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'If It Ain't Broke, Don't Explain It': The Influence of Visual and Verbal Information about Prior Use on Consumers' Evaluations of Refurbished Electronics

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ABSTRACT   Refurbishment presents opportunities for designers to improve the sustainability of new and old products via an experiment and *post hoc* interviews, this research investigates and explores how information about prior use – offered in a visual

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(signs of wear and tear) or verbal (textual description) form – influences consumers' evaluations of refurbished products. The findings show that visual information about prior use has a negative effect on consumers' evaluations of refurbished electronics. Furthermore, presenting consumers with verbal information on prior use can negatively affect consumers' evaluations of a refurbished product if no signs of wear and tear are present because it confuses consumers. If signs of wear and tear are present, verbal information about prior use will not influence consumers' evaluations.

Introduction

Extending products' functional lifespan in use is a fundamental design strategy for sustainability (Cooper 2016). As a counter-movement to a 'throw-away' culture, designers have come to revisit questions about stimulating longevity via creating more durable designs and enhancing products' reparability. Moreover, designers have been tasked to craft more emotionally appealing designs to strengthen the relationships that people develop with products to make such person-product relationships more long-lasting (Mugge, Schoormans, and Schifferstein 2005; Niinimäki and Koskinen 2011). However, for many products – and particularly for consumer electronics, such as smartphones and computers – the reality is that longevity in use is not only situated in extending the product lifetime for a single user (and the relationships that he/she develops with it), but also in how a product can be given multiple lifetimes and provide value to different users over time (Mugge 2017). In a circular economy, products maintain their value for longer periods of time and material flows are restored through closed-loop processes (MacArthur 2013). To create these loops and extend products' total lifespan, the transfer of products and their value across different users is a key question for companies and designers. Consequently, in designing for sustainability, important questions for designers are not only found in their original design (and the accompanying production systems) but also in how products are re-used and redistributed across different users.

Second-hand products can take many forms ranging from antiques (Parsons 2007), vintage (Cervellon, Carey, and Harms 2012), to the products that are sold via car-boot sales (Gregson et al. 2013) and on eBay (Denegri-Knott and Molesworth 2009). In these cases, second-hand products are sold as 'as-is' products without additional warranty. However, another important part of today's second-hand market consists of products that are officially checked and/or updated via refurbishment or remanufacturing. This paper provides a focused inquiry into the latter for an electronic product that is frequently refurbished: an

Apple iPhone. Past research shows that conceptions about prior use can negatively impact the way people perceive products (Ackerman and Hu 2015), and it is not uncommon for consumers to doubt the quality of second-hand electronics (Lee and Lee 2005). Refurbished electronics represent here an important subset of second-hand products in the sense that they are inspected and repaired to function as a viable alternative to new products. Refurbishment refers to the process of collecting used products, assessing their condition, and replacing and/or upgrading parts in order to resell them to other consumers (Pigosso et al. 2010). Refurbishment differs from remanufacturing. Remanufacturing implies that used products are brought back to a like-new condition with similar warranty, whereas refurbishment implies that products are brought to a functional and satisfactory state. For electronics, this implies that new and remanufactured products are sold with a warranty of at least two years, whereas for refurbished products a warranty of only one year is required (EU Directive 1999/44/EC). However, it is not uncommon that refurbishment companies often offer warranties for electronics ranging from one to three years.

Scholars in engineering and management have addressed strategic and logistic factors involved in refurbishment, acknowledging it as both economically and environmentally advantageous (Ijomah et al. 2007; Rathore, Kota, and Chakrabarti 2011). However, the possibility to establish a closed-loop process through refurbishment only emerges when consumers accept refurbished electronics as a viable alternative to new electronics. Currently, this is questionable, which provides intriguing opportunities for design research. Previous studies indicate that consumers display a lower willingness to pay (WTP) for refurbished products (Hamzaoui Essoussi and Linton 2010, 2014; Harms and Linton 2015; Michaud and Llerena 2011) and perceive refurbished products to be of lower quality (Hamzaoui Essoussi and Linton 2014). Hence, companies and designers engaging in refurbishment need to overcome the negative associations people may have for refurbished products to increase their general appeal.

From a design perspective, the processes surrounding the upgrading and redistribution of refurbished products offer interesting opportunities to positively influence these consumers' evaluations. In design, it is well acknowledged that products hold a range of roles for, and can trigger different experiences and emotions among, their users (Desmet 2002; Desmet and Hekkert 2007; Norman 2004). Designers also participate in shaping how consumer perceive and respond to products. However, for refurbished products, this task is more challenging as the prior use may alter the original design. When designing for refurbishment, this implies that designers need to acknowledge that products will go through multiple lifetimes and refurbishment processes to make their designs more applicable for such processes. Moreover, companies and designers need to consider the degree of refurbishment that is warranted to not unnecessarily allocate material and financial resources.

