



PLATE conference - Nottingham Trent University, 17/19 June 2015

Harmer et al.
The joy of vacuuming?

The joy of vacuuming? How the user experience affects vacuum cleaner longevity

Harmer L.^(a), Cooper T.^(a), Fisher T.^(b), Salvia G.^(a), Barr C.^(a)

a) School of Architecture, Design and the Built Environment, Nottingham Trent University, Nottingham, UK

b) School of Art and Design, Nottingham Trent University, Nottingham, UK

Keywords: user experience; product longevity; brokenness; vacuum cleaners; cleanliness.

Abstract: An apparent reduction in the average lifetime of vacuum cleaners is explored in this paper in relation to their perceived usability and increasingly frequent product replacement. Motivations for product disposal combine perceived and real product failure with a perceived or real improved product offer. From an historical perspective, vacuum cleaners typify this pattern, continually offering a 'cheaper and improved' product.

Vacuum cleaner manufacturers reinvigorate the sense of satisfaction and revulsion associated with extracting dirt from our homes through new performance focused product development. For example, increased motor power, filtration, bag-less machines and clear bin compartments have all acted as sales drivers, whilst cost effective materials and offshore and more efficient manufacturing have reduced purchase prices. The latter, cost-driven, processes can create machines that are more likely to be functionally and aesthetically damaged in use, reinforcing the trend for faster replacement. The market appears likely to continue to focus on improved user experience, with growth in market share for lighter weight cordless battery powered machines posing the risk of an increased environmental burden.

Drawing from qualitative and quantitative research undertaken for a study for Defra, we explore the user's relationship to the product, investigating the frustrations and joys of vacuum cleaner use and ownership. The findings illustrate that the revulsion and attraction of cleaning, as well as the tedium and satisfaction fostered by the product, have direct implications for vacuum cleaner longevity.

Introduction

From their invention vacuum cleaners have been sold on their ease of use and effectiveness. They have been envisaged as almost 'magic' cleaning machines. Jackson (1992, p. 166) reports on an advertisement promoting the first vacuum cleaners from the 1920s suggesting that they offer, "easy, effortless cleaning of every nook and corner" and provide "leisure and freedom." She concludes: "this reveals something of the mythology of the 'mechanical servant': it is as if the vacuum cleaner steers itself around the house unaided" (*ibid*).

From the early 1920s Hoover advertisements through to the most recent G Tech commercials, the vacuum cleaner is still advertised as creating enjoyable experiences

where before there was only cleaning drudgery Stoppani (2012). Schifferstein (2008) asserts that creating an enjoyable product experience is a principal method of enhancing emotional attachment to a product and argues that the products to which we are most attached should be the ones we keep for longer. He describes product pleasure as combination of product meaning, monetary value and utility, and attachment as the strength of the bond these factors create that affects our willingness to dispose of the product. Yet it appears (WRAP 2013) that vacuum cleaners are being disposed of after a shorter period of use than ever before, which implies that vacuum cleaners are either not as enjoyable to use as promised or that this positive use experience does not last. This disparity is significant because of the resulting environmental burden of vacuum cleaners,

disposal accounting for the second largest embodied GHG emissions of electrical products after televisions, largely because of high sales volumes (WRAP, 2012).

As part of a project commissioned by the Department for Environment, Food and Rural affairs (Defra), investigating motivations for product disposal, this paper draws on the qualitative and quantitative data collected, focusing on responses relating to the experience of using a vacuum cleaner. This includes data from 114 on-street questionnaires, 9 in-home interviews, 507 online interviews, a co-creation session with 30 participants and a focus group with 15 respondents, in the UK, between March 2014 and January 2015.

The main objectives of this paper are to investigate the effects of user experience in purchase, use and disposal of vacuum cleaners and how designing for enjoyable product experiences might increase their longevity.

