



Consumer-Product Attachment: *Measurement and Design Implications*

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Due to differences in the attachment consumers experience towards the durable products they own, they hang on to certain products whereas they easily dispose of others. From the viewpoint of sustainability, it may be worthwhile to lengthen the life span of many durable consumer products. Hence, there is a challenge for designers to strengthen the bond between consumers and their products through the product design process. In the present study, we develop a scale to measure consumer-product attachment, and we identify and measure seven possible determinants of attachment: enjoyment, memories to persons, places, and events, support of self-identity, life vision, utility, reliability, and market value. Only memories and enjoyment contribute positively to the degree of attachment. The highest levels of attachment are registered for recently acquired products (<1 year) and for products owned for more than 20 years. For new products, enjoyment may be the main driver of attachment, whereas for old products memories may be more important.

Keywords — Attachment, Product Experience, Sustainability, Memories, Enjoyment.

Relevance to design practice — Based on these results, several design strategies are proposed to intensify the emotional bond that users experience with their durable products: design more enjoyable products, develop products that are used together with other people, and design products that gracefully accumulate the signs of their usage history in their appearance.

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Introduction

Many objects that were once bought for their functional, hedonic or psychosocial benefits are eventually discarded. In some cases, consumers get rid of durable products that still function properly at the time of disposal (DeBell & Dardis, 1979; van Nes, 2003), because they look old-fashioned, because they are no longer compatible with other products, because new products on the market offer more possibilities, and so on. From the viewpoint of sustainability, a high product turnover is in many cases undesirable, because it produces waste and it uses up more scarce resources. Therefore, it is worthwhile to attempt to lengthen the psychological life span of durable consumer products (Cooper, 2000; van Hinte, 1997). One possible strategy to slow down product life cycles is by increasing the attachment people experience towards the products they use and own (e.g., van Hemel & Brezet, 1997). When a person becomes attached to an object, he or she is more likely to handle the object with care, repair it when it breaks down, and postpone its replacement as long as possible.

In the present study, we start out by defining the construct of consumer-product attachment, we develop a scale to measure it, and we use this scale to assess the degree of attachment consumers experience for a number of durable consumer goods. In addition, we investigate the measure's relationship to the product's degrees of irreplaceability, indispensability, and self-extension. Furthermore, we explore the determinants of consumer-product attachment by deriving a set of potential determinants and estimating their relative effect on the degree of attachment. We explore how attachment varies over the length of ownership and discuss the implications of our findings for design practice.

Consumer-product Attachment

We define the degree of consumer-product *attachment* as the strength of the emotional bond a consumer experiences with a durable product. Consumer-product attachment implies the existence of an emotional tie between a person and an object. An object to which a person is attached is considered to be special and typically means a lot to that person. Consequently, the person will experience emotional loss if that product is lost. In such circumstances it is unlikely for the person to dispose of the product.

It is important to establish that our primary interest is the *strength* of the emotional bond a person experiences with a product. We will not further investigate the exact *nature* of the different emotions that are elicited (for this type of research see, e.g., Desmet & Hekkert, 2002). Nevertheless, we would like to add that people mostly report that they experience positive emotions towards the products to which they feel attached. Schultz, Kleine, and Kernan (1989) counted 83 different emotions when they

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asked 95 respondents to describe the feelings they experienced while thinking about an object that would be extremely hard to part with. In most cases, these emotions were positive, such as happiness, love, pride, security, and comfort. However, in certain cases the emotions could also be negative (e.g., sadness), for instance when the object was a memento of hard times.

Attachment differs from other consumer behavior constructs, because it focuses on the consumer's relationship with a particular product specimen. In contrast, product involvement (e.g., Laurent & Kapferer, 1985) addresses a person's feelings towards an entire product category, such as cars, whereas brand loyalty (e.g., Chaudhuri & Holbrook, 2001) and brand attachment (Fournier, 1998; Fournier & Yao, 1997) focus on the brand instead of the physical product.

People may hang on to products to which they are attached even when these products no longer function properly, suggesting good product utility is not a necessary condition for consumer-product attachment. In our opinion, the fact that a product fulfills its primary utilitarian function, such as indicating the correct time for a clock or transporting a person from one place to another for a car, does not contribute to the degree of attachment. Only in cases where a product performs better than average, for example because it is extremely easy to use, may this contribute to the degree of attachment experienced. To obtain a better understanding of the attachment construct, we investigate its relationship to the concepts of irreplaceability, indispensability, and self-extension.

Irreplaceability, Indispensability, and Self-extension

When a product is judged to be *irreplaceable*, it has a symbolic meaning to its owner that is not present in other products, even when they are physically identical. For instance, the fact that a particular person has physically touched the product or that the product was obtained in a special context (during a trip, at a birthday party) has made it unique to its owner (see Belk, 1988; Grayson & Shulman, 2000). These feelings of irreplaceability are likely to form the most important component of attachment, because they are based on the personal, idiosyncratic relationship with the product, whereas other components are mainly determined by the (more distant) producer and seller. Therefore, we expect a tight relationship between measures of irreplaceability and attachment.

In cases where a product is judged to be *indispensable*, it is often so for practical reasons, not for emotional reasons. The

product cannot be missed, because it is needed to perform certain functions. Since attachment can occur irrespective of the product's success in fulfilling its primary utilitarian function, attachment is unlikely to be related to a product's indispensability. Also, the degree of irreplaceability will not be related to the degree of indispensability.

