HOW DO HEDONIC DESIGN FEATURES INFLUENCE AN APPLICATION'S USAGE

Complete Research

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Abstract

Mobile applications (apps) have permeated every walk of our life. This has motivated many companies to jump onto the «mobile wave» and develop specific apps for their products and services. With the growing number of apps, it has become ever more difficult for companies to arrest attention and to motivate users to continuously use the installed apps. A strategy that frequently is followed is to «beautify» primarily utilitarian apps with hedonic design features in order to increase enjoyment. The current study therefore attempts to understand what effects do hedonic design features have on the usage of utilitarian apps. Our findings show that the implementation of hedonic design features goes along with two effects. First, the general duration how long a user uses an app is increased. Second, there is an inadvertent side effect in that hedonic design features negatively impact the usage duration of an app's utilitarian functionality. The paper concludes with the discussion of theoretical and practical implications of these findings.

Keywords: design experiment, design features, hedonism, mobile applications, usage.

1 Introduction

Constant improvement of both hardware, e.g. better processers, larger wireless network bandwidth, and software, e.g. multi-device development platforms, have considerably motivated commercial and independent programmers to develop applications (apps) for the *mobile market* (Holzer and Ondrus, 2011). In the past years, a tremendous increase can be observed. For instance, starting with just a handful of apps in 2008, the Apple Store accepted its one-millionth app for sale in 2011. Similar developments can be seen on other mobile markets, such as by Google and Microsoft, as well.

However, the massive increase of apps on mobile markets also has a downside and especially presents commercial software developers as well as enterprises using the mobile devices as additional trade channel with two fundamental problems: First, the mobile app market has become highly competitive and even free apps do not guarantee a large quantity of user downloads. Second, long-term acceptance and continued use of mobile applications is a key issue since evidence exists that after only 30 days, less than 5% of application consumers are still using free apps (Chen, 2010). In this sense, mobile apps have become a commodity for users and an ever more challenging «playing ground» for firms (Kajanan et al., 2012); especially for those which offer products and services that do not require a frequent customer interaction (a typical example could be insurance incident or claims management).

To overcome the issue of remaining unnoticed by users and to prolong usage time, many enterprises have started to leverage hedonic design features in their mobile apps (e.g. in-app games, infotainment) which go beyond the primer utilitarian intention (e.g. processing of business transactions). According to Van der Heijden (2004), the term *hedonic* is used to denote systems (or functionalities thereof) that "aim to provide self-fulfilling value to the user"; whereas *utilitarian* design features rather "aim to provide instrumental value to the user".

In spite the growing importance of *hedonism* as instrumental concept in information systems design and technology acceptance, only few studies report on the matter (e.g. Chung and Tan, 2004; Sun and Zhang, 2006; Venkatesh et al., 2012). The goal of this paper is to build upon this prior research in order to clarify the influence of hedonic design features on an application's usage, and to provide substantive directions for future research investigating multi-purpose (i.e. utilitarian-hedonic) systems.

Understanding the impact of either utilitarian or hedonic design features on the mobile application's usage provides opportunities to further enhance mobile software development. Our paper provides a promising avenue for exploring the reciprocal effects of contradicting design features, first, by establishing that hedonic functionality positively affects usage duration and, second, by providing evidence that there is a significant interaction effect between hedonic and utilitarian design features which ultimately have a negative impact on the usage duration. Future work can use these results as a basis for new directions in improving the design of mobile applications by considering the mentioned functional interaction effects.

The paper is organized as follows. The first section was to clarify the research problem, definitional foundations, and primer motivation of this study. Next, we present a brief overview of the theoretical basis and underlying hypotheses. This is followed by the description of our research methodology. Building upon the case description and delineation of analytical approach, we then present the findings of our design experiment. The paper concludes with a summary of theoretical and practical implications drawn from our analysis and propositions to guide future research.

2 Theoretical Background

In this section we delineate the theoretical background and key assumptions of this study. First, we provide a short excursion on technology diffusion, as it is a central theory for explaining the *usage* concept. Second, we briefly describe the related work on hedonism and *hedonic design* in information systems design and technology acceptance studies. Based on this, we then describe the key hypotheses of this study.

