

Expected versus experienced usability:

what you see is not always what you get

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The aim of this study was to explore what factors impact expected usability, and whether and how experienced usability affects participants' evaluation of other product properties, such as sales price and appearance. To do this we compared pre-use and post-use evaluations of electronic consumer products. Participants based their expectations about the usability of a product on its functional form (i.e., number/shape of buttons, screen size), styling, brand, and price. For one of the products, which was experienced as much harder to use than expected, we found that the participants' evaluation of price and the importance of price and styling was affected. It was also found that a product's appearance can be a poor predictor of whether it will be experienced as usable.

INTRODUCTION

We all have split personalities: inside of us there is a customer, who buys products, and a user, who experiences products. And their behavior differs hugely. At parties we complain that it has cost us two whole evenings to figure out our new DVD-recorder. At work we curse at our cell phone and vow that we will never again buy something that is that hard to use. And then we are in the store or a web shop and we find ourselves subjected to our desire to own something beautiful, or to the fear of buying a product with slightly less functionality. When it comes to usability, we seem to dig our own holes.

Usability of electronic consumer products under pressure

The advent of microelectronics in consumer products has increased the number of functions per product and reduced their size (Lindholm *et al.*, 2003). Products with more extended functionality generally are harder to use (Keijzers *et al.*, 2008). In addition, products with micro-electronics contain less visual clues to indicate what the products are for and how to operate them (Buurman, 1997; Standaert, 2004); their 'guessability' (Jordan, 1994) is reduced. Because of the increased functionality, reduced size and reduced guessability, users are faced with products for everyday use that are becoming less usable (Han *et al.*, 2001; ISO, 2006). Finally,

electronic consumer products are increasingly used in networks, which adds connectivity and inter-operability issues (De Visser, 2008).

Positive and negative effects of usability

Usability seems to be of major influence on whether people develop negative or positive feelings about a product (Jordan, 1998; Demir *et al.*, 2008). Positive experiences with a product can result in a stronger brand position and (re)purchase intent among consumers (Park *et al.*, 1992; Reichheld, 2003). In addition, improved usability is seen as a way to prevent customer complaints and product returns and thus as a tool for cost prevention (Bias and Mayhew, 1994; Den Ouden, 2006; Steger *et al.*, 2007).

Thus, usability can be considered a strategic product property. However, it can hardly be claimed that all products on the market are usable, and consumers sometimes buy products with poor usability in overwhelming numbers (Jokela, 2004), even though some of the products are so hard to use that consumers need assistance to use them, or even return or abandon the product (Den Ouden, 2006; Steger *et al.*, 2007; Horrigan and Jones, 2008).

Usability and consumer preference

Some authors point out that there seems to be a weak

relation between good usability and good sales numbers, and attribute this to the fact that as a user one only experiences the usability of a product after purchasing it (Keinonen, 1998; Jokela, 2004; Nielsen, 2004). Keinonen found that consumers have a hard time assessing the usability of a product without using it (Keinonen, 1998) and that expectations about usability hardly impact consumer preference for a product, but that a product's functionality does (Keinonen, 1997, p.183).

Rust *et. al* (2006) showed that people tend to opt for a product with more elaborate functionality. However, after having used the product, the participants in this study expressed a preference for a product with less functionality and more usability. This aligns with a study by Mooy and Robben (1998), who suggest that implicit product properties, such as usability, are best communicated by experiencing a product. In a situation where consumers do not have access to the product, they seem to base their preference more on explicit product attributes, such as aesthetics and descriptions of functionality.

Product properties influencing expected usability

According to Keinonen (1997), consumers primarily use brand, display size and the number of buttons as indicators of a product's usability. Kurosu and Kashimura (1995) and Tractinsky (1997) found a strong relation between a positive evaluation of the appearance of a user interface and expectations about its usability. In an article entitled '*What is beautiful is usable*', Tractinsky *et al.* (2000) found that a positive evaluation of the appearance of a user interface not only impacts expectations about usability, but also how usable participants had experienced the interface after having used it. Price is mentioned as a factor that influences the perception of overall product quality (Antonides *et al.*, 1999), and thus can be assumed to affect expected usability.