Our definition of attachment differs from the one used by Ball and Tasaki (1992), who define object attachment as "the extent to which an object which is owned, expected to be owned, or previously owned by an individual, is used by that individual to maintain his or her self-concept" (p. 158). Their definition implies that attachment is identical to *self-extension*. Their view seems to be shared by Kleine, Kleine, and Allen (1995), who see attachment as "a multidimensional signifier of self-extension" (p. 341).

In our opinion, however, self-extension (Belk, 1988) is related to attachment, but is not the same as attachment. Indeed, when a person feels emotionally attached to a possession, the product may be regarded as part of the self: what is 'mine' becomes 'me'. However, emotional attachment does not seem to be a necessary prerequisite for self-extension. People may regard their possessions in general, including those owned for utilitarian purposes, as self-extensions (Prelinger, 1959). McClelland (1951) suggests that some objects become viewed as parts of the self when a person can exercise power or control over them. For example, a carpenter may perceive his tools as self-extensions because he needs these tools to perform his job. In addition, his tools are part of his identity: without them he does not feel a carpenter anymore. Thus tools may be appreciated for both their emotional and their utilitarian benefits. Therefore, we expect the degree of self-extension to be related both to measures of the strength of emotional attachment (irreplaceability) and utilitarian consumer-product relationships (indispensability). In conclusion, the relationships between attachment, irreplaceability, indispensability, and self-extension are expected to exhibit the pattern shown in Figure 1.

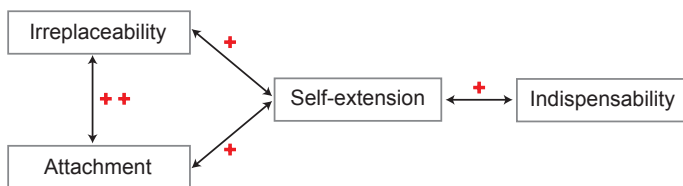


Figure 1. Expected interrelationships between product attachment, irreplaceability, self-extension, and indispensability.

Exploring the Determinants of Attachment

People form feelings of attachment to objects irrespective of the primary functions these products perform. Why then do people become attached to objects? In the consumer behavior literature, several authors have pointed out that people use objects to define the self, to create a sense of identity, to remind themselves and others of who they are or who they would like to be, and to protect and enhance their self-concept (e.g., Ball & Tasaki, 1992; Belk, 1988; Wallendorf & Arnould, 1988). According to Greenwald (1988), four facets can be distinguished in a person's self-schema: the diffuse self, the private self, the public self, and the collective

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self. Each facet provides a basis for self-evaluation. If people become attached to objects because these objects help to define and maintain the self and this serves to enhance a person's feeling of self-esteem, then the four facets of the self-schema may indicate which variables affect the degree of attachment between a person and an object. We therefore used these four facets to propose four possible determinants of attachment (Figure 2).

The *diffuse self* strives for hedonic satisfaction. It has its roots in the body's innate pleasure and pain responses. The existence of a diffuse self suggests that product enjoyment is a driver of attachment. This contains sensory pleasures experienced during usage, aesthetic pleasure derived from a beautiful appearance, enjoying the familiarity of a well-known product, and so on. The *private self* aims at individual achievement; it tries to meet internal, personal standards. This implies products should help in defining a person's being, wants and abilities. Products to which we become attached should reflect our identity, individuality, independence, uniqueness, skills, goals, and achievements. The *public self* looks for approval of others. Products that support the public self thus define the important others for a particular person; they symbolize a person's relationship to family members, friends or social groups. Also, they may consist of tokens of approval from significant others, such as heirlooms, gifts received from loved ones, and gifts received at special occasions. The *collective self* searches for approval from a reference group. After internalizing the norms of a reference group, people may strive to conform to these norms. Examples of important reference groups are the inhabitants of a country, a religious community, a subculture, or an ethnic minority. The corresponding objects do not refer to specific people in the reference group, but they symbolize an idea, a philosophy of life or an intangible, abstract entity; elements of a person's life vision. Objects include books, works of art, and ornaments like amulets, crucifixes, decorative pins, and precious stones.

The distinction between the four facets of the self bears resemblance to Jordan's (2000) description of the four different types of pleasure that people may seek in products: physio-pleasure, psycho-pleasure, socio-pleasure, and ideo-pleasure. It also relates to the three levels of information processing that result in different types of design focus according to Norman (2004): visceral design, behavioral design, and reflective design. In all three frameworks, the first and most basic level involves direct sensory gratification, whereas the last level involves high-level cognitive elaboration linking the individual product experience to its societal, cultural, and historical context. At the intermediate level, the public self is closely related to the enjoyment derived

from relationships with others (socio-pleasure), and is likely to be considered in reflective design processes. The main discrepancies between the frameworks seem to occur for the remaining levels. For instance, behavioral design is concerned with the execution of well-learned, routine behaviors and skills. On the other hand, psycho-pleasure is derived from products' cognitive demands. Although these areas partly overlap, psycho-pleasure may also involve complex cognitive elaboration, whereas behavioral design may involve perceptual skills and basic emotional responses. Furthermore, the private self does not only involve personal achievement on cognitive or routine tasks, but involves life as a whole.