Consequently, more knowledge is needed about how consumers evaluate refurbished electronics in order to inform companies and designers about the specific execution of the refurbishment/redistribution processes. This research contributes to the literature by investigating how information about prior use influences consumers' evaluations of refurbished electronics and the grounds upon which consumers form such evaluations. Today, refurbished electronics are sold with varying signs of use. For example, Leapp (a Dutch refurbishing company of Apple electronics) sells refurbished iPhones, ranging from those with heavy signs of use to those with a like-new appearance. These signs of wear and tear provide consumers with information about the product's prior use. Companies can prevent signs of wear and tear via the use of more durable materials, remove these signs by updating/replacing the exterior design or leave signs of wear and tear from prior use untouched. Not replacing exterior parts saves time, energy, and resources, making it a more sustainable and economically interesting option. However, updating the exterior or making use of more durable materials results in a refurbished product that looks like new, which may positively influence consumers' evaluations of it. When designing for refurbishment, what parts of a product to retain or replace brings about different requirements to tend to during the design process.

Literature Review

Theoretical Model

Several theoretical models have been introduced to describe how consumers respond to product design (Bloch 1995; Crilly et al. 2004; Desmet and Hekkert 2007. For our study, we build on Bloch's model (see Figure 1), which was developed for consumer response to new products, and extend it for the specific context of refurbished products. We decided to start from this model because it gives specific attention to the combined effects of visual information (via product appearance) and verbal information (via marketing communications), which corresponds to consumers' decision-making processes when purchasing refurbished electronics. In the model, the product appearance is influenced by design goals and constraints (e.g. costs), which together are embodied in the product form.

Based on the appearance, consumers experience various affective (e.g. positive or negative emotions), cognitive (e.g. quality perceptions), and/or behavioural responses (e.g. approach/avoidance) to the product. Companies often set out to trigger certain (desirable) responses from consumers in designing the product appearance and designers are often allocated to execute the task within product development. However, the relationship between product appearance and consumer responses is not always the same and depends on the context in which it is presented and individual differences in tastes and preferences (Bloch 1995).
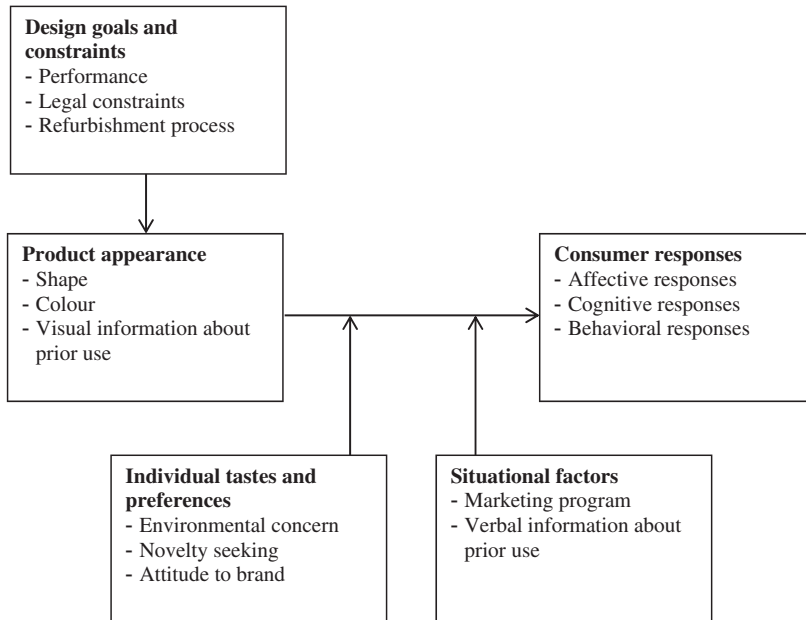
Figure 1.
Theoretical model on consumer responses to product appearance (adapted from Bloch 1995).

To this end, if we extend Bloch's model to refurbishment, we can first conclude that for refurbished electronics, design could have important part to play in shaping these products' success. However, the design of the product appearance will not only be influenced by the specific design choices in the initial design process, but also by the specific decisions made in the refurbishment process, that is by the decision to (not) upgrade scratches and other surface deviations. Furthermore, as part of the marketing program of refurbished electronics, it would be possible to offer verbal information about prior use of refurbished electronics, such as the length and intensity of the first use period. This verbal information about prior use can serve as a situational factor that can moderate the effect of product appearance.

Visual Information About Prior Use

While Bloch's model conveys the importance of product appearance in consumer choice/decision-making for new products, previous studies on refurbishment suggest that product appearance is not a primary criterion in consumers' purchase process of a refurbished product when the wear and tear is not severe and as long as the product still functions (van Weelden, Mugge, and Bakker 2016). Other studies conclude that the way in which refurbished products are evaluated is mainly based on their functionality (Jiménez-Parra, Rubio, and Vicente-Molina 2014). Correspondingly, consumers evaluate the option to update the

appearance of a refurbished smartphone as unimportant for increasing their purchase intention (Mugge, Jockin, and Bocken 2017). This corresponds to prior research on aesthetic flaws, which also suggested that wear and tear does not necessarily influence consumers' evaluations of a product in a negative way. Aesthetic flaws, like scratches or dents may be less important for consumers when the product is sold at a reduced price and/or with a warranty (Kotler and Mantrala 1985). As refurbished electronics are checked and updated, sold at a reduced price and offered with a warranty, the current stream of research on refurbishment would suggest that the effects of visual information on prior use (i.e. wear and tear) on consumers' evaluations will most likely be small.