Cleaning practices

Do wider cleaning practices affect whether people find vacuuming a satisfying, or even a joyful, experience? MINTEL (2013) reported that younger people (25-34-year-olds) are more likely than older people to get satisfaction from doing household cleaning and a survey by Electrolux (2013) claimed that a third of vacuum cleaner users in the UK - especially women - feel satisfied after vacuuming.

These surveys suggest that some people do enjoy vacuuming, though this is not as universal as advertisers suggest. Our study found that although nearly 40% of respondents in the on-street questionnaire wished that someone else would clean their house, a majority did not. What types of people are in this 60% who might enjoy vacuuming?

Vaussard et al. (2014) identified four sets of cleaning habits based on the motivation a household shows to keep their home clean, the efforts made and time spent on cleaning. These have been adapted in our research to categorise types of cleaner, as follows:

1. *Spartan Cleaners*, vacuum less than once a week and consider cleanliness of their house a medium or low priority

2. *Minimal Cleaners*, vacuum once a week or, if less often, consider cleanliness of their house a high priority
3. *Caring Cleaners*, vacuum at least 2-5 times a week and consider cleanliness of their house a high or medium priority
4. *Manic Cleaners*, vacuum daily and prefer to do it themselves rather than employ a cleaner.

These cleaner types were recognisable in the in-home interviews, particularly the Manic cleaners who enjoy cleaning and require their vacuum cleaners to function in a way that completes it to a high standard. One Manic cleaner interviewee reported vacuuming every day to relax after work – perhaps the ultimate enjoyable task. In contrast, the ‘Spartans’ we interviewed aimed to complete their vacuuming in the shortest time possible, though people across all the cleaner types reported getting some satisfaction from vacuuming. This suggests that there is satisfaction in using an efficient vacuum to collect both obvious and invisible dirt – pleasure in sparing oneself from filth.

The enjoyable purchase experience

MINTEL (2010) ranked factors that consumers report influencing their purchase of a vacuum cleaner. Our work has suggests that three of the top five factors relate to the overall experience of using the machine alongside specific, measurable performance criteria:

1. Suction power
2. Easy to move around
3. Lightweight
4. Easy to store
5. Suitable for hard and soft surfaces

Purchase decisions are also informed by people’s confidence in the product. An interview conducted for the project with a vacuum manufacturer confirmed that guarantees are important sales drivers, especially for premium products although they are not necessarily used by consumers if a product does fail.

Alongside guarantees, this manufacturer highlighted consumer reviews as important for sales. Reviews reassure consumers about both enjoyable experience and function and they were identified as particularly important with purchases online or untested from retailers. These factors, along with flexible return policies, help to encourage enjoyment of a

product and avoid the cognitive dissonance that Wood (2001) describes as damaging to the consumer - brand relationship when products do not meet advertised expectations. These relationships are intrinsically linked to cost and can be maintained with consumers in spite of product failure or disposal when consumers achieve their perceived product value.

The enjoyable use experience

A workshop with vacuum cleaner users was held to explore methods for prolonging the machines' lifetimes, including these notions of vacuum cleaning enjoyment. Participants were asked to describe their most frustrating and most enjoyable vacuum cleaners. The workshop sought more detailed data about factors influencing purchasing decisions than that collected in market research by MINTEL (2010).

The workshop task allowed groups of participants to draw on their own experiences. Provided with simple line drawings of an iconic upright and cylinder vacuum cleaner they were encouraged to work together to annotate and adapt each drawing (Figure 1).

Participants indicated that they considered vacuum cleaning most enjoyable when using a machine that is easily manoeuvred (e.g. lightweight and cordless), user-friendly (e.g. easy to take apart), adaptable (e.g. including

accessories), requires low maintenance (e.g. easy to empty and repair), powerful (e.g. high suction performance) and appealing (e.g. smooth aesthetic and sensible price).

By contrast, participants felt that vacuum cleaning was most frustrating when the machine was difficult to manoeuvre (e.g. heavy, wobbly and unstable), not user-friendly (e.g. noisy and difficult to store), required complex maintenance tasks (e.g. emptying from the bottom and disentangling hair from the brushes), lacked in suction power, was visually bulky and attracted dust and scratches. A summary of their discussions is shown in Table 1 and a characterisation of one group's experiences is shown in Figure 2.

