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Digital Nudging Decoy Effect and Social Norms Nudge in E-commerce

Testing the effectiveness of the decoy effect and social norms nudge in the context of an e-commerce flower store

Marlan Röthlisberger

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Abstract

With the advent of the internet, people are making more decisions in digital environments such as websites or mobile applications. It has been shown that the ability of people to make rational decisions is bounded. Often heuristics and biases are utilized to reduce the cognitive burden that can be associated with decision making. Digital nudging has become a field of research in behavioral economics using interface design elements to nudge users towards a specific choice within a choice set. Digital nudging in an e-commerce setting can be used to steer users towards a specific choice, however research into the effectiveness of digital nudges in the context of e-commerce is limited. This thesis aims to test the effectiveness of the decoy and social norms nudges in nudging users towards a more expensive option within a set of choices. Online experiments were conducted with the e-commerce florist shop “Jardin sur Perolles”. While the results for the decoy and social norms nudges provided inconclusive evidence regarding their effectiveness in nudging users towards more expensive options, the decoy nudge has shown to be more effective than the social norms nudge.

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List of Acronyms and Abbreviations

S-O-R	Stimuli-Organism-Response
JSP	Jardin-sur-Perolles
ITP	Internet Tracking Prevention
GTM	Google Tag Manager

1 Introduction

With the advent of the internet, people are making more decisions in digital environments such as websites or mobile applications (Mirsch, Lehrer & Jung, 2017a). However, these decisions are not always made rationally. People have cognitive limitations which causes them to implement heuristics and biases when making decisions (Schneider, Weinmann & Brocke, 2018). People's decisions have been shown to be influenced by the choice environment in which a set of choices is presented (Thaler & Sunstein, 2008). Additionally, it has been shown that choices can never be presented in a neutral way, therefore all choice environments are subject to either advertent or inadvertent bias (Johnson et al., 2012; Thaler, Sunstein & Balz, 2012).

The inherent lack of neutrality in choice environments coupled with the current understanding of heuristics and biases has led Thaler and Sunstein to introduce the concept of nudge theory (Thaler & Sunstein, 2008). It refers to the making of small changes to choice environments that either utilize or overcome the psychological effects of heuristics and biases (Thaler et al., 2012). Nudging has been widely tested in the domains of health (Martin, Bassi & Rupert, 2012), dietary behavior (Thaler et al., 2012), policy (Behavioural Insights Team, 2011), personal finance (Thaler & Benartzi, 2004), and energy (Ayres, 2013; Schultz, Nolan, Cialdini, Goldstein & Griskevicius, 2007).

Digital nudging, on the other hand, extends the concept of nudging to the digital environment (Hummel, Schacht & Mädche, 2017). It refers to the subtle manipulation of user-interface design elements to guide people's decisions in a digital choice environment (Weinmann, Schneider & Brocke, 2016). Research conducted in controlled environments have demonstrated the effectiveness of the middle-option-bias (Simons, Weinmann, Tietz & vom Brocke, 2017), the decoy effect (Tietz, Weinmann, Simons & vom Brocke, 2016), and the scarcity effect (Weinmann, Simons, Tietz & Brocke, 2017). While these studies have helped to prove the validity of these digital nudges in a controlled environment, their experimental designs lack a significant degree of ecological validity.

The importance of nudging in a digital context has become of greater importance as more decisions for purchases, holiday bookings, insurances are being done online (Mirsch, Lehrer & Jung, 2017). The ability of digital nudging to nudge users towards certain choices makes it relevant in the e-commerce domain as it could be utilized by organizations to nudge their customers towards more profitable choices. Digital nudging is a relatively new phenomenon and therefore hasn't been widely tested in an e-

commerce context. However, preliminary research has shown that digital nudging could be an effective tool in such a context (Schneider et al., 2018).

Therefore, this thesis aims to use conduct empirical research to test the effectiveness of implementing two digital nudges (decoy and social norms) in nudging consumer choice on an e-commerce florist store (Jardins-sur-Perolles). The results of this research contribute to the field of marketing, behavioral economics, and information system and can help support the validity of using digital nudges in e-commerce stores. Profit maximization is the goal of every for-profit business and digital nudging is a tool that can be implemented to influence consumer choice (Schneider et al., 2018).