Although the literature above mostly downgrades the role of wear and tear for consumers' evaluations of refurbished products, Bloch's model (1995) suggests that its role is more important than previously assumed. In fact, visual information about prior use as expressed by signs of wear and tear on the product appearance of refurbished electronics can serve as a significant cue for consumers' evaluations of these products. Consumers use a product's appearance to draw inferences about its performance quality (Mugge 2011; Mugge and Schoormans 2012; Page and Herr 2002). These studies demonstrate that consumers perceive products with a less attractive appearance as having lower quality. As the presence of wear and tear on (electronic) products is generally believed to be unattractive, these inferences about lower quality are expected to negatively affect consumers' evaluations of refurbished electronics.

Other studies link wear and tear to an increase in the perception of contagion of a product (Baxter, Aurisicchio, and Childs 2015; White et al. 2016). Wear and tear function here as a cue that the product was used and touched by others, which leads to perceptions of contagion, negatively influencing the product evaluations (Argo, Dahl, and Morales 2006, 2008). Moreover, the product's exterior is the most frequently used cue to determine whether and how a product has been used before (Baxter, Aurisicchio, and Childs 2015). In the second-hand market, visual information about prior use, such as wear and tear, is commonly used to assess the risks attached to a product purchase (Derbaix 1983; Gabbott 1991). When purchasing a second-hand car, for example, consumers use visible and verifiable cues, like dents and scratches on the exterior, to gather information about invisible and unverifiable cues about how the car was used by the prior owner(s), and accordingly, as indirect cues in assessing its technical components and functioning. Whether or not to update the exterior is not a trivial design matter during the refurbishment process, especially in comparison to second-hand products that are not refurbished. It is likely that signs of wear and tear that are present on a refurbished product due to prior use leads to more negative evaluations.

Hence, we hypothesize:

H1: Consumers will evaluate refurbished electronics more negatively when visual information about prior use (in signs of wear and tear) is present than when such visual information is absent

Verbal Information About Prior Use

Consumers generally experience a higher perceived risk and uncertainty for refurbished than for new products (Hamzaoui Essoussi and Linton 2010; Ovchinnikov 2011; van Weelden, Mugge, and Bakker 2016). Studies propose that gathering more information lowers the perceived risk when consumers purchase a new product (Derbaix 1983; Gabbott 1991). In line with these findings, van Weelden, Mugge, and Bakker (2016) and Ovchinnikov (2011) propose that consumers may be more likely to purchase a refurbished product when they receive verbal information about its prior use. In the automotive market, providing verbal information about prior use is a common strategy for dealers selling second-hand cars. Information about the duration and intensity of prior use (e.g. year, mileage) and maintenance is often presented to consumers to lower their perceived risk in buying a second-hand car. Second-hand cars and refurbished electronics, however, are different product categories. They differ in the average lifecycle, price and so forth, so it is unknown whether verbal prior use information will have the same positive effect on consumers' evaluations of refurbished electronics as it has for second-hand cars.

In contrast, there is also research stating that providing verbal information about the prior use of a refurbished product is counter-productive. A study on second-hand clothing revealed that consumers had a higher disgust rate when informed that the clothing had previously been used, cleaned, and sanitized (Ackerman and Hu 2015). Reminding consumers that someone else used the product might elicit a negative reaction due to fears of contagion; 'the process through which the quality, meaning or value of an object changes due to interaction with someone or something' (Baxter, Aurisicchio, and Childs 2015). Verbal information about prior use is a reminder that the product has been used and touched before. This could elicit the perception that the refurbished product is contaminated, which may negatively affect consumers' evaluations of it.

Based on Bloch's (2015) model of product appearance, we expect that verbal information about prior use will interact with the effect of visual information in the form of signs of wear and tear on consumers' evaluations of refurbished electronics. Prior research concluded that consumers prefer congruence between the information provided by a verbal (advertising) cue and the visual product appearance (van Rompay, de Vries, and van Venrooij 2010; Van Rompay, Pruyn, and Tieke 2009). A state of congruence is established when the visual and verbal information communicate equivalent information. When refurbished electronics show no signs of prior use, consumers are less aware of the prior use through the presented visual information. Then,

verbal information about prior use is incongruent to consumers' expectations and may be detrimental to their evaluations of refurbished electronics as the verbal information makes consumers more attentive of the prior use. However, when refurbished electronics show signs of wear and tear, consumers realize that the products have a use history. Presenting consumers with verbal information about prior use will then be congruent to their expectations, and will not influence their evaluations of refurbished electronics.