The structure of our exploratory conceptual model is summarized in Figure 2, which shows how each of the four facets of the self leads to a possible determinant of product attachment: enjoyment, individual autonomy, group affiliation, and life vision. These four determinants make explicit the different ways in which products can be instrumental in supporting the owner's self. For instance, a product that provides enjoyment through its beautiful appearance can support the owner's diffuse self. Note, however, that the determinants themselves do not depend on emotional reactions. They point out the ways in which the product can provide meaning to its owner and are part of the appraisal process that can evoke emotional reactions (e.g., Desmet & Hekkert, 2002). The degree of attachment, on the other hand, is dependent on the intensity of the emotional reactions to the product.

Besides these four determinants, we investigate the effects of two additional variables on the degree of attachment. The first of these factors is product utility: the product's usefulness, its durability, its reliability, and so on. As noted above, product utility should not contribute directly to attachment. However, a product that is used often may give the consumer a feeling of familiarity and of being home. Also, the product may perform its basic task so well that the consumer really enjoys using the product. In both cases, the consumer may develop emotional attachment to the product that is not derived directly from its primary utilitarian properties, but from the enjoyment evoked by the product.

A second factor that is unlikely to have a direct effect on the degree of consumer-product attachment is the market value of the product, because the monetary value of a product is probably largely independent of its emotional value. Nevertheless, a valuable product may be used as a status symbol to impress other people. In that case, the product serves as a token of achievement and will support the private self. Hence, we either expect the market value of the product to have no separate effect on product attachment, or to be part of the individual autonomy factor.

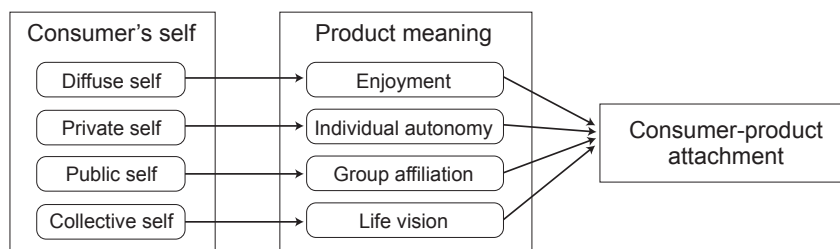


Figure 2. Proposed conceptual model of consumer-product attachment.

Changes Over Time

From the viewpoint of sustainability, it is interesting to determine changes in the degree of consumer-product attachment over time, because they will partly be responsible for the moment of product disposal. Ball and Tasaki (1992) distinguish between five stages in the development of attachment and disattachment for a particular product: preacquisition, early ownership, mature ownership, predisposal, and postdisposal. Although the length of these stages may differ considerably between products, they seem to apply to all types of products.

Feelings towards a product may already start to develop before the product is actually obtained. A person planning to buy a product, but lacking sufficient money to buy it, may already fantasize about how it will be to own or use the product (Desmet & Hekkert, 2002; MacInnis & Price, 1987). Producers can stimulate such feelings towards new products through advertising. These feelings are likely to enhance the degree of product attachment a person experiences after the product has been acquired.

The moment of product acquisition is very important in providing the first occasion for physical contact with the product and for opening up the possibility for memories to be formed. If the product is a gift, a special person may present it at a special occasion. The current owner may have bought the product in a special store or in a place far from home. These circumstances affect a person's initial feelings toward a product and are likely to affect the emotions experienced during ownership.

The objects in people's homes belong to one of the three intermediate stages distinguished by Ball and Tasaki (1992): early and mature ownership and predisposal. During ownership, consumption activities can be defined as storing, using, maintaining, repairing, and disposing of the purchased product (Nicosia & Mayer, 1976). A consumer's emotions with regard to a specific product are likely to change over time due to dynamics in the target product (e.g. loss in functionality, change in appearance), the consumer (e.g. increased age, change in family life cycle, move to another house), the product-consumer interaction (e.g. different usage, ownership), and the situational context (e.g. fashion changes, technological improvements). Given the large number of durable products that are bought and owned in affluent societies, it is likely that disattachment for many products starts soon after the product is acquired, whereas only few products remain cherished for a long time.

The Present Study

In the present study, we used a questionnaire to investigate the degree of consumer-product attachment that people feel to some of the durable products they typically own: a lamp, a clock, a car, or an ornament. We measure the degree of attachment to each product and investigate its relationship to the product's irreplaceability, indispensability, and self-extension. In addition, we estimate the effects of seven possible determinants on the degree of attachment and determine how attachment varies over the time of ownership.

Method

Respondents

A questionnaire was sent to 200 newly recruited members of a consumer household panel based on a random sample of the local community. Since one of the products investigated was a car, we restricted our sample to car owners. 161 usable questionnaires were returned in time, a response rate of 80.5 percent. Of the 161 respondents, 103 (64%) were males. Ages ranged from 21 to 78 years, with an average age of 51. Almost half of the sample had a higher vocational (29%) or academic (18%) education.

Questionnaires

In previous investigations of product attachment, consumers were typically asked to name one or more products to which they felt either very attached or not attached at all, and then to indicate the reasons why they were (not) attached to these products (e.g., Csikszentmihalyi & Rochberg-Halton, 1981; Hirschman & LaBarbera, 1990; Kamptner, 1991; Wallendorf & Arnould, 1988). The disadvantage here is that many different products are mentioned and only product cases characterized by very high or very low attachment are investigated. The first disadvantage makes it difficult to determine which reasons are specific for the product category and which are general. The second disadvantage may result in a selected set of possible determinants. In addition, the degree of attachment will not be distributed normally, which hampers the use of statistical methods to determine the relative impact of various determinants.