Objective

The aim of this study was to explore how people arrive at expectations about a product before use (especially expectations concerning the usability), and whether, and to what extent, actually using a product changes people's opinions about it (again, with a focus on usability). An issue we also wanted to explore was whether poor or good usability impacts the post-use evaluation of appearance, functionality, price and brand.

Research design

The aforementioned studies on expected and experienced usability took place in a controlled (laboratory) environment, only a limited amount of the studies included measures before as well as after participants had used the product, and finally, in none of the previous studies the participants had the opportunity to use the product for an extended amount of time. We opted for a study where we assessed the participants' initial impression of a product, gave them the opportunity to use it in their own environment for two weeks, after which a second evaluation took place. We conducted four studies, each with a different product as stimulus (one navigation device, three alarm clocks). The first study was executed with the navigation device. In view of the results from this study, a second study was performed, involving adaptations as to the products that were used as stimuli and including improvements of the procedure.

STUDY 1: NAVIGATION SYSTEM



Figure 1: The navigation system.

Method

Product. During the first study, a premium brand navigation system was used (see figure 1.). This product was selected because at the time the study was executed portable navigation systems were new to the market and consequently, most people were not familiar with the product category. We considered the selected brand to be the one with the most positive image, especially with regard to the usability. The retail price at the time of the study was € 500,-. The navigation system was offered to the participants in the original packaging with the manual, mounting material and other accessories. The normal retail price was mentioned.

Procedure. The procedure consisted of an intake session, a period in which the product was used, and an exit session. In both sessions the participants filled out a questionnaire, followed by an in-depth interview, in which the participants were probed for considerations leading to the scores in the questionnaire. Thus, the questionnaire scores served as a topics guide for the in-depth interview.

In the questionnaire the participants assessed statements about product properties using 5-point Likert scales, distributed over the following subjects:

- appearance: material and spatial manifestation of a product;
- functionality: the tasks a product can fulfill;
- price: net sales price;
- brand: company or organization that has associated its name with a product;
- usability: how easy is it to use a product?

The participants were instructed to use the product as often as possible, to explore all functions, and to fill out a diary before and after every time they made a trip with the assistance of the device. The diaries were not used for analysis, but during the exit interview they served as a reminder for the participants about their experiences. To keep them motivated for the study, and to stimulate frequent usage, during the usage period the participants received several stimuli, such as (friendly) reminders via e-mail and SMS. After a number of usage situations, they received a small present.

Participants. The five participants of the first study all owned a car. Two of the participants had experience with a navigation system (not of the selected brand). Other selection criteria were frequent usage of the car and frequent visits to unfamiliar locations.

Results

Intake session. From the start, all participants had a neutral to positive opinion towards the brand. Many participants were already familiar with the brand, due to commercials and stories of (positive) product experiences of their friends.

"I heard some good stories about it at birthday parties. [Brand name] is for people that want a good product. It should just work." (participant 1)

"I have a friend who is very enthusiastic about it. [...] I think it is important to listen to other people's encounters with a product." (participant 5)

Furthermore, the participants expected the product to have a

good quality and usability because of the brand.

"I expect the system to be easy to use, since it is a well-known brand and so it should offer quality." (participant 3)

"I think the product will be well thought-out, since the manufacturer is market leader and has a good reputation." (participant 4)

However, that very same participant (participant 4) did not trust the product to be that easy to use, because he had had some bad experiences with other navigation systems:

"I'm kind of taking it for granted that it won't work." (participant 4)

Not all participants evaluated the aesthetics of the product equally; some liked the rounded shapes, although others thought it did not fit their car interior and it was not appropriate for businessmen like themselves. Additionally, there was a difference in how important the aesthetics were to the participants. Two participants mentioned aesthetics would not influence their purchase decisions, it was not important to them, while other participants said:

"If I buy a product, I always look at the specifications first, but with equal specifications, the aesthetics are decisive." (participant 3)

"I think it is important that a navigation system fits my car interior." (participant 5)

Although some participants liked the styling of the navigation system, nearly all participants thought it was too big and bulky.