Accordingly, the following is hypothesized:

H2: The presence of verbal information about prior use will moderate the relationship between visual information about prior use and consumer evaluations of refurbished electronics. Specifically, when visual information of prior use is absent (no signs of wear and tear), consumers will evaluate refurbished electronics more positively when verbal information about prior use is absent (vs. present). Verbal information about prior use does not influence consumer evaluations of refurbished electronics when visual information about prior use is present (signs of wear and tear).

Experimental Study

Method

Study Design and Participants
The experimental study used a 2 (verbal information about prior use: present vs. absent) × 2 (visual information about prior use: wear and tear present vs. wear and tear absent) between-subjects design. One hundred and ten members from a consumer panel participated in the study (52% male, mean age = 46 years; response rate = 55%); receiving a small compensation (€3.45) for their participation.

Stimuli
An Apple iPhone 5 was selected as the stimulus product. The average life cycle of a new smartphone is 1–2 years (Geyer and Blass 2010), after which refurbishment can be a viable business opportunity to move to a circular economy (MacArthur 2013). At the time of the study, refurbished iPhone 5s in different conditions were already sold by such retailers, as Leapp and Iused (Leapp.nl, Iused.nl).

To create stimuli for the manipulation of verbal information about prior use, a pretest was conducted. This pretest aimed to create a realistic scenario for the verbal information about prior use of refurbished smartphones. Eight participants who recently bought a new smartphone were asked questions about the one they had discarded. The questions addressed the following issues related to smartphone use: duration, frequency and type of use, reason for disposal, and (if present) an explanation of the wear and tear (based on van Weelden,

Mugge, and Bakker 2016). These findings were used to create a text describing a realistic prior use scenario for a refurbished smartphone (see Online Appendices). The information was presented in a narrative form, enabling the reader to have a richer product experience.

We used a picture of a refurbished smartphone as stimuli for the manipulation of visual information about prior use because this corresponds to consumers' decision-making in an online purchase setting. Nowadays, many refurbished smartphones are sold online. Specifically, a picture of an iPhone 5 showing no wear and tear was digitally altered. Scratches were digitally added on the backside of the phone together with a small scratch and a dent on the front. Based on the pre-test responses, these scratches were deemed appropriate in terms of the wear and tear that can be expected for a refurbished smartphone.

All stimuli were accompanied by general information about the price, warranty, the aesthetic and technical state of the smartphone. This general information was based on the information provided by a refurbishing company (Leapp) about a refurbished iPhone 5 in 'visibly-used' condition. General information was the same in all conditions, except for the aesthetic state (either the presence or lack of wear and tear), to match the two smartphone pictures.

This resulted in four different conditions in which participants were presented with (no) verbal information on prior usage and a picture of a refurbished smartphone with (no) signs of wear and tear. All participants were randomly assigned to one of the conditions. The stimuli are available upon request from the first author.

Procedure and Measurements

In the online questionnaire, participants first received a brief explanation that refurbishment is the process in which a used product is refurbished to a proper working condition by disassembling, checking, and cleaning it, and by replacing or upgrading parts that do not meet the standard. Subsequently, they were shown one of the four conditions and were asked to respond to a series of questions (see Online Appendices). First, we measured consumers' evaluations of the refurbished smartphone using Likert scales. In consumer research, Likert scales are common for measuring subjective responses, such as people's perceptions, evaluations, and emotional responses. By asking multiple questions, latent constructs, such as product evaluations, can be measured in a reliable manner (Nunnally and Bernstein 1978). Likert scales are also commonly used in design research (e.g. Mugge 2011; Mugge and Schoormans 2012). To assess the success of the manipulations of verbal and visual information about prior use, measures for participants' knowledge of the smartphone's prior use and perceived wear and tear were included. To control for attitudinal and trait differences in participants, we also included measures for environmental concern, novelty seeking, and their attitude towards the Apple brand. All Likert scales ranged from 1 (strongly disagree) to 7 (strongly agree).

Figure 2.
The effects of visual (i.e. wear and tear) and verbal information about prior use on the perceived wear and tear of refurbished electronics.



