

User Experience and Hedonic Quality of Assistive Technology

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Abstract

This study examined user experience by evaluating the hedonic and pragmatic perception of assistive technology and the relations with need fulfilment and positive affect. This was tested by presenting information about a new advanced driver assistance system to 90 participants. They evaluated the user experience and furthermore reported their purchase intentions. The results confirmed that need fulfilment was associated with positive affect and perceived hedonic quality of the assistive technology. In addition, there were positive relations between purchase intentions and the variables positive affect, need fulfilment, and perceived hedonic or pragmatic quality. These results demonstrate the relevance of need fulfilment and hedonic quality of assistive systems, which could be employed to promote adherence in healthcare contexts.

1 Introduction

Technology plays a major role in people's everyday lives. It is, however, not only the internet that changes people's behaviors, but further intelligent technologies are developed, such as automated cars. Most relevant for rehabilitative care is assistive health technology that aims to support people with disabilities or older people by enabling them to live more independently. To achieve this end, it is important to address the needs of the user and provide a positive experience with technology (Bittner & Schipper 2014). Therefore, research on the motivational aspects of human-technology-communication aims to improve technology from a user-experience perspective (Bittner & Zondervan 2015).

If health technologies satisfy the needs of users, they are more likely to evaluate it favourably. This is especially relevant for assistive systems because they are oftentimes rejected by users and evoke reactance. Technology for older car drivers, for example, could prevent accidents of drivers with chronic illnesses, or with restrictions in vision, movement or attention (Kenntner-Mabiala & Totzke 2011). If there is medical indication to use assistance in driving, the acceptance of assistive technology could lead to higher levels of adherence. Ultimately, the

use of assistive systems can support disabled or older users in their mobility in daily life, by removing barriers for an independent life.

In previous studies, emotions and need fulfilment that were attributed to a product were found to affect its perception and evaluation (Hassenzahl et al. 2010). Moreover, product perception can be divided into hedonic and pragmatic quality (Hassenzahl et al. 2008). While the pragmatic quality can be subsumed under perceived usability of products, such as practicability and ease of use, the hedonic quality describes the perceived pleasure a product induces. Hassenzahl et al. (2010) detected a direct relation between needs and product perception concerning the hedonic quality of products, and stated that hedonic quality could be the result of need fulfilment by a product.

2 Current Research

The present study provides insight into motivational mechanisms underlying user experience and the evaluation of assistive technology. The hypotheses expected that product perception is based on psychological needs and that there is a link between need fulfilment and the resulting positive affect. Furthermore, we examined the consequences of hedonic and pragmatic quality of an assistive technology on purchase intentions.

2.1 Sample

The sample consisted of 90 persons with an age range between 18 and 63 years ($M = 29.6$; $SD = 9.9$). They were from different educational backgrounds, and 55.6% had an academic degree. They received the opportunity to participate in a prize draw for Amazon vouchers.

2.2 Material and Procedure

With regard to *advanced driver assistance systems*, participants evaluated a new automatic parking function that had just been released by a German car manufacturer. A text with information about the automatic parking function was presented along with a picture of the car and the touch panel to park the car automatically.

After participants had read the information, the following predictors were assessed: need fulfilment, affect, hedonic vs. pragmatic product perception and purchase intentions.

Need fulfilment was measured by the need fulfilment scale (Sheldon et al. 2001). The instruction was to rate the automatic parking function on a 5-point scale regarding the fulfilment of ten psychological needs, with three items for each need (e.g., *competence*, *stimulation*, *autonomy*).

Positive and negative affect was assessed by PANAS (Krohne et al. 1996). Participants rated on a 5-point scale how they were feeling at that moment on 20 adjectives (e.g., "happy", "angry"). Results were calculated for the two subscales positive and negative affect. Internal consistency was good for positive affect ($\alpha = .92$) and negative affect ($\alpha = .86$).

Product perception and evaluation were assessed by AttrakDiff 2 (Hassenzahl et al. 2008) to measure the perceived hedonic (14 items) and pragmatic quality (7 items). The automatic parking function was rated on pairs of opposite words on a 7-point scale (e.g., *appealing* – *unappealing*). Consistency was good for hedonic ($\alpha = .87$) and pragmatic quality ($\alpha = .79$).

