
Product attachment and replacement: implications for sustainable design

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Abstract: This research investigated a number of main areas of attachment in order to determine how consumer-product relationships are formed and to identify whether these feelings influence replacement decisions. Primary research comprised of interviews with consumers to discuss the topic area in relation to three possessions selected for their attachment qualities. The research highlighted how attachment is determined by multiple themes, many of which are circumstantial to consumers' experiences and therefore difficult for designers to control. Findings showed that memories were the most prominent theme of participants' attachment, closely followed by pleasure and usability. Enjoyment and pleasure were found to be the primary reason for attachment to newly purchased items, whereas nostalgia was highest for older possessions. Appearance and reliability were found to have considerable influence on participants' attitudes towards replacement.

Keywords: product attachment; product replacement; sustainable design.

Reference to this paper should be made as follows: Page, T. (2014) 'Product attachment and replacement: implications for sustainable design', *Int. J. Sustainable Design*, Vol. 2, No. 3, pp.265–282.

Biographical notes: Tom Page is in Electro-Optics Development and Production and worked for Ferranti Defence Systems Ltd. in Edinburgh. In 1990, he took up a two-year fixed-term research assistantship at the Engineering Design Research Centre in Glasgow. Upon completion of this role, he taught computer-aided engineering at the University of Hertfordshire in Hatfield. Since moving to Loughborough University in 2003, he has taught electronic product design, interaction design, design and manufacturing technology and physical computing. His research interests are in engineering design, value management, technology education and electronic product design.

1 Introduction

Product attachment has been outlined as a feasible sustainable design strategy. Reducing our current 'throwaway culture' by increasing the ownership time of durable products has been highlighted as a concept that may help in creating an environmentally friendly future. To encourage product longevity consumers must feel a certain degree of emotional attachment towards the products that they own. Over time, feelings of sentimentality and nostalgia will develop and users will feel a stronger and more meaningful bond with their attachment product. These emotional ties that consumers have with their possessions have a considerable effect on postponing product replacement.

This work provides an overview of the main areas of attachment and identifies a number of consumer attitudes and feelings towards their possessions. A primary research study was undertaken to determine the types of products that consumers form attachment to. Conclusions drawn from findings identified the most prominent factors of attachment that designers may utilise to encourage the formation of consumer-product relationships. It was important to establish a clear difference between the attachment formed to products due to their functionality and usability and those developed because of the sentimental affection and personal meaning they have to the user. The primary interest of this research focuses on consumer attachments in order to provide designers with an attainable strategy to encourage design for longevity.

1.1 Aim of this research

The aim of this study was to explore the main determinants of consumer-product attachment to establish how these bonds are formed and to identify whether this concept could be used as a design strategy to postpone product replacement.

1.2 Objectives of this research

In achieving the research aim, the following objectives were realised: a review of literature available on consumer-product attachment; to identify the types of products consumers form attachment to concluded through a research study; and to analyse the data from the study to establish whether product attachment can affect consumer product replacement motives. Furthermore, this work identified how product attachment forms and how it affects consumers' replacement decisions.

2 Literature review

2.1 Sustainability in design

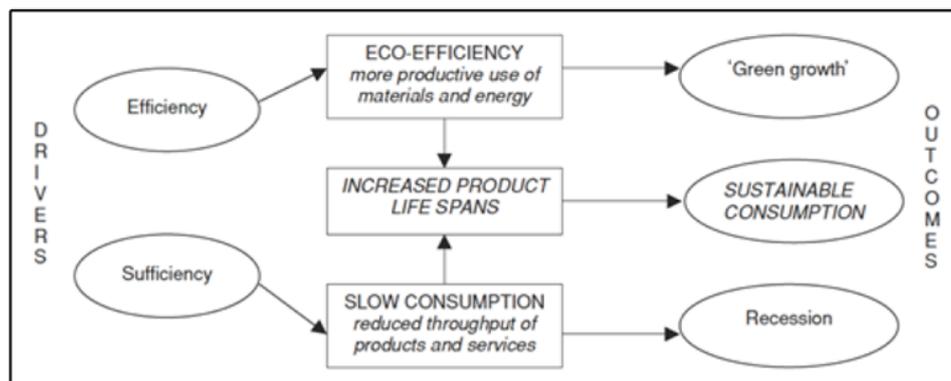
Sustainability has become a highly debated topic by designers and academics in recent years (Bhamra and Lofthouse, 2007; Chick and Micklethwaite, 2011). Chick and Micklethwaite (2011, p.81) define sustainable development as a 'diverse concept' due to the broad range of views and areas it encapsulates. Bhamra and Lofthouse (2007) suggest design is critical when addressing sustainable development and designers need to be encouraged to change the way they design and manufacture products. However, Cooper

(2005) explains that consumers also play a key role in sustainable development. Designers need to change the way they design and consumers need to change their attitudes towards the products they own before we are likely to see a significant change to the environment (Chick and Micklethwaite, 2011). Sustainable consumption has been defined as “patterns of consumption through which the purchase and use of goods and services meet people’s needs while minimising any environmental degradation” [Cooper, (2000), p.47]. In order for a change in consumption, consumers’ behaviour towards their products needs to change (Walker, 2006). Reducing our throwaway culture will assist in the progression towards an environmentally friendly attitude to consumption and will help in the overall drive to sustainable development (Mugge et al., 2005; Cooper, 2002).