Respondents to the subsequent online survey were given a hypothetical scenario of purchasing a 'totally new type of vacuum cleaner' and asked to rank five types of innovative designs.

The proportion of 'top' rankings by the survey respondents were as follows: vacuum cleaners that were maintenance free (59%); machines that communicate their performance (23%); a rewarding experience (9%); looking good as it gets older (6%); resale value on replacement (3%). These preferences were confirmed by and explored with the focus group, identifying real time performance information as specifically appealing.

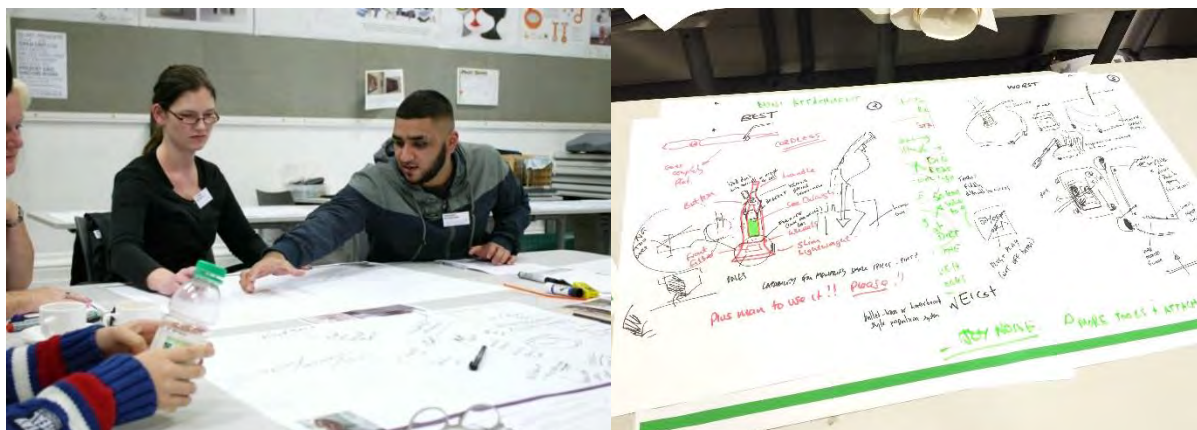


Figure 1. Workshop participants discussing and sketching the most frustrating and most enjoyable vacuum cleaners (left). The resulting sketches (right).

Most frustrating vacuum cleaner	Most enjoyable vacuum cleaner
Manoeuvrability	
Bad mobility	Ball wheels
Heavy	Easy to move
Unstable and wobbly	Cordless
Loose cable	Fits in corners
Excessively long hose	Lightweight
Short cord	Long cable
Small wheels	
Hard to drag around	
Rigid hose	
Square wheels	
User-friendliness	
Difficult to store	Easy to store
Small capacity	Large capacity
Difficult to assemble	Easy to take apart
Hidden features and parts	Clear plastic
Noisy	
Scares children and small animals	
Adaptability	
Too many tools	Lots of nozzles
Loose parts liable to be misplaced	Interchangeable tools
	Multi-application tools
	Compact but extendable
	Able to charge mobile phones
	Removable 'Dustbuster'
Maintenance	
Empty from bottom	Easy to empty
Paper bags	Compresses dust into bales
Not repairable	Easy to repair
No replaceable parts	
Repaired and held together with sticky tape	
Dust and hair gets caught in brushes	
Performance	
Lack of power	Powerful
Poor suction	Satisfaction through excellent suction
No suction	
Appearance and Price	
Bulky	Smooth aesthetic
Catches dirt in edges	Strong, smooth material
	Thin, slim line body
	'Sensible' price

Table 1. Summary of 'Most Frustrating' and 'Most Enjoyable' features for a vacuum cleaner.

