INDIVIDUALS CHOICE DECISIONS BETWEEN MEDIA TECHNOLOGIES

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INDIVIDUALS CHOICE DECISIONS BETWEEN MEDIA TECHNOLOGIES

Research

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Abstract

Individuals choice decisions between hedonic and media technologies have not been considered so far, even if the adoption of one media technology usually does not rule out the adoption of another technology. The consideration of choice behavior in the context of media technologies is beneficial for IS research, because it provides further insight in personal usage behavior. Content producers are currently left with-out theoretical models to explain regular decisions between media technologies. We thus focus in our study on the choice between different media technologies by starting with a validated model and extending it with the habitual use, because habits account for almost the half of media consumption. To analyze the effect strength of habits in the decision between multiple media technologies, we adopt a multi study analysis across two different pairs of fully substitutable media technology pairs. Both studies do not show a measureable impact of habitual usage of one technology on the usage of another technology, despite the statistical significance of the relationship in both studies. The effect sizes of those relationships are 0 in both cases. We conclude that that other determinants play an important role in the situational choices between multiple media technologies.

Keywords: Choice Behavior, Media Technology, Post-Adoption, Habit.

1 Introduction

The economic development of the world’s economies has not only led to increased wealth among the world population, but also in the past 10 years to a decrease in an individual’s average working hours. Increased wealth and spare-time drives the overall demand for leisure activities. One of the most prominent leisure activities is the use of media content across different technologies. Individuals have a variety of ways to consume the desired media content, either between differing content types or even among different technologies for the same content. Some technologies are perfect substitutes for the same content, like books and e-books or mp3s and music streaming. Other technologies even compete for the attention among users, simultaneously (Brasel & Gips 2011). Most users have adopted multiple technologies for the same content type (Brasel & Gips 2011). The initial adoption of technologies has received a lot of attention, but decisions made between adopted technologies have been virtually not present (A. Schwarz & C. Schwarz 2014). Prior research addressed mostly the drivers of a commitment towards a single technology. Limayem et al. (2007) analyzed how an old habit can impact the usage of an adopted media technology. Hsieh et al. 2012 investigated the determinants of a switching behavior in cases where both technologies are substitutes, but the focus lies on discarding one technology for the other and not keeping one in the long run. Taneja et al. (2012) analyzed the media consumption in relation to its availability, the circumstances, and activity patterns like commuting, finding that media consumption and the according technology usage is heavily depending on the daily patterns of life. A. Schwarz & C. Schwarz (2014) argue that the current adoption models in IS are not able to predict, which
choice is more likely to be made between multiple adopted options, despite its apparent relevance for individuals’ daily lives. A Schwarz & C. Schwarz (2014) made initial strides in answering this question by analyzing technology choices among productivity systems. Hedonic and media technologies have not been considered so far, even if the adoption of one media technology usually does not rule out the adoption of another technology as prior studies have shown (Brasel & Gips 2011). We believe that this choice scenario is even more prevalent in a media context, because the use of media and hedonic technologies is less dependent on extrinsic factors or rational considerations (Wu & Lu 2013). The consideration of choice behavior in the context of media technologies is beneficial for IS research, because it provides further insight in personal usage behavior. It is also helpful for IS practice, because it provides understanding of users and thus customer’s usage and decision behavior. Content producers are currently left without theoretical models to explain such a behavior. As Lugmayr (2013) pointed out, the importance of the digital media industry is steadily increasing in practice but lacks the proper consideration within the research community. With our study, we take up the call and investigate the consumer behavior in a way, which was not considered up until now (Lugmayr 2013) and provide more insight for content providers and creators. We also consider user behavior in comparison between multiple technology pairs – emerging, new technologies and sometimes considered to be obsolete, technologies. We thus focus in our study on the choice between different media technologies by starting with the model of A. Schwarz & C. Schwarz (2014) and extending the model with the habitual use of the old technology, because habits account for almost the half of media consumption and are a powerful and reliable predictor of media technology usage (LaRose 2010; Taneja et al. 2012). To analyze the effect strength of habits in the decision between multiple media technologies, we adopt a multi study analysis across two different pairs of fully substitutable media technology pairs.