Around 80% of a product’s environmental impact can be eliminated through better design. Designers are under increased pressure to produce products with a sustainable outcome (Chick and Micklethwaite, 2011). A number of strategies and guidelines have been proposed by various authors to support designers. Increasing product reliability, ensuring easy maintenance, designing for adaptability, recyclability and ease of disposal, product personalisation and encouraging attachment have all been outlined as methods of creating durable products (Cooper, 2000; Mugge et al., 2005). Similarly, Cooper (2005) discusses product durability and product life extension as key themes that will help to reduce frequency of disposal (Ehrenfeld, 2008).

Chapman (2005) defines durability as “just as much about desire, love and attachment, as it is functionality.” Products must be physically durable to last, however, without consumers’ attachment to their possessions there would be no desire or need to keep them (Grisaffe and Nguyen, 2011). Furthermore, designers need to respond to current consumption rates, designing products that last longer and satisfy the needs of the user (Cooper, 2000). Cooper’s (2005) model of sustainable consumption (Figure 1) indicates the potential product longevity has on slowing consumption rates. He suggests that the rate of consumption is reduced when products are easy to maintain. Considering these opinions, further research into product life extension and durability as suitable methods of sustainable design will be carried out and themes discussed (Lidwell et al., 2010).

Figure 1 Product life spans and sustainable consumption



Source: Cooper (2005, p.55)

2.2 *Product longevity*

The importance of product durability and increased life extension in relation to sustainable development has been recognised. Authors argue that for product life spans to increase consumers must keep their possessions for longer without replacing or discarding them (Mugge et al., 2005, 2010; Van Nes and Cramer, 2005).

Millions of products are disposed of and replaced globally each day (Cooper, 2010). Although replacement does not necessarily mean that a product has been discarded, consumers' ownership time of products is decreasing considerably (Van Nes and Cramer, 2005). Consumers often have little concern for the replacement of their possessions, discarding items that still function fully to buy newer models. With the constant progression of technology, perfectly functional products are quickly becoming obsolete, losing their desirability to the user once a new model is available. This attitude is the reason our throwaway culture has developed (Cooper, 2010).

It is considered by many authors that consumers are the main determinant of product longevity (Mugge et al., 2005; Van Nes and Cramer, 2005). Mugge et al. (2010) explain how replacement often depends on the consumer's experiences with and feelings towards their possessions. Developing from this, Mugge et al. (2005) have produced a number of determinants for product replacement. They suggest that loss of functionality, loss of usefulness, replacement need and shift in desire are all factors that motivate consumers to replace products. Similarly, Schifferstein and Zwartkruis-Pelgrim (2008), indicate three main drivers for users to replace their products: the product – appearance wears and functionality declines; the consumer – age and lifestyle; and the product-consumer interaction – change in usage and ownership.

Focusing on the product, Cooper (2005) argues that designers can influence replacement through adaptable design, improving ease of maintenance, repair, replacement and upgrade of parts. Designers need to develop dynamic and flexible products that can be upgraded and repaired. Furthermore, Mugge et al. (2005) offer a number of eco-design strategies for designers to address unsustainable consumer replacement. These include increasing product reliability and durability, implementing long life guarantee, designing modular or adaptable products to allow for individual component replacement or upgrade, creating a classic design, and strengthening the relationship between product and person (Hirschman, 1994).

Mugge et al. (2005), and Van Nes and Cramer (2005) agree that if a person experiences a strong relationship with a product they are more likely to care for it, repairing it when possible and postponing its replacement. When a person feels attached to a product detaching from it becomes undesirable as the special meaning of the product will be lost (Mugge et al., 2005). Many authors suggest that long-term product attachment will take place products are considered to be irreplaceable (Grayson and Shulman, 2000; Mugge et al., 2005). Schifferstein and Zwartkruis-Pelgrim (2008) define irreplaceable products as those that "have a symbolic meaning to their owner that is not present in other products, even when they are physically identical." Grayson and Shulman (2000) expand, suggesting that the irreplaceable aspects of a product are the feelings and memories attached to them. Although product longevity and attachment are separate concepts they do share similarities. Mugge et al. (2006) describe how the determinants of product attachment will indirectly affect product longevity. Their study indicates that product attachment is often developed with products over a lengthy period

of time and once formed will have a long lasting effect on product lifespan and ownership time.