2.1 Information Systems Diffusion and Usage

Information systems usage has largely been studied under the lens of technology diffusion (e.g. Agarwal and Prasad, 1997; Bhattacherjee, 2001; Wang et al., 2013). Diffusion research centres on the conditions, which increase or decrease the likelihood that an idea, product or practice will be adopted using rather a macro-view. *Diffusion* is thereby understood as "the process by which an innovation is communicated through certain channels over a period of time among the members of a social system" (Rogers, 1962). A general assumption is that the portion of the population adopting an innovation is approximately normally distributed over time and can be sub-divided into innovators, early adopters, early majority, late majority, and laggards (Rogers, 1962). According to Cooper and Zmud (1990) the willingness to use a system is significantly influenced by the compatibility and complexity of the technology. Moore and Benbasat (1991) additionally highlighted the role of voluntariness, relative advantage, image, ease of use, result demonstrability, visibility, and trialability as major factors for usage.

Only little research exists that focuses on investigating usage beyond initial adoption of technology (Schwarz and Chin, 2007). While macro-level studies emphasize the investigation of indicators for first-time usage (or acceptance), on a micro-level perspective other themes are of greater interest such as user demographics (e.g. Karpischek et al., 2012), routinization (e.g. Polites and Karahanna, 2013), or optimization of designs (e.g. O'Brien, 2011) in order to foster an optimal usage interval or long-term usage behaviour. In our paper we also adopt rather a micro-level view on IS usage. It is worth noticing that we are not interested in identifying ways to persuade laggards to use mobile apps, nor to understand motivational reasons why specific user groups accept or reject the app. With this study we want to look inside the «use» black box having a clear scope: We want to know how do hedonic design features influence the use of a primarily utilitarian app.

2.2 Information Systems Usage and Hedonism

In examining the determinants of continued IS and the possible effects of hedonic system features on usage, researchers such as Mallat et al. (2009) and Hong et al. (2006), have based their work on Davis' (1989) technology acceptance model (TAM) or successive models (TAM2, Venkatesh and Davis, 2000; UTAUT, Venkatesh et al., 2003). A common denominator in all these theories is to perceive usage behaviour (or system usage) as a result from a reasoned appraisal of pre-adoption beliefs regarding the perceived usefulness and perceived ease of use. Especially the predictive ability of perceived usefulness has been strongly supported by research (e.g. Adams et al., 1992; Taylor and Todd, 1995), since the Information Systems (IS) community has been predominantly concerned with the study of work-related contexts (Legris et al., 2003). However, ever more researchers such as Xu et al. (2012), Sun & Zhang (2006) and van der Heijden (2004) criticise TAM, stating that it ignores the fact of usage behaviour governed by hedonic intentions like perceived enjoyment and perceived playfulness of systems being designed for other than work-related contexts. This notion of perceiving the world through a hedonic and/or utilitarian lens not only found strong support in the subarea of mobile computing (e.g. Dickinger et al., 2006; Wakefield and Whitten, 2006) but also in general IS research (e.g. Lin and Bhattacherjee, 2010; Van der Heijden, 2004). However, we follow the perception that a system is not at the end of a one-dimensional scale (either hedonic or utilitarian), but

rather is a function of the relative salience of its hedonic and utilitarian attributes or features (Chernev, 2004). As such, it is evident that certain kind of interrelation effects may exist.

2.3 Hypotheses

As we described at the beginning, our main goal is to understand whether the implementation of hedonic design features can have positive or negative side effects on the usage of (primarily utilitarian) mobile apps. In this sense, we assume that two distinct kinds of design features exist: (i) Utilitarian design features enable business transactions and/or provide information directly related to the core of the app or the issuing enterprise (e.g. information about agencies and products as in our insurance case, which we will describe in more detail in the following section). (ii) Hedonic design features provide self-fulfilling value to the user and as such are not directly related to core app business transactions or the issuing enterprise. In the following we develop a set of hypotheses about how these design features individually and collectively affect a mobile application's usage. The underlying research model of this study is illustrated in Figure 1.

