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# DESIGNING ADAPTIVE NUDGES FOR MULTI-CHANNEL CHOICES OF DIGITAL SERVICES: A LABORATORY EXPERIMENT DESIGN

Dennis Hummel Karlsruher Institut fur Technologie, dennis.hummel@partner.kit.edu

Silvia Schacht Karlsruhe Institute of Technology (KIT), Institute of Information Systems and Marketing (IISM) and Karlsruhe Service Research Institute (KSRI), silvia.schacht@kit.edu

Alexander Maedche Karlsruhe Institute of Technology (KIT), Germany, alexander.maedche@kit.edu

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# DESIGNING ADAPTIVE NUDGES FOR MULTI-CHANNEL CHOICES OF DIGITAL SERVICES: A LABORATORY EXPERIMENT DESIGN

#### Research in Progress

- Hummel, Dennis, Karlsruhe Institute of Technology, Karlsruhe, Germany, dennis.hummel@partner.kit.edu
- Schacht, Silvia, Karlsruhe Institute of Technology, Karlsruhe, Germany, silvia.schacht@kit.edu
- Mädche, Alexander, Karlsruhe Institute of Technology, Karlsruhe, Germany, alexander.maedche@kit.edu

#### Abstract

Channel-switching, cross-channel free-riding, and research shopping is causing problems for companies offering multiple channels. Either customers could choose a channel that is more expensive for the company or they inform themselves in one channel but switch to a competitor for the final purchase. We aim to influence channel choice by using the recently proposed IS concept of digital nudging. In particular, we leverage the nudges of social norms and perceived risk in the online channel. In addition to this concept, we propose that the individual context of the user, like gender or personality, has to be incorporated as a moderator by designing customer specific (i.e. adaptive) nudges. To test these hypotheses, we outline an experiment design for a lab experiment and show how multi-channel choices can be influenced with design interventions in the form of nudges. As previous studies have only tested static nudges, we contribute to existing research by enhancing the nudge theory to the new context of multi-channel choices. Finally, we provide guidance for practitioners on designing their own online channels.

Keywords: Adaptive nudges, Multi-channel choice, Social norms, Experiment design.

### 1 Introduction

The rise of new technologies allows customers to choose different channels for each stage of the purchasing process (Verhoef et al., 2007). This bears two risks for companies: First, customers could choose channels that are more expensive. For instance, the average transaction cost in the US for the call center and the banking branch are around \$4, while the online and mobile channel cost less than \$0.20 (pwc, 2012). Second, customers could switch to a competitor for the purchase (e.g. Nunes and Cespedes, 2003). The phenomenon has different denominations such as research shopping (Verhoef et al., 2007), free-riding behavior (Chiu et al., 2011; Chou et al., 2016), or channel-switching behavior (Pookulangara et al., 2011). Switching channels during the purchasing process is common and widely researched (Chiu et al., 2011; Chou et al., 2016; Heitz-Spahn, 2013; Verhoef et al., 2007). Van Baal and Dach (2005), for example, find that one out of five consumers exhibit free-riding behavior. In addition, there is practical evidence of channel switching in the financial services industry. In an earlier study, we analyzed a dataset of multi-channel choices of more than 2,000 banking customers in Germany and we showed that a considerable number of customers expose banks to the first risk mentioned above. The customers used the online channel to inform themselves about a service, but the branch to purchase it (Hummel et al., 2017).

Despite the wide dissemination of the phenomenon, past research has developed only few effective strategies to deal with channel-switching behavior. Verhoef et al. (2007) propose that channel lock-in can be used to reduce channel-switching and research shopping. Other researchers suggest that creating switching barriers and decreasing the perceived risk of a channel is effective to reduce channel-switching (Chou et al., 2016). Thereby, nudges might be an appropriate method to lock-in customers in a channel, as nudges have been proven to influence decisions in other contexts, too (Martin et al., 2012; Schultz et al., 2007; Thaler and Sunstein, 2008). A nudge is "any aspect of the choice architecture that alters people's behavior in a predictable way without forbidding any options or significantly changing their economic incentives. To count as a mere nudge, the intervention must be easy and cheap to avoid" (Thaler and Sunstein, 2008, p. 6). Nudges are helpful when decisions are complex and infrequent, which is true for many financial services. We want to further improve the effectiveness of nudges by adapting them to customer specificities. In past studies, nudges were static and did not take into account the individual context of the customer or user. In addition, they have not been applied to the multi-channel context. Thus, we aim to answer the following research question:

RQ: How to design adaptive nudges in order to influence multi-channel choices of digital services?