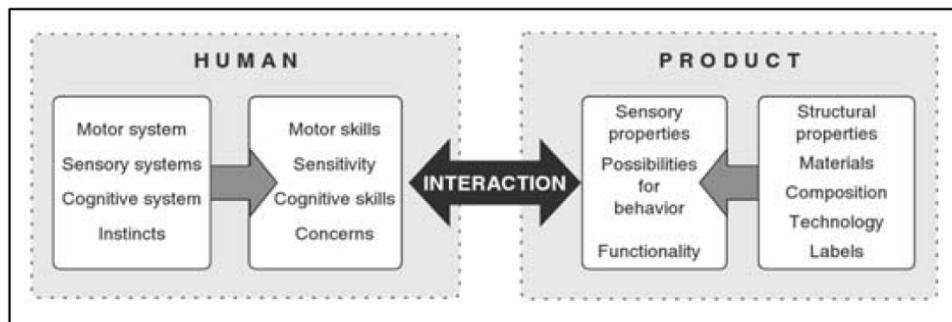
2.3 Defining product attachment

Product attachment has been defined as “the emotional bond a consumer experiences with a product” [Schifferstein and Zwartkruis-Pelgrim, (2008), p.1]. Mugge et al. (2006) explain how this relates to the emotional tie built between a user and a special possession. Product attachment is different from other forms of consumer behaviour as it focuses on the direct relationship between the user and product (Schifferstein and Zwartkruis-Pelgrim, 2008).

Norman (2004) discussed the main levels of emotional design. His framework indicates that attachment between user and product can be formed through three levels of involvement: visceral-product appearance and aesthetic appeal to the user; behavioural-product in use: effectiveness and pleasure of use; and reflective: personal satisfaction of using a product. Furthermore, he explains how every product will evoke a different form of emotion depending on the user (Ekman, 1992). However, it is important to note that most emotions experienced when using an attachment product are positive (Schifferstein and Zwartkruis-Pelgrim, 2008). Developing on this, Jordan (2000) proposes four types of pleasure experienced when using a product, psycho-pleasure, physio-pleasure, socio-pleasure and ideo-pleasure. This framework is globally recognised as means of establishing pleasure with products.

Fenko et al. (2011) discuss product attachment as a result of the interaction between user and product. They provide a model of human-product interaction (Figure 2), indicating that experiences with products often guide the attachment that forms between the two. It is in this interaction that products develop and obtain a specific meaning.

Figure 2 Model of consumer-product interaction



Source: Fenko et al. (2011)

Mugge (2007, p.13) believes that to obtain personal meaning, a product should provide the owner with “something exceptional over and above its utilitarian meaning.” Products need to exceed purely utilitarian function to become special and provide long lasting attachment. Additionally, Mugge (2007) proposes a set of meanings as possible determinants of product attachment: group affiliation-product is associated with user’s involvement in a group; self-expression-user’s identity is expressed through the product;

pleasure: product provides pleasurable in use; memories-product is a reminder of past events (Ekman, 1992). This model has similarities to the framework proposed by Norman (2004), however, does not highlight the importance of usability in the same way (Park et al., 2006). Although emotional attachments formed through memories and self-expression will create strong product-person bonds, for a product to be pleasurable to use it must function well and satisfy the user (Mugge et al., 2005).

2.4 Determining consumer-product attachment

Many studies reviewed on product attachment focus on consumers' most meaningful and cherished possessions. Ball and Tasaki (1992) however, take a broader overview of the types of products people form attachment with. They indicate that the types of products will vary across the population as background and lifestyles change (Holmes, 1993). Although meaningful items lend themselves to a strong user connection, everyday items can also serve attachment functions well. It is therefore difficult to define the specific types of products that consumers are likely to form a strong connection with (Kleine and Baker, 2004).

Designers have the difficult task of creating products that induce attachment. A set of criteria has been proposed by Schifferstein and Zwartkruis-Pelgrim (2008) to assist in the development of attachable products. The seven determinants, enjoyment, self-identity, memories, life vision, utility, reliability and market value, can be used as predictors of consumer-product attachment. Designers are encouraged to consider these themes when designing to help strengthen the product-consumer bond. It has been noted by several authors that memories play a key role in consumer-product attachment. Mugge et al. (2005) state that memories developed through regular interactions with a product affects consumer experience and strength of attachment. When memories are formed with a possession the owner will become more protective in fear that without the product these memories will be lost. Conversely, Mugge (2007) recognises that all products have the ability to obtain memories. When asked to think of stories associated with certain products people will often recall a number of experiences. Although most of these memories will be of little importance, there are still many connections through product use and the past. Objects that have been owned for a long time will evoke many memories, and will be likely to accumulate more as time goes on (Schifferstein and Zwartkruis-Pelgrim, 2008).

Mugge et al. (2005) have proposed a number of factors that enhance consumer attachment and memories. They suggest that stimulating social contact and allowing products to be shared and used with others will encourage associations with happiness and fond memories to form. This theory is significant as it relates to the previously discussed 'group affiliation' section from Mugge's (2007) definition of product attachment. Although difficult to guarantee, it is possible for designers to stimulate nostalgia through sensory design (Mugge et al., 2005). Odours are a particularly effective way of arousing feelings and stimulating senses. Mugge et al. (2005) discuss how implementing smells within products can be used as a way to encourage and trigger memories. Users will create associations with a particular smell and when experienced again the emotions and memories of the product will be aroused.

