# DESIGN ELEMENTS OF DIGITAL NUDGES AND EFFECTS ON CONSUMER BEHAVIOR: A LITERATURE REVIEW

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| | |
|---|---|
| **UI** | User Interface |
| **UX** | User Experience |

# Abstract

# 1 Introduction

In the last ten years, our lives became more and more digitized. We buy products in online shops, book our next trip and holidays on digital hotel platforms and even manage our finances with the help of our smartphones (Schneider et al. 2018). All those digital environments have one thing in common. Choices. All the time users are faced with choices they have to take, even if people do not perceive it directly. There a lot of things digital (and also non-digital) environments that frame the whole choice process and therefore influence the decision-making through certain biases and heuristics (Tversky and Kahneman 1974).

Johnson et al. 2012 states that ”what is chosen often depends on the representation.” This representation describes as the term of choice architecture, which should ”alter people’s behavior in a predictable way” (Thaler and Sunstein 2009). In the age of digital transformation, digital environments are powerful tools where the choice architecture can be controlled in detail and therefore provide opportunities to influence user behavior in several ways with the help of user-interface design elements. This process is called ”digital nudging” (Weinmann et al. 2016).

One example of such a digital nudge is present on the online travel platform *booking.com*. Here users typically search for travel accommodations. The result page lists several hotel rooms. With the description of the room and the price comes a piece of information that this hotel was booked several times in the last 12 hours and that there are only a specific number of rooms available. In bright, red color this should create a scarcity in the mind of the user, to perceive the good as more valuable. Through this digital nudge, the likelihood of reservation in this particular hotel is increased[1].

Digital nudging and the design of online choice architecture have recently gained interest in different research areas. Because of the complexity behind this concept, it is significant to understand how such nudges influence the decision-making of the user and how the cognitive biases behind this process are working. Especially in consumer choices, there are good and bad patterns of nudging when it comes to an ethical point of view (Sunstein 2015). To get a better understanding of how digital nudges influence consumer choice this paper presents a systematic literature review from the last ten years in a scientific manner.

The goals of this paper are versatile. The primary aim is to provide an overview of dif-

[1] A screenshot of the web page can be found in the appendix on figure 1

ferent research streams within the topic of digital nudges. The author focuses here on digital nudges in the area of consumer choice and their specific design elements. Literature in this domain shall be gathered, reviewed and analyzed. Secondary, a recommendation for future research is derived from the analysis to advance research in this particular subject. Because of the multidisciplinary assortment of digital nudged, this paper contributes to several scientific domains. First of all, it is major implications for the area of information systems by showing areas with little research. Furthermore, the paper holds implications for the areas of marketing and consumer research as well as psychology and behavioral economics with regards to digital environments

# 2 Conceptional Background

## 2.1 Birth of Nudges

With the release of the book ”Nudge” in 2009, Thaler and Sunstein have laid the foundation stone for the concept of nudging. This concept was primarily a subject of research in behavioral economics. Because of the multifaceted meaning of the word *nudging*, a consistent understanding is essential. Further on, this paper uses the central definition of nudges from Thaler and Sunstein 2009:

*”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.”*

One central aspect of this definition is economic incentive of the consumer, which should not be changed. This fundamental thought is the basis of a concept called *libertarian paternalism*. In this concept choices are influenced in a way to make them easy for people and aligning them with their interests. One example for that would be ”putting the fruit at eye level”. But banning the food would not be a nudge. (Thaler and Sunstein 2009). This principle is the foundation of nudges for a good reason. Influencing people’s behavior can simply be exploited. So, the ethical viewpoint on nudges should always be kept in mind when implementing and using them to guide customer choices (Sunstein 2015).

The underlying foundation for nudging cognitive limitation of human brains. Because the human brain only has a limited capacity to store and process information, consumer often feel subconsciously overloaded. This results in greater difficulty and complexity when in comes to decisions and cognitive demanding tasks (Broniarczyk and Griffin 2014). Therefore ”many decisions are based on beliefs concerning the likelihood of uncertain events (Tversky and Kahneman 1974). Based on this assumption Tversky and Kahneman 1974 formulated three heuristics and several biases that build the underlying foundation of human decision making. Those heuristics and biases can also be found acting as a guideline in the world of digital nudges.

Besides the cognitive foundation of decision making, also the principles of nudges play a major role regarding their application and implementation. Overall, there are five general principles of nudging (based on Thaler et al. 2010)

**Incentive** Those kind of nudges aim to make incentives more salient to increase the effectiveness of the nudge. The focus lays on the motivation behind the decision. The nudge should always search for the right motivation for the right people. This motivation goes beyond monetary and material incentives.