2 Technology Choice in Digital Media

A first step in understanding technology choice is to analyze post-adoption behavior. If one technology is used, an alternative is consequently not used as much. However, this does not explain how users judge competing technologies and which factors are crucial. A. Schwarz & C. Schwarz (2014) proposed an initial model to understand user behavior in situations of technology choice. The model is similar to the theory of planned behavior (Ajzen 1991) and is built primarily around the attitude-intention-behavior relationship. Their study showed that users have absolute views about a technology, but users’ choice behavior depend on relative judgments of technologies. The context of technology choice is situated in the post-adoption phase (A. Schwarz & C. Schwarz 2014), where an individual is relatively committed to multiple technologies. Thus he or she has adopted all of the prevalent options and has generally positive attitudes and perceptions of that technologies (A. Schwarz & C. Schwarz 2014). The conclusion of A. Schwarz & C. Schwarz (2014) is that an individual has a specific number of attitudes towards her adopted options and decides based on the attitudes for any given choice. These relationships have been explored for work related technologies. Choice behavior in digital media technology is not considered in IS literature yet, despite that the adoption of multiple technologies is an apparent phenomenon in developed economies (Taneja et al. 2012). The differences in decision behavior between media consumption technology and professional contexts are recognized in the scholarly literature and it is recommended to incorporate factors related to the usage setting (Van der Heijden 2004; Taneja et al. 2012). One reoccurring factor in the consumption and usage of digital media technology are habitual routines (LaRose 2010). Those media habits are usually understood “as a form of automaticity in media consumption that develops as people repeat media consumption behavior in stable circumstances” (Verplanken & Wood 2006). Habit has been established as a powerful predictor of media consumption (Diddi & LaRose 2006) and it is assumed that half of all media consumption is habitual, be it traditional or digital media (LaRose 2010). It is thus not surprising that the habitual use of digital media has been analyzed multiple times and is significant in media usage behavior (Chan-Olmsted et al. 2013). The establishment of habits is also important for the providers of digital media technologies, as it described as a lifelong factor among consumers (Chan-Olmsted et al. 2013). Brasel & Gips (2011) investigated the habitual use of multiple media technologies at the same time in a form of multi-tasking between the...
TV and computer screen and compared the usage patterns between both screens, finding that those technologies do not substitute each other and thus both habits stay preserved, but the attention gravitated towards the computer screen in their study. Kefi et al. (2015) also established habits as an antecedent of continuity usage of social media networks. Technology drives media consumption and it is suggested that younger adults are adopting newer technologies and establish habits in using those technologies, but evidence for supporting this suggestion is still scarce (Kilian et al. 2012). Based on prior findings, it is expected that the habitual usage of media technologies might be a necessary factor to integrate into the model of A. Schwarz & C. Schwarz (2014) to further understand the choice behavior of users between multiple, adopted media technologies.

3 Theoretical Background

In order to incorporate the habitual use of an alternative choice into the model of A. Schwarz & C. Schwarz (2014), we first discuss the theoretical differences between habitual behavior and behavior based on the attitudinal process, which underlies the basic model. Attitude as a major predictor of individual behavior (Ajzen 1991; Ajzen 2005) and the acceptance of a new technology is a result of a psychological process, in which the resulting behavior depends on past experience, behavioral cues, established habits, attitudes, or intentions (Ajzen 1991; Verplanken & Aarts 1999; Betsch et al. 2004; Bagozzi 1981).

The behavioral decision process is differentiated from a habitual process, which is less conscious. A habit is an intentional behavioral program, which is efficient, controllable to a certain extent, and occurs without much awareness (Verplanken & Aarts 1999). The typical habitual process is triggered by a goal activation, which reflects a desired behavior, followed by an assessment of the perception of the situational sensory input, an appreciation of possible choices, a conscious integration of context and choices, and finally the resulting behavioral choice (Verplanken & Aarts 1999). Strong habits usually result in a more automated behavior, which are activated by a goal and lead directly to a behavioral choice (Verplanken & Aarts 1999). If there is a fit between the intended behavior and the outcome (Ajzen 1991; Verplanken & Aarts 1999; Betsch et al. 2004), behaviors with corresponding past behaviors can turn into habits, if they are sufficient, frequent and satisfactory (Verplanken & Aarts 1999).