Mugge (2007) found that the accumulation of memories within a product could help to increase the enjoyment of use. Likewise, enjoyment is developed when a product is pleasurable to use and aesthetically pleasing in appearance. Jordan (2000) offers a list for designers to use to encourage pleasure within their designs. These areas include, form, materials, finishes and colour. Jordan explains that colour, in particular, is an element that evokes strong associations and attachment to products and can be influential on a person's mood. Product pleasure has a connection to enjoyment and the degree of satisfaction consumers feel towards their possessions. Mugge et al. (2010) suggest that the feeling of positive enjoyment stimulates strong product attachment.

Cooper (2005) stated that the appearance and form of products can often affect their lifespan. The way in which a product wears and ages is important to both product longevity and the attachment process (Chapman, 2009). Products should age with dignity, becoming more aesthetically appealing over time as materials and surfaces wear to show the product has been used and cared for. People often become more attached to products when they have small marks and scratches as these tell the history of use and strengthen the connection between product and user (Schifferstein and Zwartkruis-Pelgrim, 2008). Obviously, users will not develop attachment to all of their possessions (Mugge, 2007). Products that have been bought for functional reasons alone will not create the same attachment as those that evoke an emotional response (Ball and Tasaki, 1992). Reinforcing this notion, Schifferstein and Zwartkruis-Pelgrim (2008) suggest that product functionality does not contribute to the degree of attachment. It is only when a product is performing a task better than any others that attachment will occur. In addition, Chapman (2005) suggests that consumers are unable to sustain attachment with products that do not have character or individuality.

Several authors have highlighted product personalisation as an important method of forming attachment (Mugge et al., 2005; Oulasvirta and Blom, 2007; Schifferstein and Zwartkruis-Pelgrim, 2008). Personalisation encourages the creation of one off unique products that express one's self and personality. Strong connections will be developed with these products as they meet users every desire, often both aesthetically and functionally. Norman (2004) believes that the personal modifications made to objects are often what make them the most sentimental possessions people own (Langford and McDonagh, 2003). The experiences and memories associated with personalisation strengthen the attachment between consumer and product. Evidence from the overview of literature suggests that product attachment tends to develop over time. As consumers interact with their possessions, a bond begins to form between the two (Kleine and Baker, 2004). Schifferstein and Zwartkruis-Pelgrim (2008) however, found that attachment often varies with ownership time. They suggest that attachment is often highest for very new products and those that have been owned for a long time. Designers have the ability to encourage attachment to some extent by following the frameworks discussed by Mugge (2007), and Schifferstein and Zwartkruis-Pelgrim (2008). These authors have proposed a number of ways to enhance attachment yet do not suggest which are the most prominent areas. Designers can easily produce usable, functional and enjoyable products. However, the challenge lies with creating items that elicit memories and emotions. Due to the broad nature of the topic, more research is needed to establish the types and strengths of attachments users develop and whether the type of products they become attached to play an important role in this.

3 Methodology

A number of prominent areas have been identified as determining factors for why attachments are formed between people and their possessions. Theories of attachment were reviewed and have helped to broaden knowledge on the subject. Key themes have been taken from these studies and utilised in the development of an empirical study. Primary research was used to return some insightful consumer perspectives and attitudes towards the area of product attachment and present interesting areas for discussion. This section examines the research methods and methodologies that have been reviewed and used with the study.

3.1 Design of empirical study

The topic areas found to be most prominent within the literature review were chosen as a basis for the development of an empirical study. Using Schifferstein and Zwartkruis-Pelgrim's (2008) seven determinants of product attachment as a reference, a set of criteria were developed, as shown in Table 1. Adapting and developing from existing themes, these determinants focus on the key areas in forming consumer-product bonds. The list features determinants of attachment and a series of influential factors that affect the ways in which each are formed. The empirical study developed in this research aims to identify how and why people form attachments to their possessions and whether any similarities in the types of products they become attached to can be found. Considering users' feelings towards their products, the research study seeks to discover the degree of influence product attachment has on consumer replacement decisions.

Table 1 Determinants and influential factors of consumer-product attachment

| Determinants | Influential factors |
|-----------------|---|
| Memories | Stories of use, meanings and associations |
| Pleasure of use | Sensory pleasure and enjoyment |
| Appearance | Colour, form, materials and finishes |
| Usability | Functionality, quality and efficacy |
| Reliability | Longevity, durability and ease of repair |

3.2 Primary data collection

The primary research study consisted of interviews with 36 participants and aimed to investigate the degree of attachment people felt towards their favourite possessions. Participants were contacted prior to the interviews to be given information on the purpose of the study and were asked to think of three products they felt an attachment to. Table 2 indicates the criteria given to participants to follow when selecting their three possessions. Most participants were able to bring their chosen products or photographs of them to the interviews, however, some were unable to do so and were asked to describe their items in detail instead.