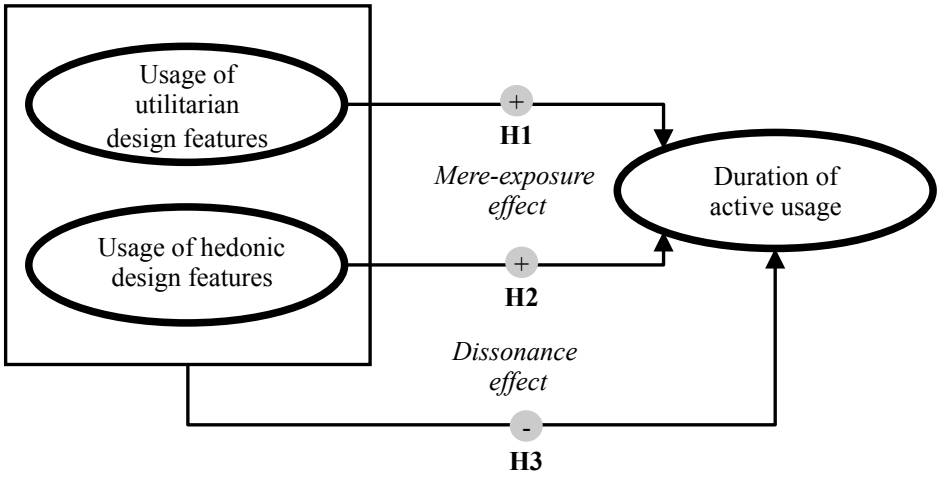

Figure 1. Research model.

2.3.1 The Positive Effects of Mere-Exposure on Mobile Application Usage

Behavioural consumer and decision-making research has shown that repeated conscious and even unconscious perception of a stimulus leads to a more positive attitude toward the stimulus (Fang et al., 2007; Zajonc, 2001). Different studies demonstrated that people generally develop a preference for things merely because they are familiar with them. For example, Pliner (1982) conducted an experiment in order to determine the effects of mere exposure on liking for edible substances and found a strong support that a exposure effect may play a role in the acquisition of food preferences. Baker (1999) showed that a positive repetition-affect relationship is helpful to influence the brand choice, especially for unknown brands. Various researchers have provided support for this fundamental cause-effect relationship also in the area of IS (e.g. Ren et al., 2012; Yang and Teo, 2008; Zhang, 2013).

Based on this prior research, we would therefore expect that users' overall attitude towards using the mobile app will improve when familiarity with respectively the consumption of utilitarian or hedonic

design features is increased. We further hypothesize that this preference development is independent from the design feature's preliminary purpose. Consequently, we assume that the mobile app would experience a longer usage both from the consumption of utilitarian and hedonic design features. Hence, we hypothesize:

H1. *An increase in the use of utilitarian design features extends the usage of mobile apps.*

H2. *An increase in the use of hedonic design features extends the usage of mobile apps.*

2.3.2 The Negative Effects of Dissonance on Mobile Application Usage

A major result from repetitive exposure to a stimulus is uncertainty reduction. Following Obermiller (1985), uncertainty is associated with aversive tension, and as uncertainty is reduced, attitude towards the stimulus is enhanced. In other words, the more an individual uses a mobile app, the lesser is uncertainty of getting disappointed.

However, in the present study we want to investigate how users react on an unexpected design of a mobile application. By integrating hedonic design features in a primarily utilitarian mobile app, uncertainty is introduced: Is the mobile app still a business tool? Is it becoming a plaything? Is the value proposition of the mobile app still the same?

In the context of our research we hence assume, that a high use of utilitarian and hedonic design features will induce a state of cognitive dissonance among the users (Festinger, 1957), as two value propositions compete with each other and users feel a misfit between the different design features. IS research is well aware of cognitive dissonance and its consequences, e.g. research in the context of a continuous use (Bhattacherjee, 2001; Deng et al., 2010; Oinas-Kukkonen and Harjumaa, 2009) builds upon expectation confirmation theory and thereby leverages the concept of cognitive dissonance. Consequently, we expect that—to a specific point—the combination of utilitarian and hedonic design features creates a dissonance, which eventually leads to a negative attitude towards using the mobile app. This leads us to hypothesize:

H3. *There is a negative interaction effect between the use of hedonic and utilitarian design features on the usage of mobile apps.*

3 Research Methodology

To test our hypotheses, we collaborated with a Swiss insurance company and co-developed an iPhone application. We particularly contributed to the overall design of the application and defined the very specific logging requirements. The insurance company is well established in the Swiss market, offering life as well as non-life insurance products to approximately 1.5 million clients in Switzerland. In 2010, the company decided to take advantage of the growing importance of mobile technologies and specifically smartphones, and became the first Swiss insurer to launch an iPhone application.