The cognitive process involves an evaluation of the potential behavior (Ajzen 1991), which results in an attitude. Attitudes are either directly linked to performed behaviors or influence it through the intention formulation (Bagozzi 1981), whereas intentions capture the motivational factors of triggering a behavior (Ajzen 1991; Heckhausen & Beckmann 1990). A stronger motivation increases the probability of the actual behavior (Ajzen 1991). The relationship between attitudes, intentions, and behavior is called the attitude-behavior correspondence and describes the fit between the attitude and the subsequent behavior (Ajzen 2005). The fit is not understood as being fixed, but growing with increasing consciousness about the behavior (Glasman & Albarracin 2006).

![Habitual Behavior Process](image)

**Figure 1:** Habitual Behavior Process

We distinguish between three layers, which impact an individual’s use of a technology. The habitual layer includes the behaviors associated with routines and habits. A sufficient amount of repetitions is usually necessary before a routine is established as a habit and thus the habitual layer is only relevant
for the incumbent technology. Verplanken & Aarts (1999) suggest that the evaluative part of the behavioral process is skipped in a habit. At the same time, habits interfere with the formation of intentions and overrule them (Betsch et al. 2004). This results in weak motivation for the intended behavior (Ajzen 2005). The habitual layer is mostly understood as an automatic process, with only minor cognitive aspects. The adoption of a new technology is usually inhibited by weakening the intention formation and activation through performing subconscious behaviors (Limayem et al. 2007; Polites & Karahanna 2012; Verplanken & Aarts 1999; Betsch et al. 2004).

Figure 2: Layers of Behavior

The evaluative layer on the other hand includes the consideration of multiple aspects of potential behavior, in our case either using an incumbent system or a new system. The conscious consideration of outcomes, past experience, eventual rewards, and composing factors of attitude results in a positive or negative attitude, which can lead to a behavioral intention (Ajzen 1991). Figure 2 summarizes the three relevant layers involved in a decision between an incumbent and new technology.

Past experience is known to influence the attitude towards a behavior and thus has influence on the attitude towards the old system (Ajzen 1991). If the attitude towards using the old system is positive, it is likely that a habit will be formed through a frequent repetition of the behavior (Verplanken & Aarts 1999). A more frequent habit becomes less dependent on the evaluation of the behavior and the predictive effect of attitudes therefore decreases (Bagozzi 1981). Habits can lead to behavioral lock-ins or result in being stuck with a habit (Betsch et al. 2004). Extensive past behavior also reduces the predictive effect of intentions (Bagozzi 1981). However, certain mechanisms are known to inhibit a desirable resolution. A frequent past behavior with satisfying results, inhibits the attitudinal change towards the new system (E. Harmon-Jones & C. Harmon-Jones 2007), as does increased importance and a personal relation towards one of the attitudes (Brehm 2007; Gawronski 2012).

4 Research Model and Design

4.1 Research Model

We adopt the approach of A. Schwarz & C. Schwarz (2014) as a starting point for our investigation with the limitation that attitudes alone might not be sufficient to explain a choice between digital media technologies, because the use of digital media technologies is often driven by habits and they are established as a powerful predictor of actual behavior (Diddi & LaRose 2006; LaRose 2010). We thus suspect that
Habits show some impact on the decision between multiple options. Like the research model of A. Schwarz & C. Schwarz (2014), we base our model on TPB (Ajzen 1991). We consider habitual usage as a possible determinant of choice behavior as suggested by Limayem et al. (2007). All relevant determinants, experiences, and potential outcomes of a behavior are summarized into one general evaluation of a behavior, which is an attitude (Ajzen 1991). We understand attitudes as associations between objects and valenced information about those objects, which an individual posses in his memory (Fazio 2007).

In situations where contrasting beliefs occur, like positive evaluations of two adopted, digital media technologies, individuals tend to stick with the most resistant attitude, which is usually the most recent attitude: the attitude towards the old system (Brehm 2007). In a case where two choices are present and the individual has extensive experiences with the old media technology and a positive attitude towards using that system, the theory expects a kind of positive feedback loop, because past experience is a determinant of attitudes (Ajzen 1991). Habits are shaped by past behaviors and by established attitudes, we therefore suggest that the attitude towards using an old system has an impact on the habitual use of this system. We thus hypothesize:

H1: A positive attitude towards using the old technology has a negative impact on the attitude towards using a new technology.

H2: A positive attitude towards using the old technology has a positive impact on the habitual use of the old technology.