Perceived wear and tear
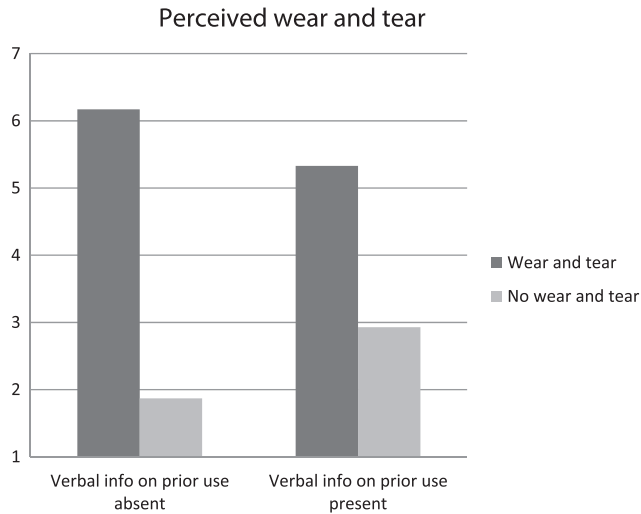
Results

Manipulation Checks

To test whether the manipulations used in this study were successful, a 2 × 2 ANOVA with participants' knowledge of the prior use as the dependent variable and both verbal and visual information about prior use as the independent variables was performed. A significant main effect was found for verbal information about prior use. As intended, participants in the conditions with verbal information about prior use indicated they knew more about the prior use than the participants in the conditions without prior use information ($M_{\text{Info absent}}$ = 1.96 vs. $M_{\text{Info present}}$ = 3.91; $F(1,106)$ = 49.51, $p < 0.001$).

A 2 × 2 ANOVA on the perceived wear and tear revealed a significant main effect for the independent variable visual information about prior use. The refurbished product with scratches and a dent was perceived to have significantly more signs of wear and tear than the refurbished product without scratches and a dent ($M_{\text{wear absent}}$ = 2.40 vs. $M_{\text{wear present}}$ = 5.74; $F(1,106)$ = 198.17 $p < 0.001$).

Moreover, a significant interaction effect between the verbal and visual information about prior use was found for the perceived wear and tear of the product ($F(1,106)$ = 16.01, $p < 0.001$). Presenting verbal information about prior use significantly decreased the perceived wear and tear for the product with scratches and a dent ($M_{\text{Info absent}}$ = 6.17 vs. $M_{\text{Info present}}$ = 5.33; $t(58)$ = 2.73, $p < 0.01$), but significantly increased the perceived wear and tear for the product without scratches and a dent ($M_{\text{Info absent}}$ = 1.87 vs. $M_{\text{Info present}}$ = 2.93; $t(48)$ = −2.89, $p < 0.01$; see Figure 2).

Consumers' Evaluations of Refurbished Electronics

To test the effects of verbal and visual information about prior use on consumers' evaluations of refurbished electronics, a 2 × 2 ANCOVA
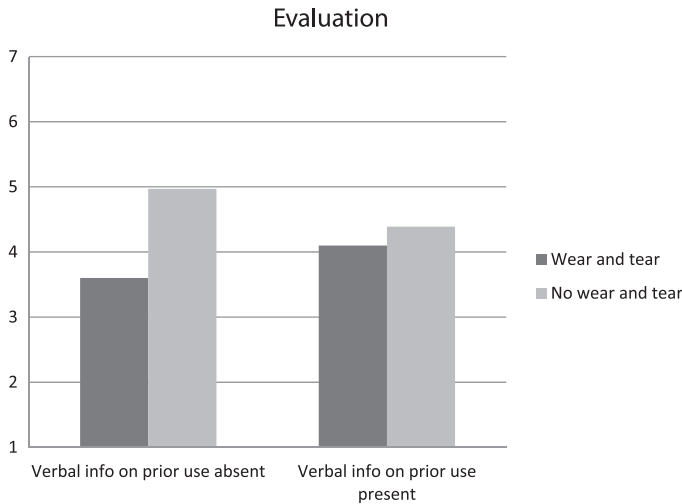
Evaluation

was performed on attitude towards the product. Environmental concern, novelty seeking, and attitude towards the Apple brand were included as covariates.

First, a main effect was found for the independent variable visual information about prior use on consumers' attitude towards the product, indicating that participants evaluated the refurbished product more positively when no signs of wear and tear were present compared with when it had signs of wear and tear ($M_{\text{wear absent}}$ = 4.65 vs. $M_{\text{wear present}}$ = 3.84; $F(1,98)$ = 9.16, $p < 0.01$), providing support for hypothesis 1. Environmental concern and attitude towards Apple were significant covariates ($F(1,98)$ = 6.02, $p < 0.05$, and $F(1,98)$ = 11.50, $p < 0.01$, respectively).

Furthermore, a significant interaction effect was found ($F(1,98)$ = 4.69, $p < 0.05$), which suggests that the effect of visual information about prior use on the evaluations of refurbished electronics depends on the presence of verbal information about how the product was used before. Two separate ANCOVAs showed that when visual information about prior use (i.e. wear and tear) was absent, participants evaluated the refurbished product more positively when no verbal information about prior use was provided ($M_{\text{verbal absent}}$ = 5.11 vs. $M_{\text{verbal present}}$ = 4.18; $F(1,53) < 1$). In contrast, when visual information about prior use was present, participants' attitude towards the refurbished products did not differ depending on the presence or absence of verbal information about prior use ($M_{\text{verbal info absent}}$ = 3.72 vs. $M_{\text{verbal info present}}$ = 3.99; $F(1,)$ = 10.24, $p < 0.01$) . These findings provide support for hypothesis 2. No significant main effect was found for verbal information about prior use. Figure 3 illustrates these findings.