3.1 Case Description and Experimental Setting

The mobile app included seven distinct functionalities when it was first released in 2010. These included three features supporting clients in the event of an emergency by providing easy access to the official emergency numbers, i.e. police, ambulance and fire brigade. In each case, the app shows the position of the user on a map and allows the user to place a call to the respective authorities either in Switzerland or abroad from within the app. This can be done simply by clicking on the respective button in the app and without a need for knowing and entering the emergency numbers. In a similar fashion, the app also offers easy access to two additional emergency numbers, which are specific call centre support numbers the insurance company is providing. Next, the app provides the users with

contact information for their local agencies. A summary overview shows the address and contact details of the specific agency as well as the user's own position, and enables the user to call the agency directly from within the app, to view directions to the agency or to open the agency's web page. Finally, the app offers a marketing feature, which encompasses a list of advertising videos as well as a virtual drawing board, which is branded by the insurance company, and where users can either save their own drawings to their smartphones or send them to the insurance company. In May 2011, one additional feature was added to the app. In an effort to bring the utilitarian insurance process of claims management into the mobile world, a claims feature was introduced into the app, which clients can use to report a claim directly to the insurance company. Clients are guided through the feature in two steps. First, they are asked to inform the insurance company by placing a call to either their agency or one of two call centres. Second, they are asked to record the respective claim they would like to submit by means of up to six photos, an audio recording and / or a written note. After checking their contact details, clients can then send their claim directly to the insurance company, where the information is automatically incorporated into the existing claims management tools.

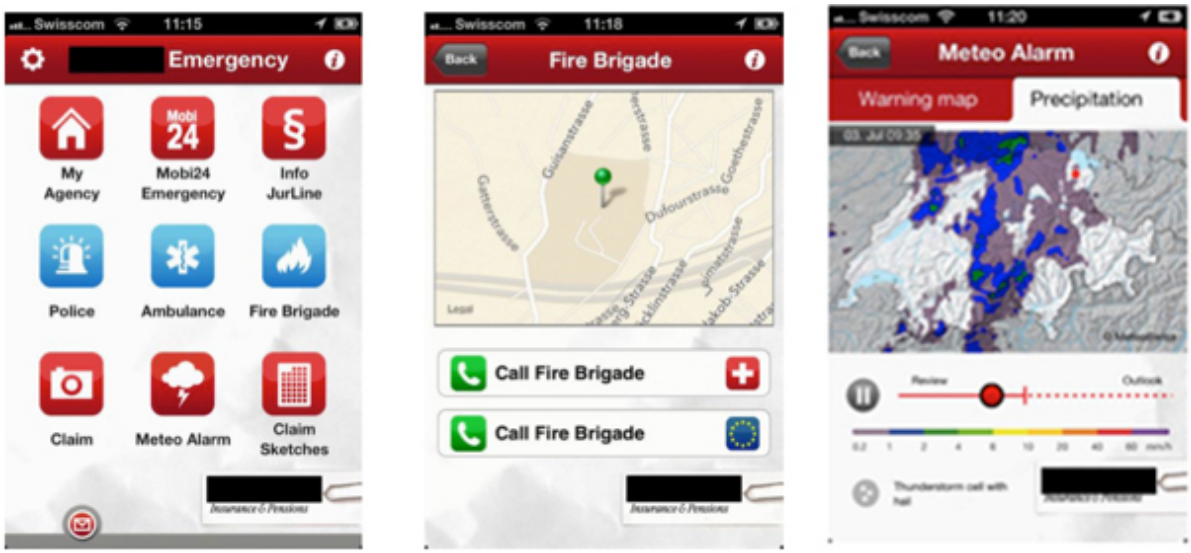

Figure 2. Mobile insurance application including weather forecast as hedonic design feature.

In May 2012, the insurance company issued version 3 of the application by adding an additional feature without changing the rest of the app. Based on the observation, that there was little incentive for clients to open the app on a frequent basis – one would not expect users to be using emergency numbers or to submit claims very frequently – the insurance company decided to add a more comprehensive hedonic functionality to the app so that users would be incentivized to open the app on a more regular basis. Following an evaluation of hedonic design features, which would not be too remote from the insurance utilitarian business and brand associations, the insurance company finally settled on a weather forecast functionality. The weather forecast includes a map of Switzerland providing rain radar and rain forecast. The weather alarm feature allows users to subscribe to specific regions in Switzerland as well as to selected types and severity levels for weather alarms they would like to receive, e.g. thunderstorm warnings from level 3 of 5 for the area of Bern. The new functionality was implemented by the insurance company in cooperation with a national meteorological service company and involved the setup of a backend system for processing user settings and alerts. As this functionality is much more remote from the typical insurance offering and does not provide emergency functionality, the weather alarm is considered a non-utilitarian hedonic functionality. Figure 2 depicts screenshots of the mobile insurance app.