The interviews were structured around the five determinants of attachment (Table 1) to establish the most dominant areas. During the interviews, participants were asked to discuss their chosen possessions in detail and to explain their feelings of attachment. The

researcher prompted the participants with indirect, open-ended questions when necessary to ensure all topic areas and themes were discussed. Furthermore, they were encouraged to suggest which themes they considered to be most influential in their experience of product attachment and were asked to discuss their attitudes towards replacing each of their possessions. Results from this research were used to indicate whether a relationship between strength of attachment and product replacement exists. The interview discussions were insightful and provided a qualitative set of data on people's feelings of attachment and their views towards the topic area. The interviews were documented using audio recording and notes were taken to record participants' body language and key responses to questions. Before the interview began each participant was required to give his or her consent for recording to take place. Once the interview process was complete the audio recordings were reviewed and key responses transcribed. Participants have been kept anonymous for ethical reasons and have instead been referred to as participants A–L.

Table 2 Product selection criteria

| <i>Product</i> | <i>Criteria</i> |
|----------------------|---|
| A Sentimental | Product with high sentimental value due to the meaning and fond memories associated with it |
| B Pleasurable to use | Enjoyment and pleasure gained because of the way the product works and feels to use. |
| C Appearance | Aesthetically appealing product due to the form, styling, colours, materials and finishes used. |

3.2.1 Sampling

As qualitative research does not require a strict sampling method it was not necessary to form detailed inclusion or exclusion criteria for the interview participants. A sample of 36 consumers, differing in age and gender, was used to give a wide variety of responses. It was necessary to interview a number of people to ensure enough usable information was collected. Some participants gave a fairly limited response to the questions asked and had to be encouraged to elaborate on their answers. Interviews were kept to a maximum length of 30 minutes to ensure participants did not lose concentration or become distracted. The time restriction also prevented data collection from becoming too time consuming, making the study more manageable within the time frame available.

3.2.2 Pilot study

A pilot interview with five consumers was carried out to ensure all interview questions were relevant and would supply enough information on each attachment theme. Overall, there were too many questions within the initial interview template. Many went unasked or were answered in the participant's response to other questions. The interview structure was therefore simplified to a smaller set of key questions that were relevant to each of the five attachment themes. Further modifications were made to the phrasing of some questions to ensure participants understood what was asked of them. These alterations helped to make the final interview structure easier to follow and provided a manageable set of questions. Supplying less definitive questions meant that more interaction and free flowing discussions were held between the researcher and participants during the interviews.

4 Findings

In consideration of the results, a wide variety of products is apparent. Despite the range, some trends can be noted in the type of possessions selected. A number of watches were chosen, either as products with high sentimental value or aesthetically pleasing appearance. These were all found to have strong ties to family, either because they were given as a special gift or were part of a family custom. Several high tech electrical products were chosen as items that are pleasurable to use or visually appealing. Most of these products were fairly new purchases and were connected to feelings of desirability and enjoyment.

Memories were found to be the most prominent area of attachment as they were frequently discussed in every interview. There was emphasis from most participants that the fond memories and associations stimulated by products made them more valuable. Usability and pleasure were considered to be of next importance. Appearance and reliability were also significant, especially concerning motives for replacement. Due to the broad nature of data collected, results have been presented and discussed according to their relevance to the five determinants of attachment put forward in Table 1.

4.1 *Memories*

Many of the products discussed in the interviews were given as gifts, had significant family importance or were bought as souvenirs from trips and holidays. Associations with family were particularly influential to participant H's selection of his Rolex watch. Bought with some money given to him by his grandfather, he explained "the watch is very valuable because it is the only thing that reminds me of my grandfather" (Participant H). Family associations were similarly important in several other participants' product choices. Chosen for the connection it had to her grandmother, participant B selected an antique box that she had always played with and found completely fascinating as a child. The participant related the box to fond childhood memories and experiences connecting her to her grandmother.

Several souvenirs from trips were chosen because of the memories they elicit. Participants were enthusiastic when telling stories of their holidays and experiences travelling, indicating the happy memories these products hold. Many suggested the products were purchased and used as a "special memento of a holiday" (Participant E). When using the products, participants were reminded of their "once in a lifetime experiences" (Participant J) which added to their enjoyment of use. Most products selected for their sentimentality seemed to elicit nostalgia. For example, participants A and D, despite both owning several other guitars, chose their first as a product with strong sentimental attachment. Memories of using the guitars when they first began playing music made these products special. One participant explained how the guitar acts as a reminder of "a brilliant time" (Participant D) in his life.

Although memories were the forefront to most discussions as participants were telling stories of use and experiences, they were not as prominent for everyone. Items that had been owned for a shorter amount of time often had fewer fond memories associated to them. Newer items, such as participant B's Patagonia rucksack, which had only been owned for six months, had fewer significant memories, suggesting that in this case attachment was determined by other themes. Participants suggested the more they used

an item the more fond memories they associated with it. Participant B's surfboard is an example of a product that has become more sentimental with age. The participant described how the product evoked more memories since it had become worn over time, with each scuff and mark acting as a reminder of the stories and experiences had with the board.