**Understanding mapping** Making the consequence of a choice clear is essential part of easing the decision-making. Mainly, this concerns complex information that is difficult to evaluate. For example, the number of megapixels of a camera. Oftentimes, customers cannot evaluate this information directly and only compare on a single number. A reasonable mapping would be to display the maximum printable size of a taken picture. This way, the product attribute can be compared efficiently.

**Defaults** The pre-selection of certain information has enormous power. By changing the default option, consumers are more likely to make a choice that near to the selected default, or even is the default. One prominent example of such a nudge is the question if people want to consent to be organ donor. Simply by changing the default option in this case can nearly double the percentage of organ donors (Johnson and Goldstein 2003).

**Giving feedback** By giving feedback during the decision-making, people can evaluate their performance and estimate the output or consequences of the decisions they face. Such an example can be found in an experiment for pre-ordering lunch in a school. Students arrange their lunch with different kind of foods. According to this arrangement they receive feedback about how balanced and healthy their food compilation is. Only based on this feedback, students selected significanntly more fruits and vegetables in their meals (Miller et al. 2016).

**Expecting error** Precisely because the underlying complexity of the decision-making process, it is necessary to expect errors to be made. Such errors should be taken into account when designing a decision and the environment should be as forgiving as possible. In complex choice environments, such the food of healthy and balanced food, a lot of people make mistakes. By giving direct feedback on those errors and providing information on how to improve the performance, this decision can me made easier (Guthrie et al. 2015).

**Structure complex choices** Another difficult task in decision-making is to compare different product alternatives. By listing all attributes, people can evaluate trade-offs and make better decisions, based on their interests. In a field experiment, researches evaluated the effect of such a nudge in a bar, when it comes to craft beer choice. By listing product more product attributes that describe the taste in natural way, people could decide easier what they want to order (Malone and Lusk 2017).

## 2.2 (Online) Choice Architectures

The concept of nudges builds on the assumption that decisions are made in choice architectures, which are designed by choice architects (Thaler and Sunstein 2009). In this case, the parallel to a ”real” architect of a building is not far-fetched. Johnson et al. 2012 describes the power of such choice architects and how choice architects guide people's choices like other architects guide behavior through the design of the ”placement of doors, hallways, staircases and bathrooms. Just like in a hotel or building, ”there is no neutral architecture” (Johnson et al. 2012) for choices. Even small things like a default choice affects the decision which is made by the user. The mobile payment app Square for example, nudges people into giving tips only by setting a default value. This way, customers actively must select a ”no tipping” option if they don't want to give a tip (Weinmann et al. 2016). ”Because advances in technology and the user of the Internet also provide new ways of finding, creating and exchanging information [...]” (Broniarczyk and Griffin 2014) people automatically shifted a majority of their decisions in the online or digital world. But those digital environments are not less complex. Just like in offline environments, there is no neutral way to present choices. Therefore, any user interface can be viewed as a digital choice environment (Schneider et al. 2018). This ranges from the positioning of elements, the colors in the interface, the language, even the design elements themselves and beyond.

To get a better understanding on how such choice architectures can be built up and what elements are available, Münscher et al. 2016 created a taxonomy of choice architectures and their techniques. Overall, there are three major categories with several associated techniques.

**Decision information** The first level of choice architectures targets the ”presentation of decision-relevant information” (Münscher et al. 2016). One important aspect is that

this category only includes the presentation and no altering of the options itself. Techniques for that choice architecture category are the translation of information, visibility of information and the providence of social reference points

**Decision structure** Secondly, choice architects directly modify the available options of the choice itself. This includes techniques like choice defaults, the related effort and consequences of an option and also the range of composition and options.

**Decision assistance** Lastly, choices can be designed in a way that consumers follow their intentions. Techniques for such an assistance can be the fostering of a commitment or by providing reminders of the preferred behavior.

## 2.3 Nudging became digital

Because a lot of choices we take today ”involve some form of information technology” (Johnson et al. 2012), the concept of nudging recently gains interest in research of different disciplines. Thereby, the underlying concepts of ”offline” nudges are transferred and adapted in digital environments. The result are digital nudges. According to Weinmann et al. 2016 digital nudges are defined as follows:

*Digital nudging is the use of user-interface design elements to guide people's behaviors in digital choice environments.*

Just like in the offline and analog environments, digital environments face multiple sources of decision difficulty such as task complexity, information load, information uncertainty, conflicts, emotional difficulty and preference uncertainty (Broniarczyk and Griffin 2014). To face those challenges in digital environments the use of cognitive heuristics and biases can act as a baseline to design digital nudges. Different user-interface design elements facilitate different nudges. Table 1 gives an overview of the different biases, in which way they influence decision-making and how those are translated to specific design elements.