3.2 Data Collection

Usage data of all devices running the iPhone version of the app was logged on a screen-by-screen basis. In order to test our hypotheses, we need a sample of devices with version 3 of the app. For each device we want to build upon 6 months of usage data. Therefore we selected only those devices, on which the app was installed during June and July 2012. By setting these borders, reflected usage includes page views until end of December 2012. Then, we excluded devices with less than a total of 5 views, as we do not want to incorporate users who immediately stop using the app without even exploring it (devices excluded 1'548). Henze et al. (2012) highlight the fact that mobile apps are most often used in unforeseen ways, which makes careful data selection a necessity. We can confirm this finding and exclude devices with more than a total of 300 views, as we realized that there are a couple of special 'heavy users', i.e. internal employees demonstrating the app to potential customers. We set the upper limit to 300 views after interviewing and analysing the usage of known heavy users (100 devices excluded). The final dataset we used for further analysis contained the data of 6'072 devices.

3.3 Analysis Approach

We propose a hidden Markov model (HMM) for capturing the mobile app's usage dynamics as it particularly resonates well with the presented underlying conceptualizations of diffusion and IS usage. A hidden Markov model is a model of a stochastic process based on hidden states that cannot be observed directly but can only be viewed through another set of stochastic processes that produce a set of observations (Rabiner 1989). In our HMM we call the hidden states usage states. Each usage state corresponds to a specific usage behaviour, i.e. a certain amount of utilitarian and hedonic page views. The conceptualization of a usage state with unique usage behaviour allows us to capture dynamics in usage behaviour. At any given point in time, a user resides in only one state. However, he/she can transition from one state to another.

4 Results

Table 1 provides the basic descriptive statistics of the sample. On average 23 weather page views were recorded per device over a period of 6 months (M = 23.07, SD = 23.54). Furthermore, 27 utilitarian page views were recorded (M = 27.20, SD = 30.01).

Variables	*Minimum*	*Maximum*	*Mean*	*SD*
Utilitarian Page Views	1	218	27.20	30.01
Hedonic Page Views	1	221	23.07	23.54

Table 1. Descriptive statistics.

Following the notion of a design experiment (Mettler et al. 2014), we first conducted a HMM analysis and second prepared a mixed effects model for testing our hypotheses.

4.1 HMM

The HMM was estimated on the basis of depmixS4, an R Package for HMM (Visser and Speekenbrink, 2010). More specifically, the HMM was derived on the number of utilitarian and hedonic page views a user generated in a specific week (week 0 being the first week of usage, i.e. day of first login plus six upcoming days). Multivariate data can be modelled within depmixS4 by providing a list of formulae as well as a list of family objects for the distributions of the various responses. In the case at hand, the numbers of page views were modelled as Poisson distributions. To estimate the HMM parameters the number of hidden states has to be specified up front. We expect

users to extensively explore the mobile app in the first phase (high usage state). Furthermore, we assume that users experience a state of very low use behaviour (low usage state) short before they completely stop using the app (inactive usage state). We also expect a state of moderate usage after the initial exploration phase, that is either driven by utilitarian or by hedonic page views. Summing up, we build upon five usage states: high, utilitarian, hedonic, low, inactive (cf. Table 2).

Parameters are estimated using the expectation-maximization (EM) algorithm (Visser and Speekenbrink, 2010). In the EM algorithm, parameters are estimated by iteratively maximizing the expected joint log-likelihood of the parameters given the observations and states. The initial state probability estimates indicate that most users start their usage in the utilitarian state (43%). However, high (21%) and hedonic (20%) also serve as common starting states. Each state is characterized by expected utilitarian and hedonic page views. Three states (high, low, inactive) show a balanced usage of utilitarian and hedonic functionality at different usage levels (utilitarian/hedonic views: 33/24, 2/3, 0/0). Two states (utilitarian, hedonic) represent rather unbalanced usage (utilitarian/hedonic views: 17/2, 6/15). Overall, these results are in line with existing literature and our assumptions with one minor exception. High is not the predominant starting state for all users, but utilitarian and hedonic also serve as major starting states.

	High	*Utilitarian*	*Hedonic*	*Low*	*Inactive*
Initial state probability (%)	20.51%	43.15%	20.08%	16.26%	0.00%
Utilitarian usage (page views)	33.03	17.06	5.92	2.19	0.01
Hedonic usage (page views)	24.05	2.13	14.83	2.52	0.00

Table 2. Basic hidden Markov model parameters.