1.1 Research Question

E-commerce is expected to grow at double-digit rates until 2022 (Laudon & Traver, 2016). E-commerce has been replacing brick and mortar stores for well over a century and this shift in purchasing behavior has brought about a new environment to choose and buy their products. The awareness of the heuristics and biases within decision making can prove to be beneficial to business owners. While it has gained in popularity, research into digital nudging is still in its infancy and lacks a significant number of experiments that prove its ecological validity. This thesis aims to test the effects of two digital nudges – the decoy nudge and the social norms nudge – on their effectiveness in an active e-commerce florist store.

RQ: To what extent can the decoy and social norms nudges influence user preference away from the cheapest variant of a flower bouquet on an e-commerce florist store?

1.2 Thesis Structure

To begin, Chapter 2 provides background on behavioral economics, nudging and digital nudging as well as explains the decoy and middle-option-bias as well as the social norms nudge and Chapter 3 subsequently presents the development of the hypotheses. Chapter 4 presents the methodology for the empirical experimental design and the accompanying method of statistical analysis that will be used to determine the significance of the results. Next chapter 5 illustrates the results of the experiment followed by the statistical analysis. Chapter 6 discusses implication, limitations and the prospective research possibilities.

2 Literature Review: Theoretical Foundation

Traditional economic theory operates under the assumption that people possess unlimited cognitive resources to make decisions and will make rational decisions based on given information in order to make a decision that maximizes one's own utility (Doucouliagos, 1994). People gather information until the cost of attaining additional information outweighs the gains of that information (Simon, 1959). Based on this concept, three variables - altering price(to increase/decrease the utility of an alternative), providing information (to decrease the cost of acquiring the information), and placing restrictions - have been identified that can affect a decision maker's behavior in an economy (Johnson et al., 2012). This concept has been criticized as it is ineffective in several situations (Johnson et al., 2012) as people do not possess unlimited cognitive capabilities. Therefore the concept of *bounded rationality* has been endorsed as an alternative information processing system that takes into account the limited computational capabilities and limited working memory with which people make decisions (Bettman, Luce & Payne, 1998; Doucouliagos, 1994; Simon, 1955).

Research has shown that people make decisions with bounded rationality because there are limits of one's thinking capacity, available information and time which can result in suboptimal decision making (A. Simon, 1982). These limits in cognitive capacity have been shown to cause the adoption heuristics when making decisions (Hutchinson & Gigerenzer, 2005; Mullainathan & Thaler, 2000). Since the functionality of nudges are rooted in heuristics, they can be used to alter the behavior of decision makers (Thaler & Sunstein, 2008). The concept of heuristics and decision making as grained traction in the domain of behavioral economics (Camerer, Loewenstein & Rabin, 2004). The method with which choices are presented influence the decision maker's decision as there is no neutral method for presenting choices (Johnson et al., 2012; Thaler et al., 2012).

2.1 Behavioural Economics

While neoclassical economics assumes that people will make decisions based on reason and utilize all the available information to make those decision in order to maximize their utility, behavioral economics incorporates insights from psychology, sociology, and cognitive neuroscience (Camerer et al., 2004; Levin & Milgrom, 1969). Behavioral economics gained widespread attention due to the works of Tversky and Kahneman having set the foundation for dual process theory which differentiated between intuition and reasoning (Kahneman, 2003).

Dual process theory states that there exist two systems – System 1 and System 2 – upon which the human mind is based (Kahneman, 2003, 2011; Stanovich & West, 2003). Kahneman (2011) characterized System 1 as being automatic and fast and tending towards intuition, whereas System 2 was characterized as being slow and effortful, but therefore more likely to spot errors in decisions making. System 2 requires more energy and time which is why people tend to rely on the faster and less effortful System 1 when making decisions in their daily lives (Kahneman & Tversky, 1973). For example, Kahneman found that the way that a decision question is framed, influences the outcome of that decision (Tversky & Kahneman, 1986). The dual process theory later aided in providing the foundation to the psychological underpinnings of the term “nudging”.

2.2 Nudge Theory

People make choices based on the rational deliberation of available information and the presentation of that information in a choice environment, which can then exert a subconscious influence on the outcome of one’s decision (Weinmann et al., 2016). Richard Thaler and Cass Sunstein first introduced the concept of nudging in their book titled “Nudge” as the concept referring to deliberately designing choice environments with the intent of influencing human behavior (Thaler & Sunstein, 2008). A Nudge refers to “any aspect of the choice architecture that alters an individual’s behavior in a predictable way without forbidding any options or significantly changing their economic incentives”(Thaler & Sunstein, 2008, p. 6). The assumption being made is that a selective manipulation of a given choice environment can result in the alteration of a person’s decision. Nudging, however, preserves the freedom that decision-makers are given to make choices whilst subtly steering them in a specific direction (Thaler & Sunstein, 2008). For an intervention to count as a nudge, it must be easy to implement and cognitively cheap to avoid (Thaler & Sunstein, 2008).