Attitudes are consistent predictors of intentions, especially if the intention is directed towards a behavior rather than an object (Ajzen 1991; Ajzen 2005; Bagozzi 1981). We subsequently hypothesize:

H3: A positive attitude towards using a new technology has a positive effect on the intention to use a new technology.

Habits are built by past experience and exposure to an information system, the use of which becomes more automated and less conscious with increased repetition (Limayem & Hirt 2003). Well established and strong habits of specific system usage results in subconscious behaviors (Limayem & Hirt 2003), which can interfere with the formation or activation of conscious intentions (Verplanken & Aarts 1999; Brehm 2007). Established habits support the attitude towards using the old technology through more personal experience and more recent activation (Verplanken & Aarts 1999; Limayem et al. 2007). Habits are a comparable concept to the intention formation process; both serve the purpose to induce certain behaviors (Verplanken & Aarts 1999). But it simply triggers a behavior with a high goal fit (Verplanken & Aarts 1999). The habitual behavior formation takes several contextual pieces of information into account, but is less cognitive in comparison to the intention formation process and thus less controllable by the user (Verplanken & Aarts 1999). The automated behaviors lower the influence of intentions and thus the relationship between intentions and behavior becomes weaker and becomes effectively overruled, resulting in behavioral lock-ins (Bagozzi 1981; Verplanken & Aarts 1999; Betsch et al. 2004; Limayem et al. 2007). We subsequently hypothesize:

H4: Habits have a negative impact on the attitude towards using the new technology.

H5: A habitual use of the old technology has a negative effect on the intention to adopt a new technology.

Behavioral intentions are known as the strongest predictor of actual usage in general (Ajzen 1991; Ajzen 2005) and in the context of information technology (Bhattacherjee 2001; Turner et al. 2010). We do not expect a different outcome and thus hypothesize:

H6: A behavioral intention has a positive effect on the actual usage of a technology.

Figure 3 summarizes our research model.
4.2 Research Design

In order to test our research model, we adopt a two study research design. Each study has the purpose to test the identical research model, measured with the same adapted measurement items across different samples. However, the setting remains the same. Our first study tests the research model across users of electronic books and books, while the second study tests our research model across the users of digital music streaming and vinyl records. Both studies only addressed and included successful adopters and users of both technologies, thus every participant of study one is a frequent reader of books and e-books alike, while every participant in study two is a regular user of digital music streaming and vinyl records alike. Thus both sample groups are appropriate to investigate our research question, because both groups are confronted with regular technology choices in at least one case of technology pairs – our focal technologies. We understand a technology pair, as a pair of technology, which are completely substitutable in a sense that every user can decide if she wants to consume particular content through the traditional way or by using a new technology. The content itself, does not differ between those technologies. A book does not change whether its read on paper or an electronic reader, neither does not change a song whether its played back from a vinyl record or a music streaming provider. We will discuss the appropriateness of each technology pair in the context of each study.

5 Study 1: The Case of E-Books vs Books

5.1 Focal Technology, Method and Data Collection

In order to analyze whether habits can have an impact on the technology choice between adopted, hedonic technologies in a post-adoption scenario, we deliberately focused in our first study on two well adopted technologies, which can be completely substituted and still serve the same function. We identified books and e-books as a fitting technology, because both serve as a means to present the same content, which is often consumed in a hedonic fashion.

The habit items have been adopted from Polites & Karahanna (2012) and Limayem et al. (2007). For measuring the behavioral intention, we adopted the reported items from Davis et al. (1989) and Venkatesh et al. (2003). And finally, the items for measuring actual usage behavior have been adopted from Limayem et al. (2007). We included only successful users of both technologies in our analysis. The survey was performed as an online questionnaire. The study was conducted during the spring of 2015 over a timespan of four weeks. We recorded a total of 353 responses, with 233 complete responses. The majority of the responses (71%) came from female participants, while 29% of responses came from males. The average participant was 24 years old (mean: 23.78 years; median: 23), and earned at least a high school diploma (65%) or even a university degree (20% Bachelors Degree, 8% Masters Degree).
5.2 Data Analysis