The transition probabilities (probably of transition from one state in week n to another state in week n+1) shown in Table 3 indicate rather instable states, i.e. the probability of remaining in either of the states is above 25% only for the inactive state. Overall, the transition matrix reveals usage behaviour that is in line with existing studies. For instance, Schonfeld (2009) reports that in the case of free apps only 20% of the users log into free apps the day after they downloaded them and even worse, after 30 days, less than 5% are still using them. In our case, two states are very unstable, i.e. high and utilitarian usage. Hedonic and low usage patterns show some stability with a probability of 13% resp. 22% of staying in the stage for the upcoming week. The dominating state is inactive, i.e. all states have at least 60% transition probability to inactive. Furthermore, the probability of staying in this state is 95%.

$t \rightarrow t+1$	*High (%)*	*Utilitarian (%)*	*Hedonic (%)*	*Low (%)*	*Inactive (%)*
High usage	1.07%	2.90%	9.78%	21.26%	64.99%
Utilitarian usage	0.43%	2.80%	1.47%	6.67%	88.64%
Hedonic usage	1.01%	0.96%	13.45%	24.55%	60.03%
Low usage	0.36%	1.46%	5.48%	21.45%	71.25%
Inactive	0.07%	0.62%	0.69%	3.85%	94.78%

Table 3. Transition matrix.

In any given period, a user can be classified as being in a particular state according to the posterior probability distribution. Figure 3 depicts the over-time trend of the distribution of users in the five states. In the first week of usage (week 0) over 80% of the users are in high engagement states, i.e. the high, utilitarian or hedonic usage state. However, only one week later about 5% are in high engagement states. Over 80% are already inactive, while about 15% are in a state of low usage. 20

weeks later only about 5% are still active, more than 90% of these active users being in a low usage state. On average, users showed activity over a course of 3 (M = 3.23, SD = 2.92) weeks (usage life cycle state unequal to inactive).

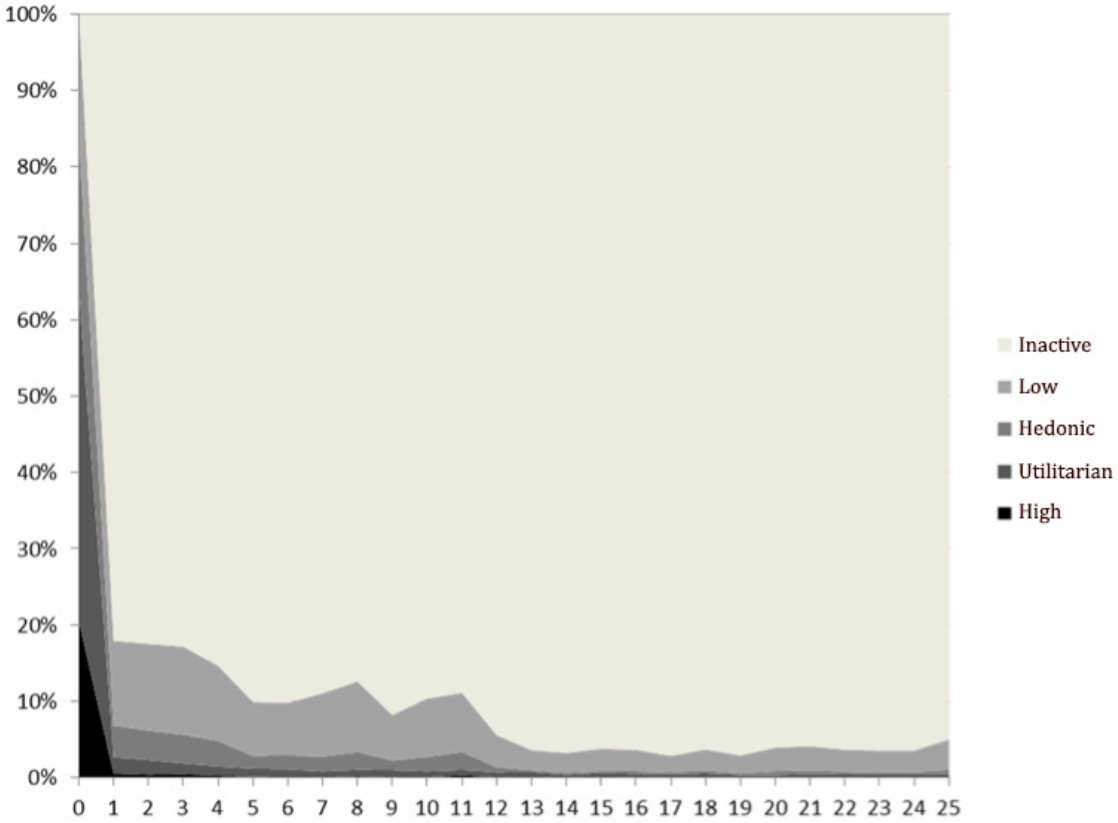

Figure 3 State distribution of users (%) against time (week of usage)