To avoid these disadvantages, we instructed respondents to choose a product specimen from a prespecified category of consumer durables and to answer all questions in relation to this product. To obtain substantial variation in the degrees of attachment experienced, we chose four categories of consumer durables that were expected to vary considerably in average attachment: lamps, clocks, cars, and ornaments. We expected attachment to be higher for cars and ornaments than for lamps and clocks. Cars are relatively expensive and may be used as a status symbol, while ornaments are likely to be loaded with memories, either because they were received as an heirloom, or because they were received as a gift from a loved one. Lamps and clocks may vary from very common, low-cost products to high-end design objects.

With our approach, we probably still overestimate the degree of attachment that people experience with respect to an average durable product. First of all, in being asked to select and evaluate a durable product currently owned by a person, the chance that the product is a cherished product is relatively high, since these are kept for longer and have a higher probability of being in the sample. In addition, people may be more likely to think of a product they cherish when they are asked to mention one. Nonetheless, the variation in the degree of attachment is likely to be larger in our study than in any of the studies mentioned above.

We developed four versions of a mail questionnaire that differed only with regard to the target product category. Each respondent filled out a questionnaire for one product. A similar

number of questionnaires was returned for the four versions (39 lamp, 38 clock, 40 car, 44 ornament). First, respondents chose a specimen from the product category indicated and described and/or drew the appearance of this product. They were asked to nominate why they had chosen this particular alternative. These two questions served to focus attention on the target product specimen. The next questions assessed the way in which the product was acquired and the duration of ownership.

Subsequently, respondents indicated to what extent they agreed with 28 statements regarding their relationship with their product (see Appendix 1) on five-point Likert scales (strongly disagree, disagree, neither agree nor disagree, agree, strongly agree). The majority of these items were generated by the authors after an extensive literature review and were used to assess the degrees of attachment (9 items), irreplaceability (5 items), and indispensability (6 items). In addition, this part contained 8 items of Ball and Tasaki's (1992) attachment scale, which we refer to in this paper as the self-extension scale. The ninth item of this scale (I don't really have too many feelings for this product) was excluded, because it assessed attachment and not self-extension in our view.

Forty-eight statements were used to measure the various possible determinants of attachment on the same five-point Likert scales. The statements represent the four possible determinants identified (enjoyment, individual autonomy, group affiliation, and life vision) and the two factors that were not expected to influence attachment directly (product utility and market value). The authors generated all statements. In addition, we included the four scales investigated by Grayson and Shulman (2000) as determinants of irreplaceability: temporal indexicality, corporal indexicality, psychic energy, and social visibility (see Appendix 2).

Results

The Attachment Construct

We performed a confirmatory factor analysis (CFA) in LISREL using the items formulated to measure the four target constructs in Figure 1: attachment, irreplaceability, indispensability, and self-extension. CFA is the theory-driven twin of the exploratory factor analysis. A CFA estimates the relationships between a number of predefined latent constructs and simultaneously tests the properties of the items used to assess these constructs. CFA generally provides a very strict and critical test of the homogeneity of the instruments used to assess the latent constructs. As a result, the items in models with good fit according to common CFA criteria may be assumed to yield homogeneous scales of the target constructs, and items with slightly different meanings or meanings related to other constructs in the model tend to be excluded.

The first model that included all items for the four target constructs proved to be unsatisfactory [$\chi^2=1492$, $df=344$, $p=0.00$, $GFI=0.64$, $RMSEA=0.13$, $CFI=0.66$, $NNFI=0.63$]. Among the eight items of the self-extension scale, six had a multiple squared correlation below 0.50, indicating that the scale is highly heterogeneous. To purify the measures and to improve the fit of the model, we deleted items with squared multiple correlations below 0.35, with high cross-loadings, and with high modification indices. This yielded a model with acceptable fit [$\chi^2=248$, $df=84$, $p=0.00$, $GFI=0.83$, $RMSEA=0.10$, $CFI=0.89$, $NNFI=0.86$]. The improvement in fit was significant [pseudo $\chi^2(260) = 1244$, $p<0.01$]. In this model, the attachment scale consisted of 5 items ($\alpha=0.87$), the indispensability scale had 4 items ($\alpha=0.80$), and the irreplaceability scale ($\alpha=0.80$) and the self-extension scale ($\alpha=0.71$) both contained 3 items.

An overview of the items retained in the model and those that were deleted from the model can be found in Appendix 1. As the CFA criteria tend to be quite strict, we cannot supply a theoretical reason for every item that has been eliminated. Nevertheless, the items of the self-extension scale indeed seem to fall roughly into two groups. The items that were retained generally depict the product as a fairly neutral source of information about the respondent, while most of the deleted items suggest emotional reactions to the product (irritation, praise, feel attacked). In addition, the retained items only involve the product owner, whereas most of the deleted items depict a social context involving other people as well.

The pattern of correlations between the constructs in the final model (Table 1) is in line with our expectations as described by Figure 1. Hence, the degree of attachment is most closely linked to the extent to which a product is irreplaceable. Furthermore, self-extension has both an emotional component (related to attachment and irreplaceability) and a functional component (related to indispensability).