To address this question, we build on the literature from multi-channel behavior and decision-making, in particular on the new IS concept of digital nudging. Based on this literature, we develop hypotheses and an experimental design in order to better understand how to influence multi-channel choices through design interventions of social norms and perceived risk. We have chosen social norms and perceived risk as they have proven to be influential in earlier studies (e.g. Ayres et al., 2013). Using the stimulus-organism-response (S-O-R) model (Mehrabian and Russell, 1974), we propose adaptive nudges that consider the individual characteristics, such as gender or personality traits, of the participant. Thereby, our expected contributions to existing research are twofold: (1) developing the nudge theory to the new concept of adaptive nudges and (2) applying the nudge theory to the new context of multi-channel choices. We are not aware of any other studies that went beyond the analysis of multi-channel choices and aimed to influence them. Finally, our study provides insights from the new angle of lab experiments. Practitioners can benefit from this work through practical examples of design features for their own online channels.

## 2 Theoretical foundations

First, we review the literature of multi-channel choice which provides the context of the study and which offers application possibilities for IS researchers. Second, we highlight the nudge theory and digital nudging and then show at which point our proposed experiment design is filling a research gap.

### 2.1 Multi-channel choice

Multi-channel choice is a subset of the overall consumer behavior and it refers to consumers' evaluations of channel selections throughout the different stages of the purchasing process in a multichannel environment. It is a widely researched topic and a variety of determinants of multi-channel choices have been identified (Neslin et al., 2006; Neslin and Shankar, 2009). Examples of such determinants are (1) channel characteristics, such as perceived convenience (e.g. Albesa, 2007; Burke, 2002) or perceived risk (e.g. Gupta et al., 2004), (2) product characteristics, such as (product) complexity (e.g. Inman et al., 2004; Konus et al., 2008) or purchase frequency (e.g. Inman et al., 2004; Keen et al., 2004), or (3) customer characteristics, such as demographics (e.g. Black et al., 2002; Strebel et al., 2004) and psychographics (e.g. De Keyser et al., 2015; Konus et al., 2008). Neslin et al. (2006) provide a comprehensive overview of determinants of multi-channel choice. Understanding which factors determine multi-channel choices is important to subsequently design nudges to influence them (Hummel et al., 2016).

From a methodological point of view, most researchers analyzed company databases (Cortinas et al., 2010; Konus et al., 2008), conducted surveys (Chou et al., 2016; De Keyser et al., 2015), or conducted

focus groups (Black et al., 2002; Lamberti et al., 2014). Only few researchers used experimental studies to examine multi-channel behavior (e.g. Pantano and Viassone, 2015).

Overall, the marketing literature has explored the determinants of multi-channel choice but they have not yet attempted to influence them. Furthermore, marketing focusses on purchasing occasions whereas they developed only few effective strategies to deal with changing channel choices in generals. At this point, IS researchers, with knowledge in guiding decisions in online contexts, can influence (i.e. direct) customer's channel choice while preserving freedom of choice. This can be achieved by employing the concept of nudging.

### 2.2 Nudge theory and digital nudging

The nudge theory of Thaler and Sunstein (2008) deals with aspects of the choice architecture. Nudges address biases in decision making and they are intended to improve decisions in different areas of daily life (Thaler and Sunstein, 2008). They are particularly needed when costs and benefits are temporally delayed, when the number of alternatives is high, when feedback is inexistent, or when the decision is infrequent or complex (Thaler and Sunstein, 2008). The theory has been applied successfully to different contexts like energy (Ayres et al., 2013; Schultz et al., 2007), healthcare (Martin et al., 2012), tax compliance (Behavioural Insights Team, 2011), personal finance (Thaler and Benartzi, 2004), or charity (e.g. Croson and Shang, 2008). For instance, donors adjust their contributions in the direction of the social information provided on the contribution of others (Croson and Shang, 2008). Moreover, several governments implemented teams of behavioral scientists into policy making (Behavioral Insights Team, 2016; Social and Behavioral Sciences Team, 2016).