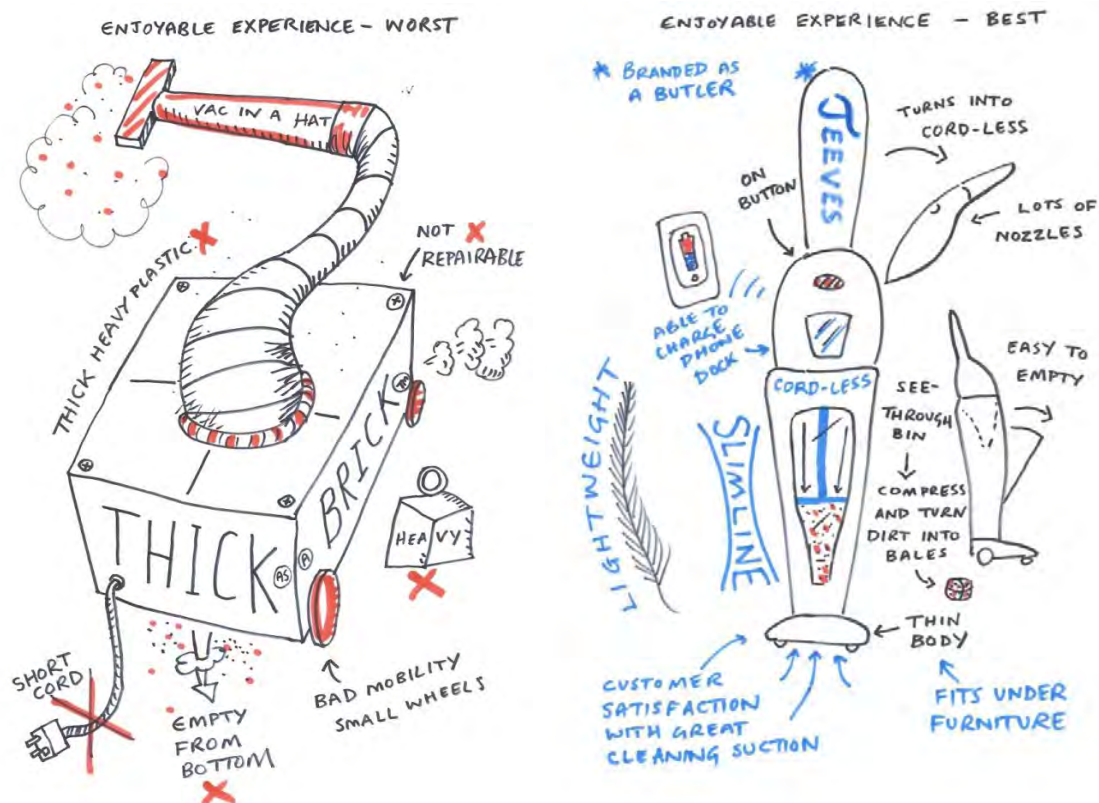


Figure 2. Examples from user workshop of features of most frustrating (left) and most enjoyable (right) vacuum cleaners (Enjoyable Experience theme group).

Vacuum cleaner disposal

In the current vacuum cleaner market, where product lifetimes appear to be decreasing, motivations for disposal become inextricably linked with motivations for purchase. If vacuum cleaners are advertised on the basis of 'enjoyability' but come to be perceived as less enjoyable, are they then more likely to be disposed of? Vacuum cleaners have a high level of ownership: 87% of the UK population in 2009 (MINTEL, 2010). This points to a market near saturation and facing a contraction of sales, which may require manufacturers to create methods for triggering replacement purchases. MINTEL postulates in the report that this may include improving the product longevity offering for some brands. Most people only report replacing their vacuum cleaner when it fails. MINTEL (2010) stated that 80% of people would only buy a new vacuum cleaner if their old one broke down. These may include products that are cost effective to repair (Which?, 2014a) or suffer a perceived loss of function, possibly from poor maintenance leading to worn or blocked filters, as we discovered through systematic vacuum cleaner 'teardowns'. Our online survey provides more

detail on what consumers consider as motives for disposal:

- The most common reasons for respondents ceasing to use their previous vacuum cleaner are because it stopped working efficiently (44%) and did not work at all (34%).
- Spartan cleaners are less likely to replace their vacuum cleaner due to reduced efficiency (33% compared to more than 40% for other types of cleaner), perhaps because they are less worried by a risk of having a machine that does not perform well or fails completely.
- 16% of respondents replaced their vacuum cleaner because they wanted a new one, despite their existing one still working. Replacement for this reason is more likely among those who are young (22%) or in a higher social grade (21% for AB level), and less likely for Spartan cleaners (8%) compared to other cleaners.
- When disposing of their old vacuum cleaner, 14% of respondents gave it away and an identical percentage still had it at home, suggesting a significant number of old



Figure 3. A selection of traded in vacuums at an auction house, the majority according to the vendor in good working order.

machines that are still operational or with which owners have a degree of product attachment.

These results suggest that any loss of real or perceived function acts as a driver for product replacement. Respondents who replaced their vacuum cleaner because it did not work efficiently or wanted a new one indicated a lack of confidence in, or emotional attachment to, the product, i.e. the product has either ceased to be useful because it has become less enjoyable.

Visible wear reinforces this loss of real, or perceived function. The plastic materials used in most modern vacuum cleaners show this wear in characteristic ways with particular consequences for longevity. Plastics are relatively soft, allowing the surface of a vacuum to acquire scratches and grazes; transparent plastic that starts life with gloss shine becomes opaque and 'milky'. The electrostatic properties of plastics mean that the very fine dust that a vacuum cleaner collects will be attracted to the surfaces of the casings, which are often made in complex shapes that are not easy to clean.

These qualities are liable to lead to disaffection with plastic products, even to the extent of encouraging disposal of products that are still functional. This is particularly the case in respect of products that have connotations of hygiene (Fisher 2004, Fisher and Shipton 2009). The use of plastic along with advances and changes in manufacturing have dramatically reduced the cost of vacuum cleaners. The first vacuum cleaners imported to Britain cost £25, equivalent to a maid's annual wage (Jackson 1992). Nowadays prices are, in real terms, considerably lower¹, perhaps 1% of an unskilled worker's annual wage. According to the White Goods Trade Association (WGTA 2010), over the last two decades appliance prices have dropped in real terms, with significant implications for the industry and for product lifetimes. Brook Lyndhurst (2011) identified the low price of replacement products as a significant barrier to extending the lifetime of 'workhorse' products. Consumers can therefore feel they have had value from a product after a shorter period. Reduced cost allows for psychological obsolescence (Cooper, 2004), illustrated by consumers who do not make use of a warranty to which they are entitled or simply

¹ According to Which? (2014b), the average cost of a new vacuum cleaner is £184, rising to £279 for a Best Buy.

dispose of a product before it is functionally obsolete. Cost therefore, has become the significant barrier to consumers pursuing longer lasting products and, additionally, Cooper and Mayers (2000)² identified a consumer concern that products may become 'out of date'.

Our interview with a vacuum cleaner manufacturer identified that product sales benefit from psychological obsolescence rather than a technical product failure that could damage a brand. Vacuum cleaners perhaps typify the practice of psychological obsolescence where manufacturers offer an innovative, fashionable new product that delivers a potentially better result within the previous products' guarantee period.

Conclusions

Notions of enjoyable experience are significant in new purchases and, by association, may encourage premature vacuum cleaner disposal. Our consumer interviews and product teardowns show that consumers are not, in the majority of cases, disposing of vacuum cleaners because they are irrevocably broken, but because they either perceive a loss of function or that repair will be inconvenient. Increasing a user's emotional attachment to the product through new product development has the potential to overcome some of the barriers to vacuum cleaner longevity. The user needs to know that their vacuum cleaner is performing effectively. The online interviews and focus groups suggested that this could be facilitated by reassuring the consumer through real time information. Longest lasting vacuum cleaners would, therefore, not only have robust design and engineering, but also combine the reassurance of recurrent performance information with genuine usability.