4.2 Mixed Effects Model

Following Henze et al. (2012) in order to conduct successful experiments using mobile apps, special emphasis has to be placed on the importance of reflecting cultural differences for generalizing results. Cultural differences have a special relevance for the app at hand. The app is primarily used in Switzerland being well known for its heterogeneity. Hence, it is a popular country for the consumer industry to launch new products and study adoption. Three major cultural regions can be identified. The northern part of Switzerland is influenced by German culture, the western part of Switzerland is influenced by French culture, and the southern part is influenced by Italian culture. Taking into account, that there are significant differences in cross-cultural adoption and use of IT, we have to assure that our analysis is not affected by neglecting this well-known effect.

A second effect can influence our results significantly, being not at the heart of our analysis either: technology. It is well known that early adopters of technology show different usage patterns than technology laggards. Furthermore, significant performance differences can exist between latest and older hardware impacting usage. This is especially true for smartphones (Huang et al., 2010). Our app reflects that in an impressive way. Loading the application with latest technology (iPhone 5) takes about one second, while loading the application with four-year-old technology (iPhone 3G) takes about seven seconds.

To reflect these two effects we build upon mixed effects models rather than regression. Mixed effects models allow the inclusion of fixed and random effects (Frees, 2004). Random effects induce some amount of random variation in the data. The counter-term to random effect is fixed effect. Fixed effects are variables that are controlled in the experiment or where systematic differences are expected. Because our research is not focusing on cultural effects, we reflect culture in our model as a random effect. The language setting of the device (i.e. German, French or Italian) serves as basis to capture culture. We also include the version of the smartphone (i.e. edition of hardware and operating system release) as a random effect.

Determining duration of active usage is a major challenge in the context at hand. End of usage life cycle can only be estimated on the basis of the available app log data. Even if a user has not logged into a system for a long time, that does not necessarily mean she will not use the app again. One profound way to estimate the end state of a process is to use state based approaches like HMM. Therefore, we take active weeks (as described in the previous chapter) as the metric for duration of active usage.

According to H1 and H2, we expect the active usage weeks per user to increase with increasing utilitarian and hedonic page views. Furthermore, based on H3 we expect a negative interaction effect between the use of utilitarian and hedonic functionality. Integrating these hypotheses, we conduct our analysis on the following fixed effects model:

$$active\_weeks = \beta_0 + \beta_1\, utilitarian\_page\_views + \beta_2\, hedonic\_page\_views + \beta_3\, utilitarian\_page\_views * hedonic\_page\_views$$

The results of the analysis are depicted in Table 4.

		Fixed Effects				*Null Model*
		(Constant)	*Utilitarian page views*	*Hedonic page views*	*Utilitarian x hedonic page views*	*Chi-Square*
Active Weeks	Coefficient	6.11e-01 ***	3.56e-02 ***	7.48e-02 ***	-1.85e-04***	6564.5***
	Sig.	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001

Table 4. Mixed effects analysis.

To assess the validity of the mixed effects analyses, we performed likelihood ratio tests comparing the models with fixed effects to the null models with only the random effects. The model passes the null model likelihood ratio tests ($p < 0.001$) so that validity is given. Furthermore, the model supports H1 and H2 by positive coefficient values. H3 is supported on the basis of a negative coefficient for the interaction effect. All coefficients are highly significant ($p < 0.0001$).

5 Discussion

Our findings allow for drawing a number of implications for both theory and practice. On the basis of real usage data, we first of all provide evidence that increasing page views of hedonic design features go along with increasing usage duration (confirmation of H1). More interestingly, we also provide evidence that hedonic design features have two effects on the usage: (i) Increasing page views of hedonic design features also go along with increasing usage duration. This result validates H2 and the mere-exposure effect. (ii) There is a significant interaction effect between hedonic and utilitarian design features negatively impacting the usage duration. This observation provides evidence for H3. In the study at hand hedonic page views have a much stronger positive impact on usage duration than

utilitarian page views. Furthermore, the interaction effect is rather small compared to the two main effects. However, we believe that the magnitude of effects heavily depends on the application under consideration. Based on our theoretical considerations, the perceived distance between hedonic and utilitarian functionality is a crucial factor for effect size. Therefore, we strongly encourage restricting generalization on effect significance rather than effect size.