Purchase intentions were rated on a 7-point scale (Sääksjärvi & Morel 2010) that contained three items asking for purchase intentions and interest in the product ($\alpha = .87$).

3 Results

The relations between the different predictors were analyzed as expected from the hypotheses. Demographic variables, including age and gender, did not change the results.

3.1 Positive Affect

According to the first hypothesis, the perceived need fulfilment should positively influence positive affect. A regression analysis showed that need fulfilment was a significant predictor for positive affect ($\beta = .64, p < .001$), but not negative affect. This result is in line with Hassenzahl et al. (2010) and confirmed that need fulfilment of the assistive system was associated with positive affect.

Furthermore, positive affect was related to the perceived hedonic quality, but not pragmatic quality of the product, see Table 1. Thus, the perception of hedonic quality in assistive technology was significantly associated with positive affect.

3.2 Need Fulfilment and Technology Perception

The next hypothesis postulated that need fulfilment would be stronger related to the perceived hedonic than pragmatic quality (Hassenzahl et al. 2010). We found significant positive correlations between overall need fulfilment and the two measures of product perception. In line with the hypothesis, the correlation was strongest for hedonic quality ($r = .41, p < .001$) and substantially weaker for pragmatic quality ($r = .27, p = .012$). A significance test for the comparison of two correlation coefficients confirmed the significant difference between the correlation of need fulfilment with hedonic vs. pragmatic quality ($z = 2.16, p = .015$). These results highlight the relation between need fulfilment and the perceived hedonic quality of a product.

3.3 Purchase Intentions

The last hypothesis assumed a positive association between product evaluations and purchase intentions. Indeed, purchase intentions showed a significant positive correlation with positive affect, need fulfilment, hedonic and pragmatic quality, as illustrated in Table 1.

<i>Variables</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
1 Hedonic quality	4.77	.93	—	.45**	.54**	.42**	-.08	.60**
2 Pragmatic quality	4.36	1.15		—	.27*	.12	-.18	.64**
3 Need fulfilment	2.18	.72			—	.64**	.08	.56**
4 Positive affect	2.58	.95				—	-.10	.46**
5 Negative affect	1.47	.60					—	-.06
6 Purchase intentions	3.93	1.76						—

Note: $N = 90$. * $p < .05$, ** $p < .001$.

Table 1: Correlations of the constructs

4 Discussion

This study tested whether the perceived need fulfilment of an assistive system is associated with positive user experience. Indeed, the results showed a significant positive relation between overall need fulfilment of the assistive technology and positive affect. These findings can be explained by the idea that fulfilled needs evoke positive emotions toward the technology (Hassenzahl et al. 2010). In addition, there was a positive relation between need fulfilment and the perceived hedonic and pragmatic quality of the assistive system. Need fulfilment, positive affect, hedonic and pragmatic quality, finally, were associated with higher purchase intentions. This is an important finding, because the perceived user experience was related to the intention to actually buy the product.

For further research, it would be interesting to investigate the causal relation between these constructs and test in an experiment whether positive affect and hedonic quality result from need fulfilment by a technology. Furthermore, it could be that these perceptions change with frequent use after purchasing an assistive product. Possibly, if users habitually use an assistive technology, they experience less positive affect and adapt to routine behaviour. A limitation could be that we did not focus on a sample of people with disabilities. There are several diseases in younger or older patients that limit physiological or cognitive driving competencies and may warrant the use of an advanced driver assistance system.

These findings are relevant for technology development in healthcare, as they highlight the importance of need fulfilment and user experience of assistive technology. Positive affect and the perceived hedonic quality are crucial for the evaluation of a new product. If product designers promote positive perceptions and user experience, consumers might be motivated to purchase a new technology. Ultimately, need fulfilment might strengthen adherence with assistive systems. This could be particularly relevant in areas such as driving, where advanced driver assistance systems may prevent accidents of disabled or older drivers.

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