Scales for Determinants

The statements regarding possible determinants were subjected to an exploratory principal components analysis (PCA) with varimax rotation in SPSS to find out whether the determinants proposed in Figure 2 would be identified as separate variables. This PCA yielded 11 factors with Eigenvalues above 1 and 72% of total variance explained (Appendix 2). On the basis of the exploratory PCA, we selected the items with the highest absolute loadings on a specific factor. These items were used to form a measurement scale for the various determinants. For each measurement scale, we calculated Cronbach's α as a measure of internal consistency. We checked whether deleting any of the items would improve α , but this was not the case for any of the scales.

Table 1. Phi coefficients (with standard errors) for attachment, self-extension, irreplaceability, and indispensability

	Self-extension	Irreplaceability	Indispensability
Attachment	0.74 (0.05)	0.86 (0.03)	0.21 (0.09)
Self-extension		0.48 (0.08)	0.57 (0.08)
Irreplaceability			0.15 (0.09)

According to Figure 2, we expected to find a distinction between product enjoyment, individual autonomy, group affiliation, and life vision in the determinants. Our outcomes showed that this was only partly correct and that several adaptations of this structure were necessary. The first factor in the PCA obtained high loadings from items involving *memories* of persons, events, and places (12 items, $\alpha=0.92$). This factor included all items from the temporal and corporal indexicality scales (Grayson & Shulman, 2000) and several items of the group affiliation factor. The second factor consisted of items that referred to an object's value in supporting the person's *self-identity* (5 items, $\alpha=0.85$) and largely concurred with the individual autonomy factor we had in mind. Factor 3 contained items referring to a product's *utility* and the extent to which the product made a person independent from others (8 items, $\alpha=0.86$). Factor 4 assessed importance to a person's *life vision*, both religious and political (6 items, $\alpha=0.84$). The next factors assessed product *enjoyment* (7 items, $\alpha=0.81$), *market value* (3 items, $\alpha=0.90$), and product *reliability* (3 items, $\alpha=0.67$). Thus, instead of one general product utility factor, we found two separate components for product utility and product reliability. The subsequent four factors consisted of one item only and were not used in subsequent analyses. The percentage of variation explained by the first 7 factors in the PCA is 59%.

For each respondent we averaged the ratings on the individual items for each measurement scale, to obtain that person's scores on the seven determinant scales. These scores were used as input for all subsequent analyses. Pearson correlation coefficients between the seven determinant scales were low ($|r| < 0.3$).

Prediction of Attachment for the Four Products

Attachment scores for the different products were compared using one-way analysis of variance (ANOVA) in SPSS. Each respondent's attachment score was calculated by averaging the responses on the five items selected for the CFA model, after recoding the responses for the two reversed items (see Appendix 1). The mean attachment scores were significantly higher for the ornament (3.6) than for the three other products (lamp 2.9, clock 3.2, and car 2.9) (post hoc Student-Newman-Keuls (SNK) test, $p < 0.05$) (see Figure 3).

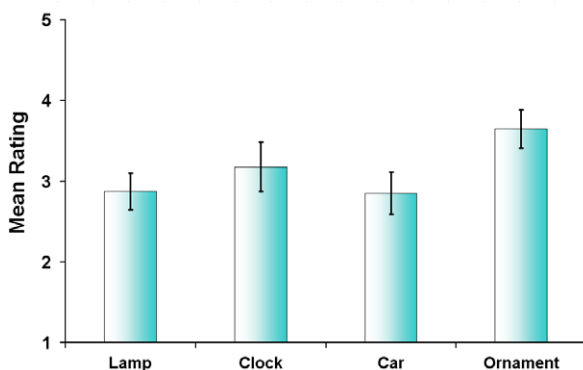


Figure 3. Mean degree of attachment ($\pm 2SE$) for the four product categories.

To investigate the impact of the various possible determinants of attachment, we performed a regression analysis in which the individual scores on the attachment scale were used as the dependent variable and the individual scores on the 7 determinant scales were used as predictor variables. Table 2 shows the results of this analysis performed for the aggregate data set and for each of the four products. The second and third columns in Table 2 show the mean rating and the standard deviation for each determinant in the aggregate data set.

To test for significant differences between the four products in the effects of determinants on attachment scores, an additional analysis was performed using JMP 4.0 (SAS, 2000). In the latter analysis, differences in attachment ratings between products were taken into account by introducing three dummy variables in the overall regression equation. In addition, product-specific differences in the sizes of the effects of the determinants were determined using interaction variables created by multiplying each normalized determinant by one of the three product dummy variables. For this additional analysis, the ornament was arbitrarily chosen as the product to which the three other products were compared. The last column of Table 2 shows the regression coefficients for the seven determinants, after the product-specific effects in the overall regression analysis had been removed. Only significant effects are mentioned below.

Memories enhanced attachment formation: the extent to which a product evoked memories was positively related to the degree of product attachment. This effect was significant for three out of four products. In addition, the extent to which respondents enjoyed using the product was positively related to the degree of attachment. This effect was significant for cars, but not for the other three products. The extent to which enjoyment affected the degree of attachment might not be the same for the four products investigated here: the product \times enjoyment interaction effect approached significance [$F(3, 124)=2.54, p=0.060$]: for cars the enjoyment effect seemed to be stronger than for ornaments [two-tailed $t=2.39, p=0.018$]. For utility, a negative coefficient was found in the analysis for clocks. However, this result was not supported by a significant main effect or a product-specific utility effect in the additional overall analysis. In conclusion, these analyses suggested that memories and enjoyment both were positively related to attachment, whereas self-identity, product utility, life vision, market value, and product reliability were not related to attachment.

