \text{'not descriptive'}, 5 = \text{'descriptive'})\). This implies that each respondent had to make 312 ratings, which took approximately 30 min to complete. To control for possible fatigue effects, multivariate analyses of variance (MANOVA) were performed for each of the four sets using the 78 personality characteristics as dependent variables and stimuli and order as the independent variables. No significant interaction effects between stimuli and order were found (all \(p > 0.05\)), suggesting that the order in which the different products were presented did not affect the rating on the personality characteristics.

### 3.3.2 Results

#### 3.3.2.1 Defining the product personality scale

The data of this quantitative study was analyzed using Ward’s hierarchical clustering method (Hair et al., 1998). Cluster analysis classifies objects into clusters so that each object
is very similar to the other objects in that cluster. If certain sets of descriptions co-occur in the descriptions of different products and by different respondents, they have more or less the same meaning for the respondents. Therefore, these descriptions can be replaced by one description out of such a set without losing valuable information.

In order to assure that the cluster solution is representative of the general population, and is thus generalizable to other objects (e.g., other products or respondents), the cluster solution needs to be validated. A common approach in this respect is to randomly split the sample into two groups and analyze these groups separately (Hair et al., 1998, p. 501). Instead of a random split in two groups, we decided to validate our cluster solution by comparing four specific subgroups (cars, vacuum cleaners, men, and women). These specific groups are more likely to differ than two randomly selected groups, which strengthens the generalizability of our findings. Specifically, we used gender as a selection criterion, because men and women may differ in their evaluation of personality characteristics that are more masculine (e.g., aggressive, dominant, tough) or more feminine (e.g., cute, romantic, sensitive). After deleting only three descriptions (i.e., vulnerable, intelligent, and annoying), all cluster solutions showed a similar pattern of six large groups of descriptions. The three descriptions were deleted, because their position changed between the four cluster solutions, indicating that their meaning is not similar for all product categories and respondents. Table 1 provides a summary of the personality characteristics belonging to the six groups. Cronbach’s alphas of these groups all exceed 0.80, which strongly supports internal consistency.

An analysis of the grouping suggested that reducing the pool to only six descriptions would not do justice to the broad scope of meaning represented by the descriptions in each group. For example, group 1 includes the personality characteristics ‘cheerful’, ‘cute’, and ‘easy-going’. Although these personality characteristics may sometimes go together in a product, it is possible to think of product designs that are perceived as ‘cute’, without being ‘cheerful’ or ‘easy-going’ at the same time. Accordingly, we analyzed the six groups again, separately, using Ward’s hierarchical clustering. The results showed that the six general groups of descriptions could be divided into 20 subgroups, containing two to seven descriptions each. The descriptions in all subgroups have related meanings. For example, the descriptions ‘provocative’, ‘wild’, ‘exuberant’, and ‘eccentric’ form one subgroup.

From each of these 20 subgroups, a description was chosen. The selection of these representing descriptions was based on two criteria. Firstly, the descriptions had to cover the meaning of the other descriptions in the subgroup. Secondly, the descriptions should have a high item-to-total correlation, which offers statistical support for the representation of the total subgroup (Hair
Table 1 Summary of the six groups of personality characteristics

<table>
<thead>
<tr>
<th>Attractive</th>
<th>Aggressive</th>
<th>Bourgeois</th>
<th>Careless</th>
<th>Conspicuous</th>
<th>Aloof</th>
</tr>
</thead>
<tbody>
<tr>
<td>Casual</td>
<td>Dominant</td>
<td>Businesslike</td>
<td>Chaotic</td>
<td>Eccentric</td>
<td>Boring</td>
</tr>
<tr>
<td>Charming</td>
<td>Excessive</td>
<td>Calm</td>
<td>Childish</td>
<td>Exuberant</td>
<td>Cheerless</td>
</tr>
<tr>
<td>Cheerful</td>
<td>Obtrusive</td>
<td>Consistent</td>
<td>Corny</td>
<td>Funny</td>
<td>Insular</td>
</tr>
<tr>
<td>Cute</td>
<td>Showy</td>
<td>Decent</td>
<td>Creepy</td>
<td>Idiosyncratic</td>
<td>Masculine</td>
</tr>
<tr>
<td>Easy-going</td>
<td>Energetic</td>
<td>Honest</td>
<td>Immature</td>
<td>Interesting</td>
<td>Old-fashioned</td>
</tr>
<tr>
<td>Feminine</td>
<td>Flexible</td>
<td>Inconspicuous</td>
<td>Odd</td>
<td>Lively</td>
<td>Reticent</td>
</tr>
<tr>
<td>Friendly</td>
<td>Happy</td>
<td>Mature</td>
<td>Pathetic</td>
<td>Provocative</td>
<td>Strict</td>
</tr>
<tr>
<td>Happy</td>
<td>Informal</td>
<td>Modest</td>
<td>Silly</td>
<td>Tough</td>
<td>Unattractive</td>
</tr>
<tr>
<td>Informal</td>
<td>Nice</td>
<td>Precise</td>
<td>Unreliable</td>
<td>Wild</td>
<td>Uninteresting</td>
</tr>
<tr>
<td>Nice</td>
<td>Open</td>
<td>Predictable</td>
<td>Untidy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open</td>
<td>Pleasant</td>
<td>Reliable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pleasant</td>
<td>Popular</td>
<td>Sensible</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Popular</td>
<td>Pretty</td>
<td>Serious</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pretty</td>
<td>Relaxed</td>
<td>Well-groomed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relaxed</td>
<td>Romantic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romantic</td>
<td>Sensitive</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensitive</td>
<td>Sweet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sweet</td>
<td>Terrific</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terrific</td>
<td>Young</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( \alpha = 0.96 \quad \alpha = 0.83 \quad \alpha = 0.88 \quad \alpha = 0.84 \quad \alpha = 0.91 \quad \alpha = 0.89 \)