4.2 Pleasure

From the product criteria specified in advance of the interviews each participant had one item that was chosen specifically for its pleasure of use. Participants emphasised the importance of this theme, suggesting feelings of attachment were stronger with possessions that were fun and enjoyable to use. The participants all agreed that their pleasurable products did not have the same degree of attachment as the memory driven, sentimental items. However, they noted that enjoyment and pleasure gained when using these items was highly influential to their relationships with their possessions. A number of participants also noted the importance of functionality in relation to enjoyment. One participant discussed the relevance of usability with his iPod, stating the accessibility and ease of use made the whole experience more pleasurable.

Several participants provided examples of products that gave tactile or sensory pleasure. Participant D described the tactile feedback given when using the rubberised buttons of his Wacom tablet. The surface texture and slight movement of the buttons made the experience of use more pleasing. Similarly, another participant explained how the "smooth action" (Participant H) and tactile engage of implements within the Swiss army knife made the product enjoyable to use. Other examples took the form of well-balanced lightweight skis and the Amazon kindle with perfectly positioned buttons making it comfortable and pleasurable to hold.

Although significant to all products chosen, pleasure was mostly gained in newly owned items. Participants spoke with excitement about new items, explaining their recently developed passion and feelings for them because of the enjoyment they gave. Participants were particularly enthusiastic about products that had been designed well and made to a high quality. These qualities were apparent with most new items, the Apple MacBook Pro, Olympus SLR camera and Patagonia rucksack in particular. In contrast, another reoccurring theme to emerge was the pleasure gained from long lasting products. Items that had been owned for a long time were found to be enjoyable to use due to feelings of comfort and familiarity. The sculpted handles of participant G's Felco secateurs made the product nicer to grip and more comfortable to use compared to others. This enjoyment of use was the main reason the user had kept and continued to use this product for over 20 years.

4.3 Appearance

Each participant provided an example of a product they felt attached to because of the way it looked. Colours, materials and finishes were encompassed within the appearance theme and were discussed in great details within interviews. Colour was found to be particularly important in one participant's selection of his freestyle skis. The bright colours and outlandish pattern on the skis reflect the fun nature of freestyle skiing and the

feelings the user experienced when using the product. Colour was similarly important for participant G's choice of her secateurs. In this case, the brightly coloured red handles made the product easy to find when needed in the garden. Materials and finishes were mentioned less frequently. However, one participant expressed attachment to the smooth surface texture and beautifully simple design of the MacBook Pro and the complementary use of matte and gloss finishes of the Wacom tablet. In contrast, another participant was unsatisfied by the quality of his leather watchstrap, explaining how the high build quality of the watch was 'let down by the poor surface finish of the leather' (Participant F) which was beginning to crack and wear.

A number of watches were chosen for their "classic design" (Participant I). Users explained how appearance was important in creating "timeless" (Participant H) products that have been kept and used for many years. One participant explained the importance of appearance when buying new things and how it remained important throughout the product lifetime. Participants expressed their attachment to possessions that were aesthetically pleasing and well designed. Participant A noted how his passion for design influenced the purchase of his GoPro camera. Designed by a top consultancy in the USA, the camera brought satisfaction to the user due to its visual appeal and simple design language.

Participant J described his Peruvian poncho as not only an item of sentimental attachment but also one that was pleasurable to use and aesthetically pleasing. He explained that when it was not being worn, his poncho became "an artistic feature" (Participant J) hung on the wall and displayed. Similar caring attitudes were found with many newly owned items, with participants wanting to keep their products in "pristine condition" (Participant D) for as long as possible.

4.4 Usability

Usability was another prominent talking point within every interview. All of the participants shared a common understanding that they gained significant enjoyment from using products with superior functionality. Participants were dependent on these products helping them carry out a task, which they would otherwise be without. In a number of cases, the design of the product was found to "aid in its usability" (Participant F). The four watches provide a prime example where the simple and easy to read watch faces made the products a pleasure to use. Similarly, the fantastically simple functionality of Participant K's potato peeler made the product into more than just a "flimsy piece of plastic" (Participant K) and into something that had been kept and used regularly for over 20 years. In this case, the participant explained that the overall design of the product was not particularly impressive or appealing, however, this was of little concern as it was incredibly consistent and efficient at carrying out its function. Product quality was a large area of discussion in relation to usability. Participants agreed that high quality products tended to function better and last longer. Products that required little maintenance over the course of ownership were considered to be more usable. The Swiss army knife showed exceptional quality as every tool worked consistently well and the blades had remained sharp no matter how frequently they were used. The sewing machine was also mentioned as an item with excellent quality and usability. Despite the complex nature of the machine the participant explained how simple and intuitive it was to use. The participant did mention the inevitability of needles breaking on the machine, however, these were standard parts that could be purchased and replaced easily.