Changes Over Time

When the average degree of attachment was plotted as a function of the length of the ownership period, attachment was found to decrease after the first year, but it was highest for products owned for more than 20 years (Figure 4). This finding was partly substantiated by ANOVA with post hoc SNK tests: attachment ratings for products owned for over 20 years were significantly higher than the ratings for more recently acquired products ($p < 0.05$), but attachment for new products (< 1 year) was not significantly higher than for those owned between 1 and 20 years ($p > 0.05$).

Table 2. Regression coefficients obtained when 7 determinants were used as predictors of consumer-product attachment for the four individual products and for the overall data set

Determinant	Mean	SD	Lamp	Clock	Car	Ornament	Overall	Overall corrected †
Enjoyment	3.24	0.60	0.47	0.44	1.02**	0.24	0.56**	0.54**
Self-identity	2.28	0.75	-0.03	0.16	-0.07	-0.01	0.02	0.01
Memories	2.22	0.79	0.60**	0.62**	0.48	0.50**	0.57**	0.55**
Life vision	1.54	0.49	0.03	-0.26	-0.08	-0.02	-0.04	-0.08
Utility	2.85	0.78	0.09	-0.45*	0.05	-0.27	-0.13	-0.14
Reliability	3.85	0.66	-0.07	0.02	-0.07	0.00	-0.02	-0.03
Market value	2.69	1.01	-0.25	0.22	-0.03	0.10	0.06	0.01
R ²			0.52**	0.65**	0.62**	0.56**	0.58**	0.65**

† Results after product-specific effects were removed

** $p < 0.01$, * $p < 0.05$

The individual products generally replicated this pattern, in that means for new (<1 year) and old (>20 years) products tended to be highest. Note, however, that new clocks and old cars were not present in the current sample. When the ANOVA was performed per product, we found that respondents were more attached to clocks owned for more than 20 years than to clocks owned for a shorter period of time. Furthermore, respondents were attached more to ornaments obtained recently (<1 year) than to ornaments owned for 1-3 years. No other effects were significant ($p > 0.05$).

ANOVA showed significant differences for the determinant variables memories ($p < 0.01$) and enjoyment ($p < 0.05$) between the various categories for length of ownership as well. The shapes of the curves for these determinants resembled the relationship found for attachment (Figure 4). For memories, the ratings for products owned longer than 20 years were significantly higher than for those acquired more recently (SNK test, $p < 0.05$), whereas for enjoyment, products owned for less than one year were enjoyed more than those obtained 4-20 years ago ($p < 0.05$). The means for the individual products followed the overall trends for memories and enjoyment. Nonetheless, ANOVAs for the four separate products only showed one significant effect: new ornaments (<1 year) were enjoyed more than older ones (1 year or more) ($p < 0.05$).

Discussion

Measurement of Attachment

The results of the confirmatory factor analysis indicate that we were able to assess consumer-product attachment in an internally consistent way. In addition, in accordance with our hypotheses, attachment was highly correlated with irreplaceability, and to a much lesser extent with functional necessity as captured by indispensability. Also, we found that self-extension was related to, but not identical to attachment. The correlation of 0.74 between these two constructs (Table 1) is in line with the values Sivadas and Venkatesh (1995) found in a similar analysis.

Determinants of Attachment

Our original model in which the degree of attachment was conceptualized as a function of four determinants (product enjoyment, individual autonomy, group affiliation, life vision) that corresponded to four facets of the self (diffuse self, private self, public self, collective self) was not supported by the data. Our outcomes supported the importance of the diffuse self (enjoyment) and the private and public selves (memories), but did not support any role of the collective self (life vision). In addition, the role

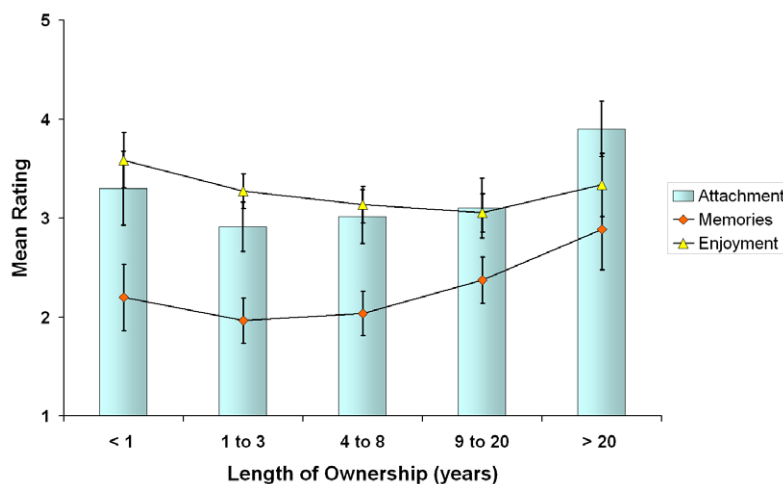


Figure 4. Attachment, memories, and enjoyment (± 2SE) as a function of length of ownership.

of the private self was smaller than expected, given that the self-identity factor did not contribute to the prediction of attachment.