For the analysis of our hypothesis, we chose to analyze the data using partial least square structural equation modeling (PLS-SEM), which we performed with R and the plspm-Package and SmartPLS. PLS is an appropriate way to test complete theories and concepts, especially since it allows us to assess and test the relationships between constructs on the theory level (Hair et al. 2012). We applied several established tests to evaluate the measurement model. For internal construct validity we calculated the Cronbach’s Alphas, which exceeded the threshold of 0.7 in all cases (Hair, Ringle, et al. 2013). For indicator reliability we examined the outer loadings of each indicator on its latent variable, which should exceed the threshold of 0.708 (Hair, Ringle, et al. 2013). All of our outer loadings are above the threshold. For convergent validity we estimated the average variance extracted (AVE) which also exceeds the threshold of 0.5 in all cases (Fornell & Larcker 1981). To test for discriminant validity we applied two tests: First, the Fornell-Larcker-Criterion (Fornell & Larcker 1981), which states that the square root of the AVE should be higher than the correlation with other latent variables. Our measurement model exceeded all criterions as shown in Table 1.

<table>
<thead>
<tr>
<th>AVE</th>
<th>Cronbachs Alpha</th>
<th>ATTB</th>
<th>HAB</th>
<th>ATTE</th>
<th>INT</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATTb</td>
<td>0.765</td>
<td></td>
<td></td>
<td>0.875</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HAB</td>
<td>0.909</td>
<td>0.939</td>
<td></td>
<td>0.875</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATTe</td>
<td>0.833</td>
<td>0.967</td>
<td>0.311</td>
<td></td>
<td>0.809</td>
<td></td>
</tr>
<tr>
<td>INT</td>
<td>0.888</td>
<td>0.937</td>
<td>-0.091</td>
<td>-0.145</td>
<td>0.669</td>
<td>0.943</td>
</tr>
<tr>
<td>USE</td>
<td>0.892</td>
<td>0.960</td>
<td>-0.091</td>
<td>-0.252</td>
<td>0.618</td>
<td>0.681</td>
</tr>
</tbody>
</table>

Table 1: AVE, Cronbachs Alpha, Fornell-Larcker-Criterium of Study 1

We also examined the cross loadings of our indicators, where indicators should not exhibit higher cross loadings than outer loadings (Hair, Ringle, et al. 2013). All of our indicators passed this test as well. We also addressed the issue of common method bias through a post-hoc analysis of the Harman-Single-Factor (Podsakoff et al. 2003). The single, unrotated factor accounted for 35% of the variance, while the exploratory factor analysis using the principal components analysis resulted in five factors with an explained variance of 86%, thus common method bias is not an issue in our data (Podsakoff et al. 2003).

![Figure 4: Structural Model of Study 1](image)

Next, we performed a bootstrapping procedure to assess the significance of the paths on different levels. The results indicate that the path of H1 is significant on a 1%-level. The paths of H2, H3, H4, and H6
are even significant on a 0.1%-level, while H5 is not supported by our data. We also calculated the $R^2$ values for our dependent latent variable, resulting in a moderate predictive accuracy for actual usage ($R^2$: 0.464) (Hair et al. 2011). The path coefficients, $R^2$ values, and significance levels can be taken from Figure 4. Our first study supports all of our hypotheses with the exception of H5, which indicates that habits of using an old technology does not have a significant impact on the intention to use a new technology. The remaining five hypotheses suggest that the extended model of A. Schwarz & C. Schwarz (2014) is applicable in the context of competing digital media technologies. The $R^2$ of our model implies a good predictability of actual usage behavior by our determinants.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1 A positive attitude towards using the old technology has a negative impact on the attitude towards using a new technology</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>H2 A positive attitude towards using the old technology has a positive impact on the habitual use of the old technology.</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>H3 A positive attitude towards using a new technology has a positive effect on the intention to use a new technology.</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>H4 Habits have a negative impact on the attitude towards using the new technology.</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>H5 A habitual use of the old technology has a negative effect on the intention to adopt a new technology.</td>
<td>n.s.</td>
</tr>
<tr>
<td>H6 A behavioral intention has a positive effect on the actual usage of a technology.</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Table 2. Summary of the hypotheses tests in study 1

To further analyze our results, we continued with the assessment of the $f^2$ effect sizes of our significant relationships. The $f^2$ effect sizes are calculated by eliminating the complete construct from the structural model and recalculating the $R^2$ of the modified model. The differences in the explained variance between the complete and modified model is the basis of the effect sizes (Hair, Hult, et al. 2013). The basic, underlying assumption of those effect sizes is the added, explained variance by adding the analyzed determinant. The interpretation of the effect sizes follows the guidelines of Cohen’s $d$, where 0.02, 0.15, and 0.35 represent small, medium, and large effects (Cohen 1977; Hair, Hult, et al. 2013). The assessment of the effect sizes for H1 and H4 resulted in $f^2$ of 0 and 0, respectively. Our data thus suggest, that the relationship between the attitude towards the old technology and the habit of using the old media technology towards using the new media technology is significant, but does not explain any additional variance of the usage.