4.5 *Reliability*

Reliability was a highly discussed theme by all participants. It was decided that most of the products selected were likely to last for many years. The theme was found to be most prominent for items that had been owned for a long time, with newer items discussed less frequently in terms of their reliability. However, one participant did mention the significance of reliability in the recent purchase of his Patagonia rucksack. The durability of the bag and materials used were mentioned as important factors affecting the performance of the product and how consistently it could be used. The participant perceived Patagonia as a “reliable and inspirational brand” (Participant C) one whose products were expected to last a long time.

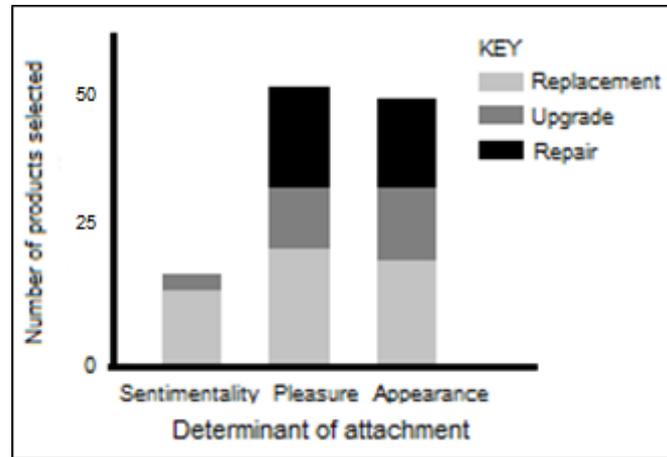
Participant G’s Felco secateurs are an example of how the reliability of the product became pleasurable to the user as shown in. During the 20 years of ownership the product had required little maintenance, just an occasional spring needing replacement and blades sharpening, which had made the overall experience of ownership very easy. The participant noted that the useful repair service provided by Felco and the availability of replacement parts that could be purchased when needed cemented her trust in the product. Similarly, participant H noted the reliability of his watch, which had only required a replacement battery once or twice in the 30 years of ownership, and was something that could be trusted to work whenever it was needed.

4.6 *Attitudes towards replacement*

Attitudes towards replacement were discussed during each interview regarding all three of the selected products. Participants were asked their opinion on replacing, upgrading and repairing their possessions and what would motivate them to do so. Figure 3 shows the results from these questions. There was a huge difference in the replacement attitudes towards products chosen for their sentimental value where strong memories were involved, compared to those chosen for appearance and pleasure of use. None of the participants would consider replacing their sentimental items, suggesting that they had too much “meaning and value” (Participant G) to do so. Consequently, all participants indicated that they would rather repair these items, however expressed concerns when sending off meaningful products for repair. Many suggested that they would rather repair these items themselves and would gain some enjoyment from doing this. Participant G was particularly affected when sending off her engagement ring, mentioning her worry that the ring may look and feel slightly different when returned.

Products that were both pleasurable to use and had superior functionality were found to be items that users were more willing to repair. Some participants were concerned that repairing their existing products would be the only option as finding replacement parts would be difficult. This was significantly important for products that had been bought as souvenirs from abroad or were one off, handmade or vintage items. These products were considered to be precious as finding an exact replacement would be almost impossible. All participants expressed the same concern regarding the decision between repairing and replacing an item. They all indicated that cost was an influential factor. If repairing an item was more costly than buying a replacement majority of users felt that replacement would be a more logical option. Monetary value of the product was also influential, with several participants indicating that expensive items would need to be repaired as buying a replacement would cost too much.

Figure 3 Graph to show user attitudes towards replacing, upgrading and repairing their attachment products



Overall, the majority of participants were uninterested in upgrading their selected possessions, indicating that there would be no need to upgrade as their existing products already met most needs and desires. However, regarding some of the high tech electrical products chosen, participants would consider upgrading these items for ones with improved specification and functionality. Products with upgradable or replaceable parts were discussed in several interviews and were found to last longer than other items. Ease and convenience of repair was found to be important to many participants and also had a connection to increasing product longevity.

5 Discussion

The results from both literature and primary research indicated a number of areas of attachment that designers can utilise to encourage consumer-product attachments to form with their products. Some themes are easier to manage and are therefore within designers reach, whereas others may be more difficult to influence. Usability was a prominent theme identified in this work and is one that designers can control to a certain degree. A number of factors were found to influence the usability of a product, including durability, quality and reliability. These findings show similarities to Norman's (2004) framework of attachment. His behavioural definition highlights the importance of usability in consumer-product relationship and indicates the relevance of user's enjoyment and pleasure to usable items. Product quality was also found to have particular importance on usability. The findings suggest that high quality products are linked to durability and product longevity. Sustaining quality over time is important to consumers' dependence upon a product and can be used to encourage their feelings of attachment.

Despite the relevance to functionality, pleasure has been defined individually as an important theme. The tactile and sensory qualities of products were found to be the most significant enjoyment area. This was highlighted in the empirical study results, where surface texture, tactile and audio feedback were found to be key to the pleasure users felt towards their products. Users experienced great pleasure from tactile material properties

and the smooth action and movement of parts and buttons whilst in use. Designers need to pay attention to every small detail when designing in order to create products that are pleasurable to interact with. These findings relate to Jordan's (2000) design criteria for creating pleasurable products, in which the materials and surface finish of a product play an important role in the pleasurable experience of use.