"It is a smart product right? Why should it be so big and bulky then?" (participant 5)

Some of the participants also anticipated usage problems because of the product's size; they thought it might take some effort to carry the product around. All participants felt the price of the navigation system was very high. They would not pay that much money for a navigation device, while alternatives (internet route-planners and maps) were so much cheaper.

Exit session. During the exit interview, nearly all the participants were positive about the usage of the product.

"Plug and Play! [...] Using it is easy, that also the company's philosophy, they give you the feeling of quality." (participant 1)

"[The product] really makes navigation better and easier." (participant 2)

"At first I was neutral towards the brand, but I've become more positive, because it works better than

my own navigation system.” (participant 3)

As a consequence, earlier mentioned criticisms seemed to be weakened somewhat. Participant 3, who initially really didn't like the aesthetics of the product, said:

"I got used to the product. If you see it up front, the rounded shapes are not so bad..." (participant 3)

Furthermore, the price of the product seemed to be re-evaluated. Before usage, most participants indicated quite strongly they would not spend this much money on a navigation system for personal use. After using the product, they seemed to find the price somewhat more reasonable.

"Yes, there are cheaper brands, but this is really good quality." (participant 3)

"I think it is worth the money if the ease of use stays as good as I have experienced it now and if it would be less bulky." (participant 5)

Learnings from the first study

The first study provided learnings with regard to the method. First of all it proved hard to separate the participants' enthusiasm about the functionality of the product (compared to maps, online route planners, etc.) from the usability of the product. The participants' enthusiasm about the product seemed to have been partly caused by their limited experience with navigation devices.

Secondly, from the answers in the interview we concluded that we should not only study the participants' evaluation of a product property, but also include how important they considered a particular product property.

Finally, in addition to brand, the opinions of friends and family seemed to impact expected usability. At the time of the study navigation systems were a new, revolutionary product, and the selected brand and product were often discussed with friends. As a consequence, our participants had heard a lot of opinions about the product from other people, which influenced their expectations about the product.

STUDY 2: THREE ALARM CLOCKS

Method

In essence the second study followed the same method, though some adjustments were made to the stimulus and procedure.

Product. During the second study clock radios were used as stimulus, because a clock radio is a low-interest

product (in comparison to navigation systems), and people were familiar with the product category. Selecting a low-interest product would reduce the chance that people had discussed that particular product with other people beforehand. Because the product category was familiar to the participants, we anticipated fewer problems in distinguishing between remarks about the product's functionality and usability.

In the first study brand had been a very dominant influence on expected usability. However, we also wanted to explore the influence of other product properties on expected usability, which is why we selected three products from the same brand.

Based on the first study we anticipated that shifts in the evaluation and importance of product properties were most likely to occur if the expected and experienced usability would differ considerably. In order to select alarm clocks with high expected usability a pre-test was executed. 14 randomly approached people evaluated photographs of six alarm clocks on six semantic differential scales, anchored with the terms Easy vs. Hard, Fun vs. Not fun, Boring vs. Interesting, Expensive vs. Cheap, Complex vs. Simple, Beautiful vs. Ugly. The aim was to select alarm clocks with a variation in aesthetic appeal and expected usability. The following three clock radios were selected.

Clock radio 1: regular model. This model (figure 2) had no distinguishing functionality and the retail price was €14.99. In the pre-test the product was mostly associated with terms such as: 'easy', 'boring', 'cheap', 'simple' and 'ugly'.