### 6 Study 2: The Case of Music Streaming vs Vinyl records

#### 6.1 Focal Technology, Method and Data Collection

In our second study, we identified the music streaming and vinyl records as our technology pair to analyze the choice behavior in the usage of digital media technology. We identified vinyl records as a fitting technology, because it is seen as an obsolete technology, the use of which was disrupted long ago by the compact disc (Uterback & Acee 2005). The extinction of vinyl records was expected by the majority of people and while sales continuously declined throughout the 1980s and 1990s, it has seen a rapid rise since the mid 2000s (Yochim & Biddinger 2008). Vinyl records sales steadily increased on a year-to-year basis since 2005\(^1\), while it is still seen as a long-gone technology for nostalgia and amusement (Etzioni 2011). The recent resurgence of vinyl records even led to the resumption of vinyl record

sales charts.\textsuperscript{2} We argue that vinyl records are an excellent case for investigating the possibility of emotional attachments towards technologies. It is a technology which is objectively obsolete and obviously inferior to compact discs, digital downloads, or music streaming in terms of usability, mobility, or reliable sonic reproduction. Nonetheless, it is used by a variety of groups (Yochim & Biddinger 2008).

The survey was performed as an online questionnaire and was distributed through a commercial Facebook page, multiple Facebook groups, and several online communities. All of the outlets are in some form concerned with music. The commercial Facebook page belonged to an international online-shop for digital music files and vinyl records. The company behind this online-shop also acts as a small independent record label and uses its Facebook page as an outlet for its shop and record label activities. The other Facebook groups and the online communities are all platforms for music enthusiasts, with no commercial intent. We conducted a raffle for vouchers at bespoke online-shops as an incentive for the respondents, but we made clear that the survey was anonymous and that the firm had no access to our data. The study was conducted at the beginning of 2015 over a timespan of four weeks. We recorded a total of 1315 responses, with 275 complete responses. After testing our screeners, 110 respondents failed at least two attention tests. We subsequently removed those responses from our sample, resulting in a total sample of 165. We intentionally addressed platforms where we can survey individuals with extensive experience and at least some level of involvement. As previously discussed, individuals hold relatively few attachments and the probability to identify users who are attached towards a focal technology is thus difficult among a general population.

The majority of the responses (92\%) came from male participants, while only 8\% of responses came from females. The average participant was 29 years old (mean: 29.92 years; median: 27), and earned at least a high school diploma (49\%), or even earned a university degree (34\% university degree; 3\% PhD), with only 14\% of the sample being below a high school diploma.

\section{Data Analysis}

We applied the same tests to evaluate the measurement model of our second study as for the first study. For internal construct validity we calculated the Cronbach’s Alphas, which exceeded the threshold of 0.7 in all cases (Hair, Ringle, et al. 2013). For indicator reliability we examined the outer loadings of each indicator on its latent variable, which should exceed the threshold of 0.708 (Hair, Ringle, et al. 2013). All of our outer loadings are above the threshold. For convergent validity we estimated the average variance extracted (AVE) which also exceeds the threshold of 0.5 in all cases (Fornell & Larcker 1981). To test for discriminant validity we applied two tests: First, the Fornell-Larcker-Criterion (Fornell & Larcker 1981), which states that the square root of the AVE should be higher than the correlation with other latent variables. Our measurement model exceeded all criterions as shown in Table 3.

\begin{table}[h]
\centering
\begin{tabular}{|l|c|c|c|c|c|c|}
\hline
 & AVE & Cronbachs Alpha & ATT\textsubscript{o} & HAB & ATT\textsubscript{n} & INT & USE \\
\hline
ATT\textsubscript{o} & 0.756 & 0.892 & 0.869 & & & & \\
HAB & 0.574 & 0.846 & 0.391 & 0.758 & & & \\
ATT\textsubscript{n} & 0.782 & 0.944 & -0.026 & -0.141 & 0.884 & & \\
INT & 0.825 & 0.929 & -0.021 & -0.100 & 0.610 & 0.908 & \\
USE & 0.796 & 0.936 & 0.035 & -0.046 & 0.670 & 0.678 & 0.892 \\
\hline
\end{tabular}
\caption{AVE, Cronbachs Alpha, Fornell-Larcker-Criterium of Study 2}
\end{table}