Discussion and Conclusion

The results above suggest that visual information about prior use, in terms of signs of wear and tear, has a negative effect on consumers'

evaluations of refurbished products. Although prior research concluded that consumers evaluate refurbished products first and foremost based on their performance in relation to price, and appearance plays only a minor role (Jiménez-Parra, Rubio, and Vicente-Molina 2014; van Weelden, Mugge, and Bakker 2016), our findings suggest that the role of wear and tear is more prominent. Wear and tear may first of all reduce the aesthetic and symbolic qualities of electronics. Furthermore, it may influence the functional value. As it is difficult for consumers to judge the performance quality of refurbished products, consumers may use the appearance as a quality cue (Mugge 2011; Mugge and Schoormans 2012), and accordingly, evaluate refurbished products less positively in the presence of signs of wear and tear. We also found support for the presence of an interaction between visual and verbal information about prior use. Presenting consumers with verbal information about prior use negatively influenced evaluations of the refurbished product that had no signs of wear and tear. The incongruence between visual and verbal information about prior use makes consumers more aware of the prior use, thereby increasing the perceived wear and tear and lowering their evaluations of the refurbished electronic product. In contrast, when signs of wear and tear are present, consumers may assess the verbal information about prior use as congruent to the visual information and a confirmation that the first owner used the refurbished product responsibly.

Qualitative *Post-Hoc* Interviews

Although this first exploration on consumers' evaluations of a refurbished smartphone surfaced interesting insights on the reception of such products, it did not address the reasons for why different effects emerged. As noted earlier, people's evaluations of products are both personally and contextually grounded. They are also often the outcome of complex processes and diverse experiences (e.g. Douglas and Isherwood 2002; Norman 2004). To this end, in probing into the origin of the effects, we complemented the quantitative study with qualitative *post hoc* interviews to contextualize our findings. In specific, building on past research on refurbishment, we were particularly interested in how factors, such as quality (Hamzaoui Essoussi and Linton 2014), perceived risk (Hamzaoui Essoussi and Linton 2010; Ovchinnikov 2011; Van Weelden et al. 2016), and the presence of product contagion (Argo, Dahl, and Morales 2006, 2008) potentially influenced the participants' evaluations of the refurbished phones in the experimental study.

We interviewed a convenience sample of 12 Dutch adults between 20 and 65 (mean age = 40.4, seven males). Interviews lasted an average of 15 min. They were audio recorded and analysed in Dutch with relevant quotes translated to English for the purposes of reporting our findings.

We started by introducing the interviewees to refurbishment of electronics. Next, we presented them with one of the two pictures of a

refurbished iPhone 5 that we had used in the experimental study. Similar to the experimental study, these pictures were accompanied by information about the price, warranty, the aesthetic and technical state of the phones, and a short description of the refurbishment process.

After having inspected their assigned picture, we asked the interviewees to elaborate their immediate thoughts concerning this refurbished smartphone, followed by questions probing the risk they perceived in purchasing the product, whether they experienced traces of the prior user, and their overall evaluations.

Following this first (visual) evaluations of the product, we presented interviewees with the verbal information about prior use from the experimental study and asked them to reassess their evaluations. We asked them whether the verbal information influenced their first impression of the product and, if so, how. We also asked them if the verbal information changed their overall product evaluations and, if so, why.

We analysed the reports of the interviewees in two stages. First, we familiarized ourselves with the data through a round of open coding in which we reviewed what had been discussed during the interviews. Second, we compared the different reasoning patterns associated with different types of refurbishment to provide a more contextualized understanding of the interaction effect we had found between the visual and verbal information about prior use in the experimental study. Building on past studies on refurbishment, we analysed the interviewees' initial responses to the refurbished smartphones, including their comments on quality, perceived risk, obsolescence, and contagion.

Findings

The presence/absence of visual wear and tear was immediately commented upon at the beginning of each interview. The interviewees who were presented with the picture of the smartphone with wear and tear all noted the (inferior) physical state of the product ('it has scratches', M64). In contrast, the interviewees who were presented with the picture of the smartphone without wear and tear commented that it looked like new ('you actually cannot see that it's refurbished,' F20).

The presence/absence of visual wear and tear also sparked immediate comments about the interviewees' interest in buying the refurbished smartphone. The interviewees who were presented the phone with wear and tear were initially more hesitant, frequently stating that the phone was too expensive given its condition ('For this price, I wouldn't buy a phone that is still damaged,' F41). In contrast, the interviewees who were presented the refurbished phone without wear and tear typically expressed more interest in buying the phone before reading the verbal information.