Figure 2: Clock radio 1; regular model (brand references removed from photograph)

Clock radio 2: playful model. This product's (figure 3) most noticeable features were that it could be rolled over to select different alarm sounds and a 'right-side up' display that tilted automatically if the product was rotated. The retail price was €19.95. In the pre-test it scored high on the dimensions 'easy', 'fun', 'interesting', 'beautiful' and 'expensive'.



Figure 3: Clock radio 2; playful model (brand references removed from photograph)

Clock radio 3: CD-player model. This clock radio (figure 4) featured a CD-player and a weekend alarm. The retail price was €49.95. In the pre-study this model was described mostly as ‘complex’, ‘interesting’, ‘expensive’ and ‘beautiful’.



Figure 4: Clock radio 3; CD-player model

Procedure. The procedure for the second study was similar to that of the first study: an intake session, a period in which the actual product was used, followed by an exit session. In the interviews we tried to distinguish more explicitly between remarks about the functional form aspects of the product, which influence usage (i.e., button placement, screen size) and the styling of the product.

The questionnaire was changed slightly to not only include the evaluation of a product properties, but also their relative importance to the participants, by using a prioritization matrix (Wang *et al.*, 1998). To remind the participants to use this low interest product, they got a calendar with facts and jokes about alarm clocks.

Participants. The second study was carried out with 18 participants: six per alarm clock. All subjects had frequently

used an alarm clock, had no experience with the selected alarm clock, and had irregular wake-up times, which ensured they would have to adjust the settings often.

Visualization of results. For each of the products a visualization of pre-use and post-use scores was made for statements from the questionnaire (see table 1). Because the complete questionnaire was too elaborate to visualize, we selected a number of statements that we considered to be related to the product properties we aimed to study. In the list below, the labels used in the tables to indicate the statements are listed in parentheses. In the tables pre-use scores are light grey, post-use scores are dark-grey. ‘++’ indicates ‘completely agree’ and ‘--’ indicates ‘completely disagree’. At the bottom of the table ‘total Δ’ marks the total shift between pre and post-use scores for a statement for all participants.

Usability

- I dare to trust the clock radio completely to wake me without any problems (Trust in product).
- The usage of the alarm clock will frustrate me [reversed] (Will not frustrate).
- I will know how to operate the alarm clock right away (Intuitiveness).
- It will take a lot of effort to use the alarm clock [reversed] (No effort required).

Styling

- The shape of the alarm clock is beautiful (Shape is beautiful).

Functional form

- The screen is of the clock radio is too small [reversed] (Screen is big enough).
- I would like the clock radio to have more buttons [reversed] (Not more buttons pref.).

Price/appeal

- The price of the clock radio is too high [reversed] (Price is not too high).
- My friends would like to try this clock radio (Appeal to friends).

Functionality

- There are functions on the clock radio I will not use (Will not use full funct.).

The scores of statements marked with [reversed] were inverted in the tables, so that for each assessment a positive evaluation would correspond with the upward direction in the tables.

Results for clock radio 1 (regular appearance)

Intake session. Most of the participants did not have much of an expectation about the usability, seemingly because it looked so very ordinary:

"It looks like a regular alarm clock, so it would probably be used like a regular clock radio."
(participant 1)

"Not really pretty, not really ugly. Just discreet."
(participant 5)

If the participants had any expectation about the usability it tended to be slightly positive (see table 1). Some evidence was found that the functional form aspects (such as button size and placement) did also impact expected usability, since:

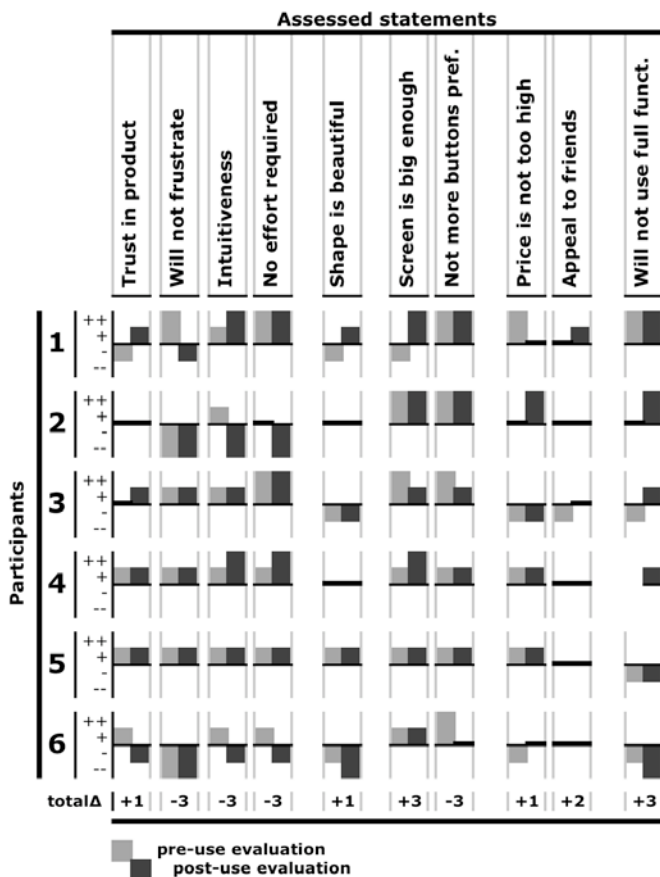
"The less buttons, the better" (participant 2)

"This one is very simple. You should see mine, it freaks you out." (participant 3)

"This seems like a good design for a clock radio."
(participant 4)

Exit session. After the usage period the scores in the questionnaires generally became slightly less positive or remained at the same level as can be seen in table 1.

Table 1: Assessment of the statements by participants for the regular clock radio (see figure 2).



The product basically had been experienced as expected, when it came to usability. None of the questionnaire scores showed a statistically significant difference before and after use (Wilcoxon signed rank test). No clear shift in the importance of product properties before and after usage was detected.

Results for clock radio 2 (playful appearance)

Intake session. This product's appearance was very striking. Participants described the product's appearance as follows:

"It looks so cute! Like an alarm clock for children"
(participant 1)

"It looks cheerful, must be easy to use." (participant 2)

"It looks nice and easy!" (participant 5)

Surprisingly, none of the participants looked at the buttons to see how the alarm clock should be operated. Participants seemed to base their expectations about usage more on the expressive styling than on the functional form. A second factor to positively impact expected usability was the brand, and previous experiences with products from this brand:

"I have other [brand] product and I am satisfied about them so why not about this one?" (participant 3)

"[Brand] is always good, isn't?" (participant 5)

Exit session. Almost all subjects were disappointed about using this alarm clock.

"I had not expected to be in need of a manual. It certainly looked easier than it was" (participant 3)

"I wonder whether people really use this alarm clock. [...] This is the hardest product I ever used."
(participant 4)

"It's just impossible to make the right settings!"
(participant 5)

"I really could not figure out this alarm clock. It wouldn't do anything I wanted it to. It just kept making strange noises." (participant 6)

The experienced usability was much lower than the expected usability (see table 2). The questionnaire scores showed a statistically significant difference ($p < 0.05$) for all the questions expressing experienced and expected usability (frustration, intuitiveness, effort required), except trust ($p < 0.10$). After using this product most participants indicated that they found usability to be very important. For example:

"Next time I'll pay less attention to styling. [...] I don't want another alarm clock that looks nice but that's this hard to use." (participant 5)

This effect was also found in the scores of the prioritization matrix that the participants filled out (table 3). After usage usability was the most important product property for all participants, at the expense of product appearance and brand.

Table 2: Assessment of the statements by the participants for the playful clock radio (see figure 3).