The concept of nudging has its foundation in heuristics and the inherent biases in cognitive decision making (Thaler & Sunstein, 2008). Many of the heuristics and biases such as availability heuristics, loss aversion and framing are based in the research by Tversky and Kahnemann (Kahneman & Tversky, 1973), which in turn means that the concept of nudging is derived from both behavioral economics and dual process theory as nudges often utilize System 1 (Thaler & Sunstein, 2008). There exist a select few nudges that target system 2 such as those that aim to show people the consequences of their decisions (Sunstein, 2014).

The preserving of a decision maker's freedom of choice whilst steering them in a particular direction is called libertarian paternalism (Thaler & Sunstein, 2003, p. 179). Both the terms Nudging and Libertarian paternalism are often used interchangeably, however there are discussions regarding what qualifies as paternalistic (Hansen, 2016; Thaler & Sunstein, 2003). Thaler and Sunstein prefer to consider policies as paternalistic when the goal of influencing a selected party aims to make that party be better off (Thaler & Sunstein, 2003). Mirsch et al. (2017) have identified 20 psychological effects in the context of libertarian paternalism and nudging.

Today, Nudging is widely used by researchers as well as practitioners. Researchers often conduct experiments that aim to influence the decisions of decision makers. The results are evaluated against a control group to determine the effectiveness of various nudges (Schneider et al., 2018). Nudge theory has been applied successfully to different contexts like energy (Ayres, Raseman & Shih, 2012; Schultz et al., 2007), healthcare (Martin et al., 2012), tax compliance (Behavioural Insights Team, 2011), and personal finance (Thaler & Benartzi, 2004). Governments are increasingly applying techniques from behavioral science, such as nudging, to alter the behaviors of their citizens to avoid the use of coercion (e.g. bans) and economic incentives (e.g. subsidies or fines) (Benartzi, Beshears, Katherine L. Milkman, et al., 2017).

2.3 The effectiveness of nudging

While there is mounting evidence that nudging is effective on a cost-to-impact ratio (Benartzi, Beshears, Katherine L Milkman, et al., 2017), there has been criticism regarding whether nudges are effective and, if so, the degree of their effectiveness. Two studies that focused on a systematic literature review expressed doubt as to whether there is appropriate evidence to support experiments on nudging (Halpern, 2015; Kosters & Van der Heijden, 2015). It found that nudges are not always effective when used in a government setting (D'Adda, Capraro & Tavoni, 2017), and another study found that while nudging can work to reduce the purchase of incompatible products, the age of the participants had an effect on the effectiveness of the nudges (Esposito, Hernández, Van Bavel & Vila, 2017). Additionally, studies have found that the implementation of a nudge such as the social norms nudge can backfire and cause undesirable results (Liu, Gao & Agarwal, 2016; See, Valenti, Y. Y. Ho & S. Q. Tan, 2013). The concept of nudging has become relevant in the digital age as people are making more choices in digital environments. The British Behavioral Interventions Team expects digital nudging to be the future of nudging.

2.4 Digital nudging

When nudging happens in a digital choice environment, it is called digital nudging. Digital nudging is defined as the designing of user-interface design elements with the aim to influence users' behavior in digital environments (Weinmann et al., 2016). In a digital environment, choice environments are the user-interfaces (e.g. ERP screens and web-based forms) which require people to make judgments and decisions (Weinmann et al., 2016). Such choice environments not only can take the form of online shops where users choose the products that they wish to buy, but also filling out online forms such for e-banking or e-government (Djurica & Figl, 2017).

The increase in the use of social media, mobile applications, and e-commerce websites has increased the amount of decisions that users can make in online environments (Djurica & Figl, 2017). Many choices provided to people in online choice environments, deliberate or not, have an influence on the choices that people make because of how the information is presented (Weinmann et al., 2016). For example, Square, the digital payment service often used by restaurants, implemented the "defaults" nudge by having the 20% tip preselected as the default option, out of a set of three (15%, 20%, and 25%), in the Square payment app. The implementation of this nudge allowed square to increase the average amount that customers in restaurants tip their waiters (Carr, 2013).