Even tough nudges aim to influence behavior in digital environments, they should not be mistaken with persuasion. Persuasion is rather a form of human communication, that is also used in technology. The goal of this technique is also to influence user behavior, but in a more persistent way, so that underlying attitudes are influenced (Oinas-Kukkonen and Harjumaa 2009). Although both concepts share similarities, this paper solely focus

| **Heuristic / Bias** | **Example Design elements and mechanisms** |
|---|---|
| Status quo bias | - Radio buttons<br>- Checkboxes<br>- Dropdown menus<br>- Sliders with default position<br>- Pre-filled inputs |
| Decoy effect | Presentation of options in:<br>- Radio buttons<br>- Checkboxes<br>- Dropdown menus |
| Primacy and recency effect | Positioning of elements<br>(earlier or later) |
| Middle-option bias | - Addition of higher- and lower-price alternatives around the preferred option.<br>- Ordering of alternatives.<br>- Modification of the option scale. |
| Anchoring and adjustments | - Variation of slider endpoints.<br>- Use of default slider position.<br>- Predefined values in text boxes for quantities. |
| Norms (moral / social) | - Display of popularity (social norms).<br>- Display of honesty codes (moral norms) |
| Scarcity effect | - Use of default slider position.<br>- Language and displaying additional information about quantity and availability |

Table 1: Heuristics and Design elements of digital nudges (based on Schneider et al. 2018)

on digital nudges and the decision-making process. An ongoing influence on underlying behavior is still possible, but not directly part of a nudge and therefore not further evaluated.

# 3 Methodology

The methodology section aims to present the research approach to the reader. Here different aspects of the research will be introduced and explained in detail. This includes: - Overall search strategy - Identification of relevant journals and why they're used - Used keywords, queries and terms for the search - Classification and patterns of papers

# 4 Results

The presentation of the literature review's results is the main part of this seminar thesis. Identified concepts, research types, use cases and more will be presented and discussed step by step. The goal of this chapter is to provide a detailed explanation of the underlying concepts and insights of the examined literature. This could include sub chapters like: - General information (number of articles, year of publishing, domain of journal) - Research type (empirical, non-empirical, qualitative, quantitative) - Field of use (IS Field, use case) - Nudging principles and concepts (used biases, choices, design elements)

# 5 Conclusion

In the end of the thesis all results will be summarized and critically discussed. The goal is to identify a research gap and to give recommendations for future research that would advance the topic.

## 5.1 Summary of Findings

## 5.2 Limitations

## 5.3 Recommendations for future research

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# Appendix

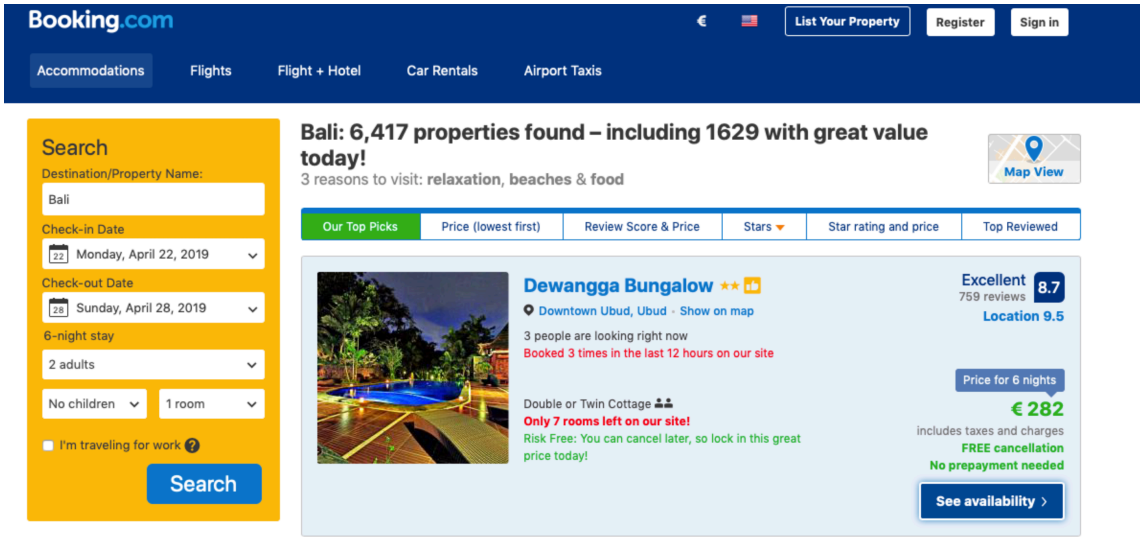


Figure 1: Digital nudging example - booking.com

# Affidavit

I hereby declare that I have developed and written the enclosed seminar thesis entirely on my own and have not used outside sources without declaration in the text. Any concepts or quotations applicable to these sources are clearly attributed to them.

This seminar thesis has not been submitted in the same or substantially similar version, not even in part, to any other authority for grading and has not been published elsewhere. I am aware of the fact that a misstatement may have serious legal consequences.

Mannheim, 25. March 2019

Marvin Messenzehl