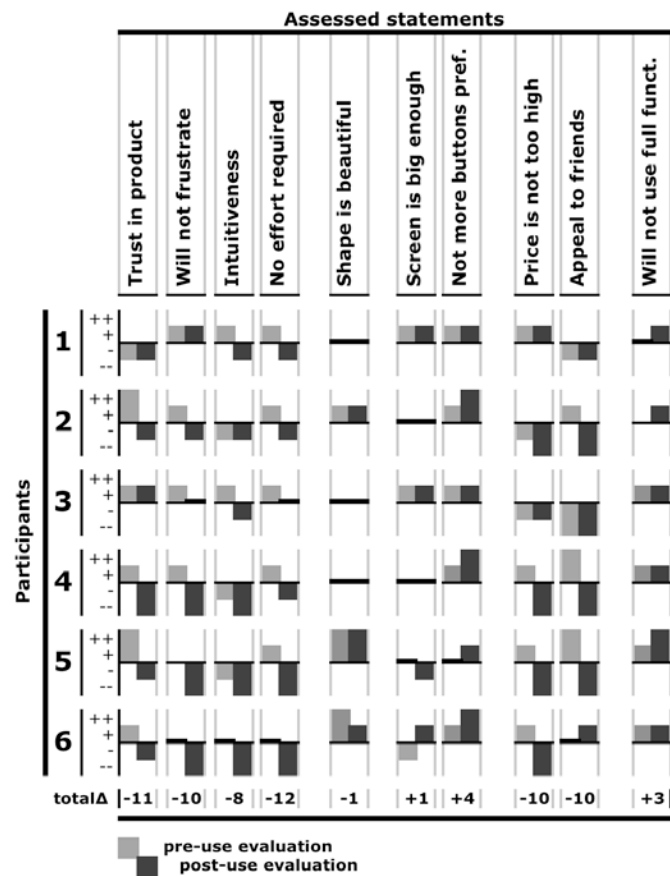
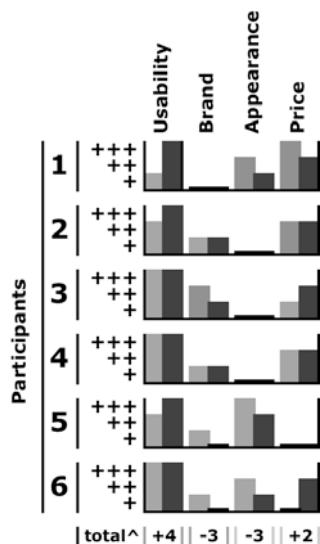


Table 3: Importance of product aspects to users before (light-grey) and after (dark-grey) using the playful alarm clock (figure 3), rated through a prioritization matrix.



The change might have been bigger if half of the participants had not already identified usability as the most important product property before use.

After usage, many respondents made remarks about the price. They seemed to use the price they were willing to pay as

an expression of their satisfaction about the product.

“I would not want to have this alarm clock, even if it is free!” (participant 4)

“0 Euro. I would not want to buy it at all.” (participant 5)

The one participant that was not really disappointed after using the clock radio was still prepared to pay the same price for it.

“20 Euro is a reasonable price for such a product, even though it could be a bit better.” (participant 1)

The possible relation between experienced usability and price can also be seen in table 2, and was confirmed in the statistical analysis. A trend could be seen for the statement that evaluated price; post-use scores were considerably lower ($p < 0.06$). Remarkably, the manufacturer does not seem to be held responsible for making an unusable alarm clock:

“I am not disappointed in [brand]. I just do not think that this a typical [brand] product” (participant 1)

“The alarm clock disappointed me, but I used so many good product of [brand] already, so I will not slate them because of this alarm clock which appeared less good.” (participant 2)

Results for clock radio 3 (CD-player model)

Intake session. During the intake interview most of the participants thought that this clock radio did not have particularly appealing appearance.