Findings from the literature review suggest that memories are different to other themes of attachment as they are more circumstantial and are therefore difficult for designers to control. Nostalgia can be formed in a number of ways, often independently of the product or through the interactions and experiences the users has with their possession. The associations a product has with people and places are what make it personally valuable and precious to the user. In this context, the product acts as a way to reminisce on enjoyable past experiences and trigger previous feelings of happiness. Research suggests that users have an enhanced attachment to the memories a product holds over the physical item itself, however without it these experiences may become difficult to recollect.

Despite the circumstantial nature of memories, designers may have some ability to encourage the formation of associations with their products. The literature review highlighted that when a product is used within a group scenario, associations and memories of the interactions with the group are likely to form. Stimulating social contact by designing products that can be used by multiple people at once will increase the opportunity for shared fond memories to develop. The empirical study highlighted that appearance has particular significance on the attachment between consumer and product. Colours and patterns were found to reflect consumers' personalities and were used as a form of self-expression and the appearance of the product was found to provoke memories. Products that had aged with dignity, showing the general wear and tear of use were often connected with fond stories and experiences. Although the materials and surface textures of a product need to be durable to last they should also age well to provoke users' pleasure of use and attachment. In addition, classically designed products were found to be more long lasting and favoured by users over ultra-modern, statement pieces. To encourage product longevity designers need to create products that are timeless and simplistic in design so they can be maintained and updated to meet user need.

Despite its relevance, reliability was seen to be a less prominent theme of attachment within the empirical study and was more important to influencing product replacement motives. Consumers' attitudes towards reliability were found to be derivative of their perceptions of product quality. Products with a high build quality were associated with increased longevity. Similarly, increasing product reliability and durability were highlighted as key to implementing long life guarantee within the literature review. Products must be designed using appropriate materials and manufactured to a high standard to ensure they are physically durable and can be used time and time again. When consumers are satisfied by the performance of a product their perception of reliability will increase and they will choose to use this item over others. These feelings of reliability and trust between consumer and product are key to the formation of attachment.

Results from primary research share similarities with those found in literature regarding consumer replacement motives. Consumer opinions highlighted within interviews indicate that the adaptability of a product has huge influence on increased

longevity. Products that were easy to repair were found to be more dependable as users could rely on them to last along time. These findings share resemblance with Cooper's (2005) view of product replacement, which highlights the importance of adaptable design. Designers must create upgradable products that are easy to repair and maintain to encourage product longevity. However, evidence from the empirical study shows that products that are sentimentally valuable and meaningful are harder to replace than other items. Memories were found to be particularly influential on consumers' attitudes towards replacement. Schifferstein and Zwartkruis-Pelgrim's (2008) definition of irreplaceable products is relevant here, as they suggest that the memories and feelings a person attaches to a product are what make it truly irreplaceable. Attachment to the appearance and usability of a product may be relevant to product longevity, however, memories and feelings of pleasure make the product irreplaceable to the user.

The differentiation and boundaries between themes have been difficult to define, as many are interlinked and influential of one and other. Therefore, it is not necessarily true that one particular determinant of attachment is more prominent than others; instead the relationships between attachment themes and consumers' circumstances are significant. In addition, a number of sub factors were found to be influential to how attachment developed according to each theme and could be used to form new and separate determinants of product attachment. However, it can be argued that distinguishing further conditions of attachment will complicate the topic, making it harder for designers to decide which themes they can encourage in their designs. Despite broad nature of product attachment the study was limited to reviewing only some of the key themes in order to produce a manageable study. Emotional attachment and brand attachment both play very important roles in consumer product attachment, however, due to restrictions neither of these themes could be looked at in detail. Similarly, the extensive breadth of the topic required a considerable amount of research to be conducted over a wide area to gain a suitable collection of data and for trends to emerge in results.

6 Conclusions

The findings from research have provided several relevant outcomes for designers seeking to encourage consumer attachment to their products. Evidence has concluded that there are many determinants and influential factors of product attachment; some can be implemented and enhanced by designers, however many are difficult to control. The unreliable nature of the topic means that there is not one specific theme of attachment that is more prominent than others, instead designers must think carefully about which attachment areas are appropriate to their product and consider their relevance for each consumer's situation. The outcomes from the study produced a list of attachment determinants that provide guidance on the most important areas of attachment. These themes were established through an extensive review of literature where several academics opinions were analysed to find key trends. The empirical study then validated these findings through discussions with consumers and helped to establish which themes were most influential to these user-product relationships.

Development into further areas of product attachment would help to establish a greater wealth of evidence for designers to use as a basis when developing attachment products. Reviewing the psychological aspects of emotional attachments would be invaluable to the study and would provide more reasoning behind why some products are

more attachable than others. As this research did not discuss the influence of brands on attachment, further investigation into the relevance branding has on the attachment process would add further insight.

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