The attachment process proved to be quite similar for the different product categories in the present study. Memories and enjoyment affected the degree of attachment for all products, although the relative importance varied. Therefore, although the attachment process can be studied at the aggregate level, product differences should be taken into account.

The finding that attachment was not related to all facets of the self in the present study might be due to the limited number of products investigated here, because only a complete ensemble of objects a consumer owns may be able to represent the diverse aspects of that person's self (see Belk, 1988). Perhaps other types of products might provide better evidence for the role of supporting self-identity in product attachment. For example, the budget may restrict the extent to which a product can be bought that reflects that person's self-identity; a consumer may not be driving his or her ideal car, because that one is too expensive. Also, products that support self-identity are more likely to be found among products that are partly or totally self-made (Mugge, Schifferstein, & Schoormans, 2004), or that are used conspicuously in public, like clothes (Bearden & Etzel, 1982).

In contrast to previous work in which the spiritual meaning of products was found to be important (Hirschman & LaBarbera, 1990; Mehta & Belk, 1991), we found no effect of life vision on attachment. The life vision effect may be absent, because average ratings on this scale were very low for all products, with 89% of the respondents having a mean rating of 2 or lower. Because many ornaments have a religious meaning (e.g., a crucifix for Roman Catholics), we expected to find the highest ratings for life vision for ornaments, but these were similar to the ratings for the other products ($p > 0.20$).

Changes Over Time

We found that attachment varied with duration of ownership. It was generally high for very new objects and for objects owned for a long time. The variation in the means for attachment, enjoyment, and memories in Figure 4 suggests that the reasons underlying attachment may be different for those two cases. The means for enjoyment are highest for recently acquired objects, while the means for memories are highest for the older objects. Hence, enjoyment might be the primary reason for people to become attached to newly acquired objects (like when you enjoy driving a new car just after you have bought it), whereas memories might be the primary reason for attachment to products people have owned for a long time (like when you look at an heirloom that reminds you of your grandfather). Objects people have owned for a long time may evoke many memories, and are likely to accumulate even more memories over time.

Design Implications

Our outcomes have several implications for designers seeking to increase the sustainability of people's consumption patterns by stimulating the degree of attachment between people and the

products they own. The present study suggests that designers should design products that evoke enjoyment, or facilitate the formation of associations between products and people, places or events (memories).

The first factor suggests that designers should create products that are both useful and enjoyable. This asks for products that evoke sensory and aesthetic pleasure. A corresponding design strategy may begin by evaluating the signals emitted by a product and the corresponding sensations perceived by the sensory systems (vision, audition, touch, smell, and taste) during use. The designer could then look for a pleasant combination of ways to stimulate the product user (MacDonald, 2002; Schifferstein & Desmet, 2008). Some rules of aesthetics concern the integration of information over multiple sensory modalities. For example, people seem to like sensory messages to be mutually consistent and appropriate to the product conveying them (e.g., Bell, Holbrook, & Solomon, 1991; Veryzer & Hutchinson, 1998). Gratifying all the senses simultaneously in a coherent and harmonious way may provide a means to evoke an enjoyable, engaging experience (Schifferstein & Hekkert, in press).

Another way to evoke enjoyment through products, which may at first seem to conflict with the first option, is by incorporating surprise into products, since such products are found to be more enjoyable (Vanhamme & Snelders, 2003). In addition, surprise is not a one-time effect only. Although the intensity of the surprise reaction decreases over time, it may occur repeatedly (Ludden, Schifferstein, & Hekkert, 2008b). The challenge in these cases is to combine familiarity and originality within the same design. Even designers who want to surprise people will generally make sure that the majority of the product-related information communicates the same message, while only one particular aspect is responsible for the element of surprise. Designers typically limit surprising designs to well-known product categories that consumers can easily identify, such as furniture and other interior products (Ludden, Schifferstein, & Hekkert, 2008a) to enhance the familiarity in their designs.

The strategy for increasing product enjoyment is likely to be most successful if it also supports the accumulation of memories. The present outcomes suggest that a strategy based on the accumulation of memories is the most promising for increasing attachment in the long term. However, the memories connected to a product are usually not under the designer's control since they typically involve an individual's connections to people, places or events that are important only to that particular individual. However, if the interaction with a product is so engaging that it stimulates product use, it also increases the opportunity for memorable events to occur. For instance, if driving your car is an enjoyable experience, you will be more likely to take the car to go on holiday: it makes you feel safe on the road, it protects you from heavy wind and rain, it enables you to see beautiful landscapes, it allows you to meet interesting people, and so on.

Another possible strategy to increase the number of memories associated with the product might be to develop products that are suitable for gift-giving, because receiving a gift at a special occasion is likely to be experienced as a memorable event. However, Kleine et al. (1995) found that many possessions

received as gifts invoked only weak attachment. For a gift to become a high-attachment product, it should reflect the receiver's personal identity. As a consequence, the success of a gift depends on the giver's capacity to judge what kind of product the receiver would like to have, which is not under the designer's control.

Another way of increasing the number of associations is by designing products that will be used in a social context and that encourage the interaction between people (e.g., Battarbee & Koskinen, 2008). Just like a wooden toy reminds you of the friends you used to play with when you were a child, electronic game consoles such as the Nintendo Wii can remind you of the joyful and exciting experiences you shared with friends and family members. Similarly, your cell phone may remind you of the pleasant conversations you shared with friends.