“I think it’s shapeless. Doesn’t look nice.” (participant 5)

“It’s too big, ugly, and has boring colors.” (participant 6)

The functional form aspects seemed to trigger anticipations about usage among participants:

“This clock radio looks like you understand it for 90% up front, because I recognize the different buttons and the frequency bar.” (participant 1)

“I don’t like these products that have almost no buttons, so that you need to push multiple buttons at once to do something. But that does not seem to be the case for this product.” (participant 3)

“Doesn’t look too complicated. There are not too many buttons, and their size is reasonable” (participant 5)

“The screen is too small, and is not positioned under the right angle. [...] The buttons are too small and there are slightly too many.” (participant 6)

Except for one, all participants believed this model to be rather expensive, because of the brand. They seemed to have higher

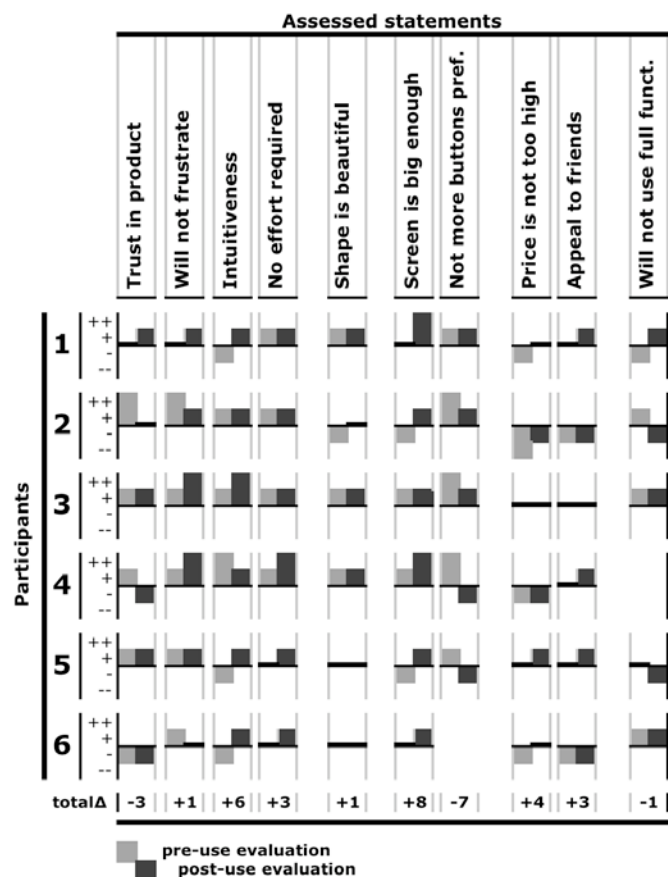
expectations about the overall product quality and usability because of the price and the brand. For example:

“... sometimes the brand expresses quality. I trust [brand] products, but I do not exactly know why.” (participant 2)

Exit session. After usage, both in the questionnaire scores (table 4) and in the interviews, the opinions of the participants about usability seemed to remain on the positive side, and with some participants a positive shift was observed. It seems that the functional form aspects were evaluated more positively after having used the product. A statistically significant difference ($p < 0.05$) between pre and post-use scores was found for the statements about the screen size and the number of buttons. After usage users thought the screen size was sufficiently big, and they were less inclined to want more buttons on the device. For the assessment of price also a significant difference ($p < 0.05$) was found between pre and post-use scores: after use participants found the price more justifiable.

For this product no clear shift was detected for the importance of product aspects before and after usage.

Table 4: Assessment of the statements by the participants for the moderately complex (CD-player) clock radio (see figure 4).



Cross-product comparison before and after use

When comparing the scores before and after usage of all participants (across products), a significant difference ($p < 0.05$) was found for the statement “There are functions on this product that I will not use”.