In 2016, nudge theory was enhanced by IS researchers to the digital world by the concept of digital nudging, which "is the use of user-interface design elements to guide people's behavior in digital choice environments" (Weinmann et al., 2016). While the traditional nudge theory mainly operates in offline environments, digital nudging addresses topics of e-commerce, e-government, and e-health (Weinmann et al., 2016). Studies using digital nudges are still scarce and we identified only few empirical papers (e.g. Gallus, 2016; Székely et al., 2016). As multi-channel choices nowadays involve the online channel, our study has direct implications on the new research stream of digital nudging.

Beyond contribution to digital nudges, we address the shortcoming that past research on nudging has used nudges as a static instrument that did not reflect the individual context of the user. For example, Fellner et al. (2013) tested three different enforcement strategies (threat, moral appeal, and social information) to enforce compliance with the law but did not tailor them to their samples. Comparably with advances in customized advertisements, we suggest that data on the decision makers should be included in the design of the nudges. In addition, it remains unclear if the effect of nudges in other contexts can be replicated in a multi-channel environment at all.

In essence, we aim to combine the two streams multi-channel choice and nudge theory to apply adaptive nudges to multi-channel choices.

### 3 Hypothesis Development

The stimulus-organism-response (S-O-R) model is used as a foundation for the hypotheses (Mehrabian and Russell, 1974). The S-O-R model presumes that *stimuli* affect the decisions of individuals when they are processed by the *organism*. The resultant actions are labelled the *response* (Mehrabian and Russell, 1974). In our experiment design, nudges serve as stimuli, while the organism is the moderating role of the individualized representation. Finally, the channel choice represents the response. We have chosen the S-O-R model, because it has been widely applied in the context of multi-channel behavior, online shopping (Pantano and Viassone, 2015; Peng and Kim, 2014), and the testing of design features (Xu et al., 2014). To design specific nudges, we draw on existing theoretical knowledge in multi-channel choices with regard to (1) social norms and (2) perceived risk. We chose these constructs as they have proven to be influential in earlier studies (Aimone et al., 2016; Ayres et

al., 2013). Moreover, social norms and perceived risk are important drivers in financial decision making, which is the setting of the experiment. Besides, we address individual characteristics of the consumers with dedicated (3) functional and emotional representations.

#### 3.1 Social norms

Social norms are "rules and standards that are understood by members of a group, and that guide and/or constrain social behavior without the force of law" (Cialdini and Trost, 1998, p. 152). Social norms have a variety of denominations: normative messages (Cialdini, 2003; Schultz et al., 2007, 2008), normative appeals (Blumenthal et al., 2001), social proof (Behavioural Insights Team, 2011), (normative) social influence (Bond et al., 2012; Martin et al., 2012; Schultz et al., 2008), social information (Croson and Shang, 2008; Fellner et al., 2013; Torgler, 2004), social contagion (Bilgicer et al., 2015), or social comparison (Ayres et al., 2013; Heldt, 2005). All studies have in common that they provide some form of social information to reach certain results. Thereby, they conclude that the more people vote (Bond et al., 2012), the more money is donated (Croson and Shang, 2008), or the less energy is used (Ayres et al., 2013). Only few studies found little or even no effect (e.g. Blumenthal et al., 2001; Torgler, 2004). When dealing with norms, a distinction has to be made between injunctive norms and descriptive norms (Cialdini, 2003; Schultz et al., 2008). Injunctive norms involve "perceptions of which behaviors are typically approved or disapproved" (Cialdini, 2003, p. 105), whereas descriptive norms involve "perceptions of which behaviors are typically performed" (Cialdini, 2003, p. 105). The design features of social norms in our experiment are depicted as descriptive norms.

H1: Design features on social norms of a channel increase the likelihood that the participant will choose the respective channel.