et al., 1998). Table 2 presents the 20 descriptions that were selected as items for our final product personality scale.

To check whether all 20 descriptions are important to differentiate products from each other, a MANOVA was performed with the personality descriptions as the dependent variables and the stimuli as the independent variable. A significant effect of the stimuli was found \( (F(315, 7065) = 3.80, p < 0.001) \). Furthermore, univariate tests revealed significant differences among the eight stimuli for all 20 descriptions (all \( p < 0.001 \)), providing support that the final product personality scale only consists of personality descriptions that may play a role in products.

The final set of 20 personality descriptions includes two descriptions that were exclusively taken from the literature, nine descriptions that were originally taken from the literature, but were confirmed by the qualitative user study in step 1, and nine descriptions that were only found in the qualitative user study. A similar proportion was found for the 78 personality descriptions, resulting from step 2. Furthermore, this proportion corresponds to that of the comprehensive pool of 1142 descriptions and shows that both the literature study and the qualitative user study were necessary to collect a comprehensive pool of descriptions.
3.3.2.2 Testing the reliability and validity of the 20-item product personality scale. The value of a measurement scale highly depends on the reliability and validity of the scale. To be reliable, respondents need to agree about the applicability of a personality characteristic with respect to different products. We checked the reliability of the 20-item scale by calculating Cronbach’s alpha for every selected description over the different products (see Table 2). The results showed that all descriptions had an adequate to a very high reliability score.

In addition to our statistical analysis on the reliability of the scale, we checked the scale’s face validity. Face validity indicates to what degree a scale appears to be a good measure of the concept one intends to measure. We checked face validity by developing the personality profiles of the products that were included in the study. A personality profile represents how respondents perceived a product on the 20 personality characteristics. If the product personality scale has face validity, one should be able to relate the personality profile of a product to its appearance in a logical way. Figure 1 displays the personality profiles of two cars based on the data of our study. These two profiles clearly indicate how the two products differ from each other with respect to specific personality characteristics. It is possible to relate the specific profiles of these two cars to their appearance and explain the similarities and differences between the two profiles with similarities and differences between the appearances of both products in a reasonable way. For example, car 1 is perceived as ‘serious’, ‘aloof’, and ‘boring’, whereas car 2 is not. This is, among

### Table 2 Reliability of the selected items (n = 33)

<table>
<thead>
<tr>
<th>Description</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheerful</td>
<td>0.96</td>
</tr>
<tr>
<td>Open</td>
<td>0.93</td>
</tr>
<tr>
<td>Relaxed</td>
<td>0.89</td>
</tr>
<tr>
<td>Pretty</td>
<td>0.93</td>
</tr>
<tr>
<td>Easy-going</td>
<td>0.94</td>
</tr>
<tr>
<td>Cute</td>
<td>0.95</td>
</tr>
<tr>
<td>Dominant</td>
<td>0.89</td>
</tr>
<tr>
<td>Obtrusive</td>
<td>0.90</td>
</tr>
<tr>
<td>Silly</td>
<td>0.69</td>
</tr>
<tr>
<td>Childish</td>
<td>0.91</td>
</tr>
<tr>
<td>Untidy</td>
<td>0.78</td>
</tr>
<tr>
<td>Idiosyncratic</td>
<td>0.94</td>
</tr>
<tr>
<td>Interesting</td>
<td>0.88</td>
</tr>
<tr>
<td>Lively</td>
<td>0.91</td>
</tr>
<tr>
<td>Provocative</td>
<td>0.92</td>
</tr>
<tr>
<td>Modest</td>
<td>0.87</td>
</tr>
<tr>
<td>Honest</td>
<td>0.67</td>
</tr>
<tr>
<td>Modest</td>
<td>0.95</td>
</tr>
<tr>
<td>Serious</td>
<td>0.91</td>
</tr>
<tr>
<td>Aloof</td>
<td>0.95</td>
</tr>
<tr>
<td>Boring</td>
<td>0.95</td>
</tr>
</tbody>
</table>
other things, the result of car 1’s basic, robust form and its grey colour. In contrast, car 2 is perceived as ‘cheerful’, ‘idiosyncratic’, and ‘pretty’, whereas car 1 is not. This is, among other things, the result of car 2’s compact, spherical shape, the curved grill and the round shape of its head lights. In addition, from the analyses of the personality profiles of all the products in the study one can see that products that are described with the same personality characteristics share certain appearance characteristics, even when these products belong to different product categories. For example, the car and vacuum cleaner that were rated as ‘serious’ are both grey and have basic, robust forms (see Figure 2). Taken together, these results indicate that our scale has face validity.