\textsuperscript{2} http://www.theguardian.com/music/2015/apr/13/vinyl-records-official-chart-company
We also examined the cross loadings of our indicators, where indicators should not exhibit higher cross loadings than outer loadings (Hair, Ringle, et al. 2013). All of our indicators passed this test as well. We also addressed the issue of common method bias through a post-hoc analysis of the Harman-Single-Factor (Podsakoff et al. 2003). The single, unrotated factor accounted for 37% of the variance, while the exploratory factor analysis using the principal components analysis resulted in five factors with an explained variance of 76%, thus common method bias is not an issue in our data (Podsakoff et al. 2003).

Figure 5: Structural Model of Study 2

Next, we performed a bootstrapping procedure to assess the significance of the paths on different levels. The results indicate that the path of H1 is significant on a 1%-level. The paths of H2, H3, H4, and H6 are even significant on a 0.1%-level, while H5 is not supported by our data. We also calculated the $R^2$ values for our dependent latent variable, resulting in a moderate predictive accuracy for actual usage ($R^2$: 0.459) (Hair et al. 2011). The structural model, including the results can be seen in figure 5. To further analyze our results, we continued with the assessment of the $f^2$ effect sizes of our significant relationships. The $f^2$ effect sizes are calculated by eliminating the complete construct from the structural model and recalculating the $R^2$ of the modified model. The differences in the explained variance between the complete and modified model is the basis of the effect sizes (Hair, Hult, et al. 2013). The basic, underlying assumption of those effect sizes is the added, explained variance by adding the analyzed determinant. The interpretation of the effect sizes follows the guidelines of Cohen’s d, where 0.02, 0.15, and 0.35 represent small, medium, and large effects (Cohen 1977; Hair, Hult, et al. 2013). The assessment of the effect sizes for H4 resulted in $f^2$ of 0. Our data thus suggest, that the relationship between habit of using the old media technology towards using the new media technology is significant, but does not explain any additional variance of the usage.

<table>
<thead>
<tr>
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<td>H1  A positive attitude towards using the old technology has a negative impact on the attitude towards using a new technology</td>
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<tr>
<td>H2  A positive attitude towards using the old technology has a positive impact on the habitual use of the old technology.</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>H3  A positive attitude towards using a new technology has a positive effect on the intention to use a new technology.</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>H4  Habits have a negative impact on the attitude towards using the new technology.</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>H5  A habitual use of the old technology has a negative effect on the intention to adopt a new technology.</td>
<td>n.s.</td>
</tr>
<tr>
<td>H6  A behavioral intention has a positive effect on the actual usage of a technology.</td>
<td>&lt; 0.001</td>
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</table>
Table 4. Summary of the hypotheses tests in study 1

7 General Discussion, Limitations, and Conclusion

7.1 General Discussion of the Results

The results of our both studies show a consistent picture, despite the differences in the media technology pair and the difference in the sample group, which are independent of each other. In both studies, H5 could have been supported, thus we can not say if the habitual usage of an old technology does really impact the intention to use another media technology. However, the impact on the attitude towards the new technology has been significant in both studies – H4. On the first sight, this is expected from the theory. Habitual use is known to impact the formation intention of related behaviors (Verplanken & Aarts 1999) and inhibit the use of technology (Limayem et al. 2007). By closer examination of the results, the actual impact of the habitual usage of the old technology is beneath what is considered a small effect and actual not measurable. Our findings contrast what has been previously done by A. Schwarz & C. Schwarz (2014) as neither the attitude towards a competing attitude, nor the habitual usage of the older technology has a meaningful or even significant relationship with the actual usage of the new technology. A possible explanation for the deviation of our findings might be the different contextual settings, because A. Schwarz & C. Schwarz (2014) investigated the choice behaviour in a professional setting, while we analysed a more hedonic setting with the consumption of content through media technologies. The differences between professional and hedonic technologies have been widely established (Van der Heijden 2004; Wu & Lu 2013).