5.1 Theoretical and Practical Implications

From a theoretical perspective, our work complements existing research, especially in the domain of technology acceptance and hedonic IS. First of all, our research confirms existing work in that utilitarian and hedonic functionality have an impact on system use (e.g. Lin and Bhattacherjee, 2010; Venkatesh et al., 2012). This is noteworthy as our experimental setting, a field study, differs significantly form typical lab experiments on technology acceptance. Especially this domain heavily relies on survey research and often builds upon lab rather than field settings. Surveys provide a quick, efficient, and accurate means for accessing information about a population. However, in the context of studying system use, they cannot built upon actual system use but rely on subjective information of the respondent, which can indeed deviate significantly from reality for various reasons. Furthermore, while experimental settings with many controlled factors are high in internal validity, they eventually have to compromise on external validity especially if they use college students as experimental subjects.

Ultimately, our research sheds light on the interplay between utilitarian and hedonic design features. We provide evidence that there can be unintended side effects between both types of functionalities. This motivates research which goes beyond existing work that treats IS as monolithic artefacts with a well-defined and static set of utilitarian or hedonic functionality (Turel et al., 2010; Van der Heijden, 2004). More specifically, we encourage future work to get inspired by the domain of retail: Hedonic design features might be comparable to “foot traffic generators” in retail, i.e. products which attract people, “bring them into the store” and increase shopping frequency thereby increasing sales across all product categories (“positive spill over”, “cross selling”). Thereby, the integration of hedonic design features in primarily utilitarian systems might be a strategic instrument to foster IS usage frequency ultimately leading to an increased usage of utilitarian design features. To build on this idea, future research should distinguish the concepts of hedonic and utilitarian usage frequency rather than just building on general usage. Moreover, the relationship between these two concepts should be theorized and evaluated thoroughly. In line with these suggestions, our work also motivates research on operationalizing the perceived distance between hedonic and utilitarian functionality. A corresponding metric can serve as a basis to introduce “perceived distance” as a major moderator to analyse the interplay between as well as the impact of the two types of functionality.

From a practical perspective, in order to be effective, our research suggests that the attractiveness of hedonic design features has to be balanced with its perceived distance from the utilitarian features of the app. If these two criteria are not addressed appropriately, hedonic design features can even harm the overall usage experience by diluting the value proposition of the app. In our case example at hand, the weather functionality also provides basic alarm capabilities, so that in case of severe weather conditions harm can be prevented (e.g. damages to the car because of hail can be avoided because of timely warnings). Therefore, a solid linkage between hedonic and utilitarian design features is given: damage prevention can well be associated with an insurance company and its mobile application. We would have expected a much greater reduction in usage, if, as an extreme example, an ordinary jump and run game had been integrated into this application as hedonic design feature.

5.2 Limitations and Outlook

We have invested significant effort to ensure the validity of our findings, especially by carefully selecting an appropriate sample. However, the study comes with limitations that provide potential for

further research. First, the sample contains device-specific instead of user-specific data. Technically, it is not possible to determine how many users have used a device. However, we argue that smartphones are very personal devices that are usually not shared. Second, the dataset at hand has limited external validity. The study was limited to Switzerland. While this is indeed a significant limitation we reflect culture in our analysis to overcome major shortcomings. The sample features a particular set of devices, i.e. the app under investigation only runs on iPhone smartphones. While there is strong evidence that iPhone users have specific characteristics, we do not believe that users of other devices would show different behaviour as to the usage of our exemplary app. A key issue in our sample is the distribution of customers and non-customers of the insurance company. The app is provided by the insurance to its customers and also to general public via the App Store. It is very likely that customers show a different usage pattern than non-customers. However, we cannot determine the customer status of a device unless a user submits a claim. Due to this selection effect, results could be biased in that effects could be both over- or underestimated. Besides these technical issues, our work is limited in that it only investigates one isolated aspect of usage.

However, usage is affected by many interweaving factors. In this context, the type and degree of integration of utilitarian and hedonic design features can be identified as a key driver to foster utilitarian usage. While such considerations are outside the scope of the analysis presented in this paper and do not affect the validity of reported results, it is imperative that they be investigated in subsequent work. Taking a broader perspective, future research may also take a closer look at dilutive effects of mobile apps on brands. This may also further support companies with questions regarding their mobile app strategies, especially which services to offer by means of mobile apps and how to structure such content.

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