The presence of wear and tear was predominantly evaluated cosmetically. Specific questions (probes) about the perceived quality and functioning of the phones were answered positively regardless of whether the interviewees were presented a phone with or without wear and tear. The life expectancy of the two phones was described as

similar. Similar to van Weelden, Mugge, and Bakker (2016), the interviewees expressed concerns about that they thought a refurbished phone would become obsolete earlier than a new phone; the main concerns revolved around the idea that a refurbished phone would not be able to handle software updates in the future. Remarks and comments about contagion and traces of prior use were comparatively few and equally present for both the phone with wear and tear as the one without. While none of the interviewees made reference to contagion in terms of residues ('dirt') of prior use (Argo, Dahl, and Morales 2006, 2008), several interviewees were concerned about the possibility of software contagion in terms of data, app settings, viruses, and Trojans enabling third-party access, regardless of the presence or absence of visual wear and tear.

Summarizing, the interviewees initially expressed confidence in the quality of the underlying refurbishment process and, by extension, the functionality of the smartphones. The warranty further underscored this confidence in the (technical) functioning of the phones ('That will be good, I assume. And, there is a warranty,' M43). Similar, when directly asked about the risks they perceived in buying the refurbished phones, the interviewees expressed few worries about the general quality and functioning of the phone regardless of which phone they had been given ('…when [it breaks down], it'll happen within a year. So, you have a warranty,' F59).

Conflicting Verbal and Visual Information

Having access to the verbal information initiated different comments about the refurbished smartphones from the interviewees. Specifically, and similar to the results of the experimental study, access to verbal information about prior use produced more positive evaluations for the refurbished phone with wear and tear and more negative evaluations for the refurbished phone without wear and tear. When the interviewees had been presented with the smartphone with wear and tear, the verbal information about prior use typically confirmed the interviewees' prior assessment of the phone and was thus considered congruent:

> Cosmetically, I can see for myself how it looks. Then, it doesn't matter what happened to it earlier. Furthermore, it doesn't influence the way I think about this phone's functionality because I don't know to what extent this information is true. So, I wouldn't base my decision on it. (F41)

In contrast, when the interviewees had been presented with the phone without wear and tear, the impact of verbal information on their initial responses can best be described as confusing and incongruent. In fact, several interviewees immediately asked for reassurance that the verbal and visual information were about the same phone.

> Because it says here that it is like-new. Of course that doesn't have to be contradictory, because maybe they changed the casing, I mean they made sure it looked like new again, so it's confusing this way. (M26)

In most interviews, the interviewees expressed some doubts about the technical quality of the refurbished phone after having read the verbal information about its prior use. While most interviewees were confident that the refurbishment process could fix technical problems, the lack of direct confirmations thereof raised doubts about the actual functioning of the phones:

> I would like to know more about the performance. For example, the remaining battery life would be useful information. So that you know it is at 80% now. (M38)

The lack of information about the refurbishing company added to the situation as it was suggested that a trustworthy company would have strengthened their general confidence in the refurbishment process and the refurbished product. Certification and/or additional information about the company were mentioned as ways to assess whether a refurbishing company was trustworthy.

Yet, in probing into the need for providing verbal information about the product and the refurbishment process, the interviewees were predominantly negative. Four interviewees that had initially seen a smartphone with wear and tear thought it was unnecessary ('It is unnecessary, it makes people doubt,' M64) whereas two thought it was beneficial ('It is an honest process – you have all the information there is. I like it but I also think it's good to know,' F25). None of the interviewees that had seen a smartphone without wear and tear expressed an interest in information about prior use. Instead, they explained how it tempered their enthusiasm about the phone and raised some doubts about whether the phone would look like-new or be damaged.

Discussion and Conclusions

The *post hoc* interviews suggested that consumers evaluate a refurbished smartphone with visual information about prior use (i.e. wear and tear) more negatively because they feel that it is too expensive. To improve consumers' evaluations of refurbished products, prior research has typically advocated for the use of more verbal information to reduce the uncertainty associated with such products (e.g. Ovchinnikov 2011; Van Weelden et al. 2015). The qualitative findings suggest that providing such information for refurbished smartphones with wear and tear was 'nice to know' as it confirmed prior assessments. In contrast, for the refurbished smartphone without wear and tear, the incongruence between verbal and visual information resulted in confusion and negative evaluations. The phone without wear and tear looked fine

but the verbal information made the interviewees focus on its prior use and, in doing so, question its functional condition.

According to Ackerman and Hu (2015), information reminding people that someone else has previously used the product increases perceptions of contagion, which negatively affects the overall product evaluations. Previous studies predominantly studied this contagion effect in terms of a product being physically dirty or unsanitary. We found support for another type of contagion, which is especially critical for refurbished electronics: digital contagion. Specifically, the impact that (residue) prior use may have on phone software formed a barrier for acceptance.