### 3.2 Perceived risk

Perceived risk is "a function of uncertainty about the potential outcomes of a behavior and the possible unpleasantness of these outcomes" (Gensler et al., 2012, p. 991) and it has been studied by various researchers in the past (e.g. Black et al., 2002; Gensler et al., 2012; Gupta et al., 2004; Verhoef et al., 2007). Most researchers find an influence of perceived risk on channel choice (Chou et al., 2016; Gupta et al., 2004; De Keyser et al., 2015), especially in financial services (e.g. Black et al., 2002; Gensler et al., 2003). Researchers find, for instance, that the Internet channel is associated with a higher perceived risk than face-to-face channels (Verhoef et al., 2007) or that consumers who perceive a lower risk in conducting online purchases are more likely to switch to the Internet channel (Gupta et al., 2004). Perceived risk has been divided into several components, such as financial, performance, physical, psychological, or social risk (see Gupta et al., 2004 for an overview). Thus, addressing the perceived risk with a design feature is a promising factor when dealing with multi-channel choices, especially in financial services.

H2: Design features on the perceived risk of a channel increase the likelihood that the participant will choose the respective channel.

### 3.3 Adaptive nudges: Gender-adaptive representations

The novelty of this paper are the adaptive nudges. We consider two different ways of gender-adaptive representation: functional and emotional representation. We draw upon this differentiation from the gender HCI literature (e.g. Beckwith et al., 2006; Boiano et al., 2006; Van Slyke et al., 2002) and the gender-specific results of the multi-channel literature (e.g. Choi and Park, 2006; Farag et al., 2006; Strebel et al., 2004). Findings from gender HCI show the potential for a gender-specific software design (e.g. Beckwith et al., 2006). A number of case studies show that women are appealed by a colorful palette, a gentle, emotional style, round shapes, and less conventional design and formality, while men are more inclined to colder colors, rectangles, and sharp shapes combined with triangles

(Boiano et al., 2006). Also the multi-channel literature presents findings for a gender-specific experiment. For instance, men are more likely to use digital channels for product information and purchase (Farag et al., 2006; Strebel et al., 2004). Contrarily, women need longer to adopt a new channel (Venkatesan et al., 2007), but are more likely than men to use multiple channels (Choi and Park, 2006).

For the gender-specific representations, we also base upon theories from linguistics, such as the speech act theory (Austin, 1962; Searle, 1977). Thereby, the nudge represents a perlocutionary act that is aimed to trigger a reaction of the recipient (Austin, 1962). We hypothesize that men are better triggered with functional and women with emotional acts. Note that, in the original sense, perlocutionary acts are speech acts and not design features (Austin, 1962). For the exact wording of the nudges, we adapt the items of performance risk from Gupta et al. (2004) and of social norms from Fellner et al. (2013).

H3a: Representations of emotional nudges of a channel increase the likelihood that female participants will choose the respective channel.

H3b: Representations of functional nudges of a channel increase the likelihood that male participants will choose the respective channel.

#### 3.4 Adaptive nudges: Personality-adaptive representation

Further, we consider personality-adaptive representations using the Big Five personality traits of extraversion, agreeableness, conscientiousness, neuroticism, and openness (McCrae and John, 1992) as personality seems to have a relationship with online shopping (e.g. Bosnjak et al., 2007; Moghadam, 2015; Schaninger, 1976; Wang et al., 2006). Thereby, neuroticism and agreeableness are negatively correlated with intention to shop online (Bosnjak et al., 2007), while openness, level of self-efficacy and risk-taking propensity are positively correlated (Bosnjak et al., 2007; Wang et al., 2006).

For reasons of space restrictions, we will limit ourselves to the description of one personality trait, namely conscientiousness. Conscientiousness is associated with being efficient, organized, planful, reliable, responsible, and thorough (McCrae and John, 1992). Drawing on the functional and emotional representation, we hypothesize that conscientious participants value the functionality (i.e. efficiency, reliability, etc.) of the online channel while unconscientious (not to confound with unconscious) participants have to be addressed with other properties of the online channel. For these participants, an emotional representation might be more appropriate.