The recollection of memories may be enhanced if a product shows physical signs of the events. For instance, a scratch on your leather jacket may remind you of losing your balance after a fabulous night of partying. If a designer chooses materials that age with dignity, these marks of use do not necessarily degrade the product's appearance, but can add to the richness of the shared history of the owner and the product (van Hinte, 1997).

In the present paper, we presented several approaches designers can use to improve the enjoyment people experience from their products or to facilitate the formation of personal memories connected to the products. These approaches exemplify strategies that can be instrumental in increasing the degree of attachment that people experience towards the products they use and own. Because strengthening the consumer-product bond may contribute to increasing product lifetime, we hope these design strategies will eventually contribute to the development of more sustainable consumption patterns (Mugge, Schoormans, & Schifferstein, 2005).

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Appendix

Appendix 1. Scales tested in the confirmatory factor analysis

Item	Included in final scale
Attachment	
I feel emotionally connected to this product	Yes
This product is very dear to me	Yes
I have a bond with this product	Yes
This product has no special meaning for me (-)	Yes
This product does not move me (-)	Yes
I am very attached to this product	No
This product has a special place in my life	No
This product means a lot to me	No
I have no feelings for this product (-)	No
Irreplaceability	
Even a completely identical specimen cannot replace this specimen for me	Yes
Another identical product has the same meaning for me (-)	Yes
This specimen is different for me than other specimens of this type	Yes
This specimen is irreplaceable for me	No
If this product becomes unusable, I will buy exactly the same one again	No
Indispensability	
Without this product, my life is fine (-)	Yes
This product is necessary for me	Yes
This product is indispensable for me	Yes
I need this product to live the way I want to live	Yes
For me a life without this product would just not be the same	No
This is a product that I can do without (-)	No
Self-extension	
This product reminds me of who I am	Yes
If I lost this product, I would feel like I had lost a little bit of myself	Yes
If I were describing myself, this product would likely be something I would mention	Yes
If someone ridiculed this product, I would feel irritated	No
If someone destroyed this product, I would feel a little bit personally attacked	No
If someone praised this product, I would feel somewhat praised myself	No
If I didn't have this product, I would feel a little bit less like myself	No
Probably, people who know me might sometimes think of this product when they think of me	No

(-) indicates a reversed item

Appendix 2. PCA of possible determinants of attachment

Item	Factor										
	1	2	3	4	5	6	7	8	9	10	11
Eigenvalue (after rotation)	7.1	4.6	4.4	3.9	3.5	3.0	2.1	1.7	1.6	1.5	1.4
% variance explained	14.7	9.5	9.1	8.1	7.3	6.2	4.3	3.4	3.4	3.1	2.8
This product gives me the feeling that I am loved and cared for	.80										
This product is evidence that something has happened	.79										
This product reminds me of persons who are important to me	.78										
This product symbolizes a bond with friends or family	.77										
This product is special because a special person (or people) was once physically in contact with it	.77			.33							
This product is special because a special person (or people) actually touched it	.76			.31							
When I look at this product, I think about who I was when I got it	.72	.33									
When I look at this product or touch it, I am transported back in time	.67										
This product is proof of something from my past	.67									.43	
If I lost this product, I would lose an important part of my history	.62					.33					
Over time, more and more meaning gets layered onto this product	.53				.42						
With this product I demonstrate what I stand for		.80									
This product symbolizes a specific way of thought that I hold		.79									
This product shows who I am		.75									
This product stands for a particular way of life		.70									
With this product I distinguish myself from others		.64									.44
This product makes life easier for me			.83								
This product is very useful			.77								
This product is very practical in its daily use			.76								
Thanks to this product I save a lot of time			.73								
This product enables me to do things myself, without needing the help of others		.33	.64								
This product gives me a feeling of independence		.44	.58						.32		
This product gives me confidence in the future		.36	.54								
This product protects me		.40	.43	.32		.34					
This product symbolizes my religion				.75							
This product is an expression of my political viewpoint				.75							
This product is blessed	.31			.74							
This product symbolizes my connection with the cosmos				.73							
I believe this product has a healing effect				.70							
This product possesses a special power			.31	.54							
I enjoy this product					.83						
It is a pleasure to use this product					.80						
I like to use this product					.65						
I feel good when I use this product					.63						
I like to show this product to other people		.42			.52						
This product evidences my taste, interest or knowledge		.42			.48						
I think about this product a lot	.43			.33	.44						

Appendix 2. PCA of possible determinants of attachment (continued)

Item	Factor										
	1	2	3	4	5	6	7	8	9	10	11
Eigenvalue (after rotation)	7.1	4.6	4.4	3.9	3.5	3.0	2.1	1.7	1.6	1.5	1.4
% variance explained	14.7	9.5	9.1	8.1	7.3	6.2	4.3	3.4	3.4	3.1	2.8
This product is worth a lot of money						.89					
This product is very valuable						.85					
This product has cost a lot of money						.82					
This product never refuses							.84				
This product is reliable			.30				.76				
This product functions properly							.61				
This product is really not for others to see								.75			
I bring, wear, or use this product outside my home in public									.82		
This product is part of a tradition										.67	
If I lost this product, I would lose a connection with someone*	.45									.47	
I have invested a lot of energy in this product											.65

*Due to its large loading on factor 1, this item was included in the memory factor.