Our findings have several implications for the current theory in IS. First, the habitual use of digital media and media technologies is a widely acknowledged predictor of actual behaviour (LaRose 2010; Taneja et al. 2012). However, the habit of using a particular technology seems not be a reliable predictor, if any after all, of another technology. Following the results of our study, a consumer might have established habits of reading books and listening to vinyl records and still use her e-book reader or listening to music on streaming services. This findings stay in contrast to general findings in social psychology, where habits usually considered as an inhibitor of similar or alternative behaviour (Verplanken & Aarts 1999). Habit is also considered as an inhibitor of technology usage, if the focal technology is a substitute of the old technology (Polites & Karahanna 2013; Krönung et al. 2013). The use of media technologies is according to our findings an exception of this relationship, despite the importance of habits as a predictor of media usage (LaRose 2010). However, only the habitual usage of the focal technology seems to be a decent predictor of the behaviour and not the habitual routines of using a substitutable technology. Similar to hedonic information systems, other, situational factors could be important determinants of usage behaviour (Wu & Lu 2013). Possible determinants could be activity patterns or availability, like suggested by Taneja et al. (2012). A consumer might be regularly reading books at home, while opting for a digital reader during the daily commute. A similar pattern could be account for some behaviour in our second study.

Second, our study builds on the foundation of A. Schwarz & C. Schwarz (2014) and extends their work on technology choice by porting their model to a different setting by focusing on media technologies instead of professional technologies. We thus acknowledge recommendations by Van der Heijden (2004) and Wu & Lu (2013). Our findings show a stark contrast to the findings of A. Schwarz & C. Schwarz (2014) and are consistent across two independent studies for two different technology pairs. We assume that multiple factors play into this difference. First, users might simple behave differently when faced a choice between media technologies and professional technologies. Second, other factors might play an important role in choice behaviour in the case of media technologies. The choice might be depending on established, daily patterns or availability (Taneja et al. 2012). Users usually consume media content in different situations, while professional technologies are usually used in fewer different, situations.
Our findings present an important starting point for further investigation. Habits are strong predictors of actual media behaviour, when the habitual use of the focal technology is considered. The same does not hold up true in, when the habit of using a substitute is considered. Users seem to differentiate between multiple options and chose among them based on determinants other than attitudes or habits. Future research should investigate those determinants. A first starting point could be the patterns of daily routines and contextual factors. Further determinants of media technology usage are greatly beneficial for researchers and managers alike. The former progress the understanding of media consumption behaviour and choice behaviour in the context of more hedonistic situations. The latter benefits of further knowledge of its customer and thus foundation of their business. The second promising avenue for further research is the reconsideration of the choice behaviour in a professional context with our extended model. Habit is widely acknowledged as an inhibitor in IS acceptance and adoption of utilitarian technologies (Polites & Karahanna 2013) and should also be an important determinant of choice behaviour in this context.

7.2 Limitations

As with every study, our study has also some limitations. While we tried to generalize our findings by performing multiple studies, further replications among other technology pairs and contexts are necessary to generalize our findings. Especially a replication of our studies for purely hedonic technologies, without ties to media consumption is needed. We can not yet know if our findings are applicable to digital media technologies alone or hedonic technologies in general. Additionally, our sample might be biased in terms of age, because both samples show relatively young respondents in average. One might argue that some of the bias might come from the distribution channels we used to collect data, which is reasonable. However, we have been intentionally interested in actual users of both technologies in both studies. Naturally, the actual users of emerging, digital media technologies are generally younger compared to the actual users of established technologies. The sampling bias thus is a result of our research design, but should be addressed nonetheless in further research.

7.3 Conclusion

Our study is the first study to our knowledge to investigate the choice behaviour of users between multiple, adopted media technologies. We build upon the model of A. Schwarz & C. Schwarz (2014) and extended it with the habitual use of the old technology, because habit is acknowledged as one of the strongest predictor of media technology usage in prior research (LaRose 2010; Taneja et al. 2012). However, both studies do not show a measureable impact of habitual usage of one technology on the usage of another technology, despite the statistical significance of the relationship in both studies. The effect sizes of those relationships are 0 in both cases. We conclude that habits might play a role, when only the focal technology is investigated but other determinants play an important role in the situational choices between multiple media technologies.

References