H4a: Representations of functional nudges of a channel increase the likelihood that conscientious participants will choose the respective channel.

*H4b:* Representations of emotional nudges of a channel increase the likelihood that unconscientious participants will choose the respective channel.



Figure 1 depicts the hypotheses introduced above and integrated in a research model.

Figure 1. Research model.

## 4 Method

### 4.1 Experimental setup and sampling

We plan to conduct the experiment in 2017 in a German university laboratory. The lab has more than 40 individual cabins and several other rooms for workshops and design interventions. The participants are part of the lab pool and they are invited by E-mail to take part in the experiment. The pool comprises mainly, but not exclusively, students of a large German university. Apart from students, local citizens of all age groups and occupations are part of the lab pool. To become a member of the pool, interested individuals can self-register themselves. The participants are given an appropriate compensation for their participation in the experiment.

As most members of the lab pool are students that might be more tech-savvy and thus, might be more likely to use the online rather than the offline channel, we plan to conduct a pre-study for the sample selection. Within this pre-study, we will distribute a survey on technology experiences and preferences to about 1,500 panel members. This survey includes constructs on process digitizability from Overby (2008) and behavior-related constructs, such as Internet usage, online and mobile banking usage, or experience with online banking (e.g. Graupner et al., 2015). Based on the survey results, we will select a balanced mixture of participants with varying preferences and preferences, we will randomly assign the participants to the experimental groups based on their demographical characteristics (Kirk, 2003). In total, we plan to invite about 800 participants to participate in the experiment. In our experiment study, we focus on nudging multi-channel choices with two determinants (social norms and perceived risk) and two different designs (functional and emotional) for two characteristics (gender and conscientiousness). Table 1 summarizes the treatment groups resulting from these interventions.

	Nudging intervention	Design intervention	Characteristics
Group1	Social norms	Functional representation	Male or high conscientiousness
Group2	Social norms	Emotional representation	Female or low conscientiousness
Group3	Perceived risk	Functional representation	Male or high conscientiousness
Group4	Perceived risk	Emotional representation	Female or low conscientiousness
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Table 1.Overview of different experiment groups

As we want to observe participants' channel behavior for two phases of the purchasing process (contracting and use), we decided to conduct a between-subject experimental design to prevent learning and carryover effects which occur when "the effect of one treatment persists in some fashion at the time of measurement of the effect of another" (Greenwald, 1976, p. 318). Hence, we end up with a 2x2x2 mixed-factorial design for our study resulting in eight treatment and one control group. A control group is needed to estimate the effects in comparison with no intervention (List et al., 2011). Due to the between-subject experimental design, a higher number of participants is required compared with the within-subject design (List et al., 2011). To calculate the group size, we utilized G\*Power 3.1.9.2 (Faul et al., 2007) and conducted an a-priori test. Assuming a medium effect size ( $f^2 = 0.25$ ) and a significance level of 0.05 for a sufficient statistical power (about 0.80) (Cohen, 1988, p. 273), the sample size for each group should be at least 88 (in total approx. 800 participants). The eye movements of the participants are recorded with an eye-tracking technology to verify if they notice the nudge.

### 4.2 Experiment process

The experimental process is subdivided into five steps and the pre-study (see Figure 2). During the experiment, the participants first receive general instructions on the experiment. Thereby, we will

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inform them that they are part of a scientific experiment and that all actions are fictitious and no financial service will be opened or executed. The participants will also learn that the experiment is grounded embedded into the context of contracting a consumer credit with a fictional bank. The consumer credit is a sufficiently complex financial service and contracting it will present an infrequent decision to most participants. Both characteristics are important for the effectiveness of nudges (Thaler and Sunstein, 2008). Second, we present a web page with information on consumer credits to the participants. By studying the web page, the participants can familiarize themselves with the different options. Third, the participants reach the core of the experiment, the multi-channel choice. In this step, they will be asked to contract the consumer credit – either via the online channel or by visiting the branch (offline channel). If participants decide to use the offline channel, they have to leave their experimental cabin and visit another room, which will be prepared as a branch. In this fictitious branch, the participant has to complete a form that will be processed by a branch employee. If they choose the online channel, the participant will be asked to complete an online form. In a variation, the participants have to perform a bank transfer as an installment of the consumer credit instead of contracting it. Again, they have to choose between the online channel and the branch. Finally, the participants have to answer a survey so that we can get insights into their demographics and personality traits.