4 Discussion

The objective of this research was to develop a reliable, valid, and generalizable scale for assessing product personality. We started with a comprehensive set of 1142 personality descriptions, which was reduced to a collection of 78 descriptions. A series of cluster analyses were used to come to a more manageable number of items. The results of these cluster analyses indicated that people can comprehensively describe product personality with 20 product personality descriptions. Next, we showed that a 20-item product personality scale that is based on these descriptions is reliable and has face validity. Consequently, we conclude that our 20-item product personality scale assesses
product personality based on product appearance in a comprehensive, reliable, valid and efficient way. The product personality scale thus offers designers and marketers of consumer products an alternative to the present ad hoc scales.

The product personality scale can be used to compare either different products within a specific product category or products from different product categories. Comparing different products within a category is valuable to evaluate a product in relationship to the competitors or to select the alternative that profoundly communicates a desired personality. A comparison among different product categories can help designers to create an entire line of products (e.g., line of kitchen appliances) that should fit together with respect to their product personality. As discussed, products with a similar personality profile share appearance characteristics, suggesting that it is possible to create a consistent product line by taking into account product personality. Furthermore, comparing products from different product categories may enable designers to uncover benchmark products in different product categories and, consequently, gain a deeper understanding of the appearance characteristics that result in particular product personalities. Such a database of benchmark products with particular personalities may serve as a source of inspiration in the design process.

Designers should keep in mind that all personality characteristics can play a role in determining a product’s personality. Only by using the complete 20-item product personality scale, one can gain insight in the full profile of personality characteristics for a specific product. However, this does not imply that all personality characteristics are equally important in all situations.
The importance of particular personality characteristics will depend on the characteristic’s centrality to the person’s self (Markus, 1977). If a person sees himself/herself first and foremost as a serious person, (s)he will focus primarily on products that communicate the personality characteristic ‘serious’.

In order to achieve a proper balance between the product personality scale’s comprehensiveness and its efficiency, we reduced the scale to a set of 20 items. Of course, there is a potential risk in reducing the number of items, because this may negatively affect the richness of the total product personality scale. However, to develop a scale that is easy to administer and that can be used to rate different stimuli in one study without losing interest, it is important that redundant items are deleted. In our research, the reduction of items was performed with great care by only taking out those personality characteristics that are unimportant for products or that overlap with other personality characteristics. As a result, the width of personality characteristics that are important for products is preserved. In conclusion, we believe that the product personality scale presents a complete overview of the personality characteristics that can play a role in products.

Some other limitations of our research should be mentioned. First, the scale was developed in the Netherlands. Therefore, the items gathered from literature had to be translated from English into Dutch. In order to make sure that the Dutch translation had the same meaning as the English original, we followed a two-way translation procedure suggested by Mullen (1995). Although this procedure is best practice, chances exist that our product personality scale is sensitive to language differences.

Another limitation of our study is that we limited our research to product appearance. Janlert and Stolterman (1997) argued that designers should pay attention to the consistency and coherence of all facets of the product design, when designing a product with a certain personality. As a result, future research should verify whether the product personality scale can be used to assess the personality of product interaction or the sound and texture of the product. In this respect, Desmet et al. (2008) found that the personality characteristics elegant and gentle may be particularly valuable to describe the personality of a product’s physical interaction style. In addition, more knowledge is needed on the combined effect of visual and other design facets to uncover their potential interactive effects.

Although Brunel and Kumar (2007) provided a first step in linking visual product design aesthetics to product personality perceptions, more research is also needed to fully understand the effect of specific product characteristics on the perception of a product’s personality. A systematic use of the product personality scale over time can be used to gain knowledge about the relation
between specific product characteristics and the user’s perception of product personality.

The product personality scale can help designers in different ways. The product personality scale may serve as inspiration for designers, because it offers them a complete overview of the personality characteristics that can play a role in products. Nevertheless, this does not imply that the creation of a specific personality characteristic in a product is straightforward and that the product personality scale may serve as a recipe for creating products with predetermined personalities. In fact, designing products with a predetermined personality is a complex and creative design task. In addition to clearly recognizable product aspects (as discussed in the validation section), small and inconspicuous details of the product design can play an important role as well. Therefore, designers need to design all relevant product aspects in such a manner that the whole product is perceived as having the desired personality. In addition, some personality characteristics, such as relaxed and honest, may be difficult to identify in products. For those personality characteristics, a discrepancy between designers and consumers in their perception of the product is likely to occur (Hsu et al., 2000). As such, designers may also use the scale to verify their expertise on product personality during the design process by testing whether the intended personality characteristics are indeed recognized by consumers.

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1. Both authors contributed equally to the research and are listed in inverse alphabetical order.