Conclusion

Refurbishment provides an interesting strategy for consumer electronics companies to contribute to a circular economy – and for designers in thinking about the sustainability of new and old products – but its success depends on consumers' acceptance of refurbished products as an alternative to purchasing new ones. Companies and designers thus need more knowledge on how to tailor their design, production and marketing strategies to increase the success of their refurbishment practices. This paper contributes by investigating in two studies how information about prior use – in either a visual (signs of wear and tear) or a verbal (textual description) form – influences consumers' evaluations of refurbished electronics. The findings show that providing consumers with information about the prior use of refurbished electronics does not have a univocal effect on consumers' evaluations of the refurbished product. Generally, consumers evaluate refurbished products with visual information about prior use more negatively. Furthermore, presenting consumers with verbal information on prior use will only be appreciated by consumers if a refurbished product shows signs of wear and tear and there is congruence between the visual and verbal information. If no signs of wear and tear are present, incongruent verbal information confuses consumers, thereby negatively affecting their evaluations. Our findings make important contributions to the literature by showing that design and communication decisions during refurbishment have an important part to play in shaping the success of refurbished electronics, and towards a circular economy.

Implications for Practice

Companies and designers engaging in refurbishment need to make many decisions concerning design, production and marketing strategies. As there are few standards for refurbishment, companies can choose for many different refurbishment options that may (not) show signs of wear on the exterior of refurbished electronics. Our findings provide important recommendations for practice by demonstrating that from a consumer's perspective, it is best if the exterior of a refurbished product looks like new because consumers evaluate

refurbished electronics more positively if no signs of prior use are visible. For designers, this implies that they should either aim to preserve a like-new appearance by using more durable materials during product development or design products in such a way that they can easily be resurfaced during the refurbishment process. For example, a modular design in which the exterior appearance can be changed easily is desirable. When a refurbished product is sold with a like-new appearance, companies should not remind consumers of the product's first life by providing verbal information about its prior use because this will lower consumers' evaluations.

Another practical recommendation would be that when manufacturers decide to retain signs of wear and tear on the refurbished product (e.g. due to high costs), it is interesting to provide verbal information about the prior use of this product through the marketing communications of these products. Consumers then consider this information 'nice to know' and it may help them in trusting the functionality of the refurbished product.

Future Research and Limitations

This research presents companies with multiple insights on how to increase the market acceptance of refurbished electronics by providing consumers with visual or verbal information about prior use (or withholding it). It also provides insights for designers in more effectively designing for refurbishment. Nevertheless, building on the results of our *post hoc* interviews, more research is needed to achieve a comprehensive understanding of why consumers accept or reject refurbished products and how to better account for refurbishment when designing. First, as an experimental account of a specific context, we did not directly account for how consumers may respond to other types of refurbished products, or restored second-hand products in general, in inquiring into how consumers evaluate refurbished iPhones. As electronic products contain many critical materials, they represent an important subset of second-hand products for companies and designers to consider when moving towards a circular economy. Our results provide guidance in thinking about how to refurbish such electronic products in terms of when to exchange parts and what information to give to consumers. We found that offering information about the prior use of the product negatively impacts (or is of limited value to) consumers acquiring refurbished electronics. This is dissimilar to other types of second-hand products, such as antiques, for which information about prior use is essential to give provenance and value to products (Parsons 2007). Given the importance placed on provenance for many products, the mechanisms by which this value emerges, and how to potentially reinforce it through design, represents an intriguing avenue for future research on design and refurbishment.

Second, our stimuli focused only on refurbished electronics of which the appearance was either 'as new' or 'visibly used'. Nevertheless, other degrees of wear and tear are possible (e.g. Leapp uses

four levels for their refurbished iPhones). Future research could explore how consumers respond to refurbished electronics with either fewer or more extreme signs of usage. It is also important to investigate whether it is possible to create products that 'age gracefully' (Lilley et al. 2016; Mugge, Schoormans, and Schifferstein 2005; Niinimäki and Koskinen 2011). More research is needed to provide designers with guidelines on how to design products and select materials for which wear and tear will result in the experience of 'patina' and more positive consumer evaluations. In doing so, it should be noted that our research was limited to a refurbished iPhone 5 and a Dutch sample. Consumer responses to refurbishment may differ in other countries and for other product categories.

Another limitation is that we asked respondents to evaluate the smartphone based on a picture. Evaluating products based on pictures corresponds to consumers' decision-making online. Nevertheless, it would also be interesting for future research to study how consumers respond to real refurbished products with signs of wear and tear that they can touch and interact with.

Another limitation is that we did not preselect participants who had an interest in refurbished electronics. This approach was chosen because we were interested in how visual and verbal information about prior use would influence the general consumer attitude towards refurbished electronics. Nevertheless, as specific customer groups may be more or less likely to adopt refurbished electronics (Mugge, Jockin, and Bocken 2017), it would be interesting to replicate our findings for different customer groups.

Finally, we realize that refurbishment is just one of the possible ways in which designers can encourage a more circular economy. Many more (design) strategies exist (Mestre and Cooper 2017). However, such strategies will only have the anticipated effects if consumers will accept these products. Consequently, it is of key importance that designers design such circular products in a way that they will trigger few risks and ample benefits to consumers.

Disclosure Statement

No potential conflict of interest was reported by the authors.

Supplemental Data

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