*Figure 2. Experiment process from the view of participants.* 

Figure  $3^1$  shows an exemplary nudge by addressing the perceived risk with a security advice (highlighted in the blue box). The control group receives the same interface, but without the nudge.



Figure 3. Exemplary multi-channel choice with nudge on perceived risk.

<sup>&</sup>lt;sup>1</sup> Original picture retrieved from Royal Bank of Scotland RBS (www.personal.rbs.co.uk/personal/loans.html)

Construct	Functional representation	Emotional representation
Social norms	"Do you actually know that almost all participants choose the Internet? In fact, a vast majority of all participants have chosen the Internet to contract the consumer credit."	"You are not alone! In fact, a vast majority of all participants have chosen the Internet to contract the consumer credit."
Perceived risk	"If something goes wrong when contracting this credit online, such as the interception of personal and credit information, the bank makes up for the damage."	"Never fear! If something goes wrong when contracting this service online, such as the interception of personal and credit information, the bank makes up for the damage."

The different design interventions are implemented as summarized in Table 2:

 Table 2.
 Examples for wording of nudges

#### 4.3 Data analysis

In addition to the survey and the tracking of participants' activities, we will use eye-tracking technology to record participants' eye fixation. In doing so, we will be able to test whether or not the participant paid attention to the various nudge treatments. Based on the eye-mind assumption (Just and Carpenter, 1980), we assume that fixating the nudge treatments will result in a cognitive process of the nudges and thus, enables to validate if the participant's decision was influenced by the nudge. For the data analysis itself, a binomial logistic regression is needed as the dependent variable is a nominal variable with two outcomes. We will use the programming language R and in particular the "mlogit" package, which can be used to estimate multinomial logit models. Thereby, the model predicts the probability (not the value) of the dependent variable to occur, given known values of the independent variables (Field et al., 2012). In the end, only N-1 regression models are displayed as one category serves as a reference and the binary model estimates the effect in comparison to this reference category (Field et al., 2012). In our case, the online channel will be the reference category.

### 5 Conclusion and outlook

This work outlines the experiment design to influence multi-channel choices of banking services through adaptive nudges. We found a lack of research in moving beyond the mere explanation of multi-channel choices and attempting to influence them. We derive the constructs of social norms, perceived risk, gender-related and personality-related representation and propose a model of their influence on the multi-channel choice of a consumer credit. We hypothesize that the participants can be nudged towards the Internet channel when they are presented an individualized design feature.

The expected results have a twofold contribution. First, nudge theory is enhanced by developing current, static nudges towards adaptive, customer-specific nudges. Second, we aim to show if and how multi-channel choices can be nudged. This study contributes to existing research by enhancing the applicability of the nudge theory to the new context of multi-channel choices. Finally, we provide guidance for practitioners through practical examples of design features for their online channels.

Nudge theory is discussed controversially (e.g. Goodwin, 2012; Selinger and Whyte, 2011) and there is an ongoing debate whether to nudge or not (e.g. Hausman and Welch, 2010). Thaler and Sunstein (2008) included guidelines on the ethical aspects of nudging and we see our approach in line with the recommendations as the alternatives are not restricted and the intervention is easy and cheap to avoid. In the categorization of intervention types by Hansen and Jespersen (2013), we systemize our design interventions as transparent, system 2 thinking nudges making it a "transparent facilitation of consistent choice" (Hansen and Jespersen, 2013, p. 23) and thus, we facilitate the freedom of choice.

Yet, our study has some limitations. First, the experiment participants are mainly students and thus, the sample is not representative for the German population. Second, it is conducted in a controlled

environment, which helps to eliminate external factors but limits the generalizability of the results. Both limitations will be addressed with a follow-up study in the field. Future research might include other design interventions. We plan to conduct the experiment in 2017 in a German university lab.

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