Acknowledgments

The interim findings presented in this paper are derived from a research project (EV0554) funded as part of Defra's Action Based Research Programme.

² This study (also known as the E-SCOPE study) addressed the purchase, use and disposal of household appliances in the UK (including vacuum cleaners). It remains the most detailed investigation of the use and disposal of Waste Electrical and

References

- Campbell, C. (1992). The desire for the new. Its nature and social location as presented in theories of fashion and modern consumerism *Consuming technologies: media and information in domestic spaces*, 48-64.
- Cooper, T. (2004). Inadequate life? Evidence of consumer attitudes to product obsolescence. *Journal of Consumer Policy*, 27(4), 421-449.
- Cooper, T. & Mayers, K. (2000). *Prospects for Household Appliances*. Halifax: Urban Mines.
- Defra (2011). *Public Understanding of Product Lifetimes and Durability*. Report by Brook Lyndhurst, London: Defra.
- Electrolux (2013). *Global Vacuuming Survey – UK*. Available at http://www.electrolux.co.uk/Discover/Articles-Global_vacuuming_Survey/
- European Commission. (2013). *Implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for vacuum cleaners*.
- Fisher, T. (2004). What we touch, touches us: Materials, affects, and affordances. *Design Issues*, 20 (4), 20-31.
- Fisher, T. (2013). 6 The death and life of plastic surfaces. *Accumulation: The Material Politics of Plastic*, 107.
- Jackson, S. (1992). Towards a historical sociology of housework. *Women's Studies International Forum*, 15, pp. 153–172.
- MINTEL (2010). *Vacuum Cleaners – UK*.
- MINTEL (2013). *Cleaning the House – UK*.
- Mugge, R., Schoormans, J. P., & Schifferstein, H. N. (2005). Design strategies to postpone consumers' product replacement: The value of a strong person-product relationship. *The Design Journal*, 8(2), 38-48.
- Rognoli, V. & Karana, E. (2014). Toward a new materials aesthetic based on imperfection and graceful aging. In E. Karana, O. Pedgley, & V. Rognoli (Eds.), *Materials Experience – Fundamentals of Materials and Design* (pp. 145-154). Oxford: Elsevier.
- Schifferstein, H. N., & Zwartkruis-Pelgrim, E. P. (2008). Consumer-product attachment: Measurement and design implications. *International journal of design*, 2 (3) 2008.

Electronic Equipment (WEEE) undertaken in the UK, with 802 households interviewed in over 180 locations and five focus groups held involving a total of 50 participants.

Stoppani, Teresa (2012) Dust, vacuum cleaners, (war) machines and the disappearance of the interior IDEA / Interior Design/Interior Architecture Educators Association (2011). pp. 50-59. ISSN 1445-5412

Strasser, S. (1999). Waste and want: a social history of trash. Macmillan.

Vaussard, F., Fink, J., Bauwens, V., Rétoznaz, P., Hamel, D., Dillenbourg, P., & Mondada, F. (2014). Lessons learned from robotic vacuum cleaners entering the home ecosystem. Robotics and Autonomous Systems. 62, pp. 376-386

WGTA (White Goods Trade Association) (2010). How Long Should An Appliance Last? Accessed at <http://www.whitegoodstradeassociation.org/index.php/for-public-mainmenu-43/how-long-should-it-last>

Which? (2014a). Repair or replace?. May, pp. 36-39.

Which? (2014b). Vacuum Cleaners. Available at <http://www.which.co.uk/home-and-garden/laundry-and-cleaning/guides/top-five-vacuum-cleaners/>

Wood, S. L. (2001). Remote purchase environments: the influence of return policy leniency on two-stage decision processes. Journal of Marketing Research, 38(2), 157-169.

WRAP (2012). Reducing the Environmental and Cost Impacts of Electrical Products. Banbury: WRAP.

WRAP (2013). Switched on to Value, Banbury: WRAP.