CONCLUSIONS

What you see may not be what you get

The results show that user assessments of a product’s usability can differ significantly before and after use, especially when the experienced usability is poor. Expected usability is influenced by several factors, most of which are not necessarily related to the actual usability of a product. Users derive their expectations about usability from a product’s brand, price, styling, and functional form. In addition, indications were found that expected usability is influenced by the marketing effort for a product, previous experiences with similar products, and opinions of other people.

It was also shown that product appearance can be a misleading predictor for experienced usability.

Relative importance of product aspects

Indications were found that people might prioritize usability differently before and after having used a product. In the case of the playful clock radio, where the expected and experienced usability differed substantially, in hindsight all participants found usability the most important product property (table 3).

Evaluation of price as indicator for experienced usability

In the case of the playful alarm clock the experienced usability was much lower than the expected usability. Additionally, after usage the participants were considerably less willing to pay the retail price. In the case of the navigation system, after the positive usage experience, the participants seemed a little more willing to pay the (high) retail price. This might be an indication that consumers use the price they are willing to pay for a product as an expression for the experienced usability.

DISCUSSION

When something is unusable, beauty no longer matters

Tractinsky (2000) claimed that ‘what is beautiful is

usable', implicating that a product that is considered beautiful is experienced as being more usable than an ugly product. The case of the playful alarm clock does not disconfirm Tractinsky's findings, but indicates that there might be some kind of limit to this phenomenon. If a product has a certain minimum level of usability, making it more beautiful might influence the experienced usability. However, if the usability of a product is below a certain level, a beautiful appearance cannot fix this, and the importance of the product's appearance seems to get reduced. As shown in the case of the navigation system, it also can occur that if a product is easier to use than participants expected, this mitigates a negative pre-use evaluation of the product's appearance.

Limited impact of negative usage experience on brand

For the product where the experienced usability was very poor, the participants did not seem to blame the company to the extent that the brand image was affected. Possibly it takes several negative experiences before a brand image changes, depending on how 'solid' the customer's beliefs are. In this study all products were from very familiar, trusted brands, and thus the participants may have had rather firmly rooted, positive beliefs about the brand.

Functional form, styling and expected usability

In the studies product appearance appeared to impact expected usability in two different ways: through the functional form (i.e., number of buttons, screen size) and through styling. The functional form seemed to influence the participants' anticipations about the user interface of a product (e.g., in the case of clock radio 3), whereas for styling the effect was different. The playful alarm clock had an aesthetic that prompted certain keywords (playful, fun) from a number of participants. To other participants the product's styling seemed to project an image of a target group. Two participants assessed the target group of the clock radio to be children or 'youngsters'. One of the participants suggested that since the target group was children, it would be an easy to use product.

It seems that styling can be used to manipulate expected usability. However, invoking incorrect assumptions about a product's usability is potentially dangerous, as disconfirmation of expectations is considered one of the triggers for customer dissatisfaction (Oliver, 1980).

Anticipated usage of functionality decreases after use

When comparing the scores before and after use across products it was found that before use the participants thought they would use more of a product's functions than they did after actually having used the product. This is in line with the findings by Rust *et al.* (2006), and further strengthens the notion of a '*I don't know what that feature does, but I might need it some day*'-behavior among customers. An alternative explanation is that people might have a hard time comprehending the full functionality that a product offers before using it.

Limitations of the research

We studied the difference between pre-use and post-use evaluations of products, because those might reflect customer and user evaluations. However, we did not replicate purchase and usage situations. In the pre-use situation participants were confronted with a product that they did not purchase themselves. They did not have the opportunity to perform pre-purchase research on the product by talking to friends and family, or by surveying consumer review websites. As a consequence their knowledge about the product was probably less than in a real purchase situation. Secondly, as they did not purchase the product themselves, they had not made a financial investment. It can be argued that the participants would have reacted differently if they had evaluated products they purchased themselves.

Finally, we actively probed for expectations and opinions about usability. It remains to be seen if usability is a spontaneously surfacing consideration in real life purchase situations, where consumers are not prompted to express their expectations about usability.

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