Digital environments often present the users with too much information which makes it difficult for each users to process all the relevant information and thereby come to a rational decision (Mirsch et al., 2017a). This makes users more prone to heuristics and biases in decision making (Kahneman, 2011).

There has been an increase in interest to research digital nudges in information system (Mirsch et al., 2017a; Weinmann et al., 2016) as can be seen by an increase in the amount of conceptual papers including literature reviews (Mirsch et al., 2017a), policy papers (Gregor & Lee-Archer, 2016), and research papers with various experimental designs (Amirpur & Benlian, 2015; Babić Rosario, Sotgiu, Valck & Bijmolt, 2016; Maslowska, Malthouse & Bernritter, 2017).

A study showed that the utilization of consumer ratings and reviews can influence on consumers' purchase decision (Babić Rosario et al., 2016); it was found that product ratings between 4.2 and 4.5 stars found significantly higher sales rates that products below and above that range (Maslowska et al., 2017). Another study found that even though the implementation of pressure cues such as those that signal limited time or

product availability, it was found that limited product availability does not have a distinct effect on sales whereas limited time pressure cues (Amirpur & Benlian, 2015).

Defaulting has proven to be powerful technique for nudging (Djurica & Figl, 2017) as well as digital nudging (Schneider et al., 2018). The default effect (also known as the status quo bias) functions by setting a target option out of a set of at least 2 as the default in a choice environment (Steffel et al. 2016). Defaults have been proven to have significant effects in the domains of investment, insurance, and organ donation. There are many possible explanations for the success of the default effect such as the cognitive effort required for choosing an option, switching costs, or loss aversion; reducing the cognitive effort that a consumer has to spend to make a decision can cause the user to stick with the default option. The switching cost refers to the cognitive cost of deciding which option to switch to and loss aversion refers to the concept where switching to another option might be perceived as a loss. Research has shown that digital nudging can be an effective tool to an e-commerce context (Schneider et al., 2018).

2.5 Designing a digital nudge

Implementing nudges in an online context is a unique opportunity as web technologies allow for real tracking of user's behaviors and therefore also presents the opportunity to test the effectiveness of nudges (Schneider et al., 2018). Schneider et al., (2018) have built upon the preexisting guidelines for developing nudges in an offline context by deducing a framework for designing digital nudges. The framework is made up of 4 steps. In step 1, designers define the goal of the organization. For example, a crowdfunding platform's goal would be to increase the total number of donations and an e-commerce platform would be to increase sales. The purpose of defining the goal is to determine how choices are to be designed (Schneider et al., 2018). Schneider et al., (2018) have defined 4 types of choices as binary, discrete, continuous, and any other type of choice. A binary choice is any choice between two alternatives (e.g. yes/no) where the resulting data can be expressed in binary. A discrete choice is one in which the user can select between various choices where the user can determine the amount of utility that each option presents (Train, 2003). A continuous choice is one in which the choice is variable such as the amount to donate to a church, or the amount to pledge on a crowdfunding platform assuming that that choices aren't fixed (Schneider et al., 2018). The type of choice that will be presented defines the type of nudge that can be implemented.

Once the type of choice has been determined, step 2 focuses on ascertaining the user's decision making process which allows the choice architect to understand which heuristics

and biases are likely to influence a user's decision (Schneider et al., 2018). People use heuristics and biases to facilitate decision making in an effort to reduce the cognitive resources required to make decisions. Step 2 requires the choice architect to understand the various heuristics and biases as well as the potential effects of digital nudges to prevent them from backfiring and inadvertently nudging people into decisions that may not align with an organization's goal (Schneider et al., 2018).

Step 3 focuses on selecting the appropriate nudging mechanism to guide users towards the organizations predefined goal (Schneider et al., 2018). A choice architect can choose from several different frameworks to select the appropriate nudges such as the NUDGE (Thaler & Sunstein, 2008), MINDSPACE (Dolan et al., 2012), the Change Technique Taxonomy (Michie et al., 2013), and Tool of a Choice Architect (Johnson et al., 2012). The selection of the appropriate nudge for an organization's goal is dependent on the both the type of choice to be made (discrete, continuous, etc…), and the heurists and biases involved. The following is a table of digital nudges that have been identified by Schneider et al., (2018):

Type of choice to be influenced	Type of Heuristics/Bias	Example of design elements and user-interface patterns
Binary (yes/no)	Status quo Bias (Defaults)	Radio buttons (with default choice)
Discrete choice (such as two products)	Status quo Bias (Defaults)	Use defaults in: Radio buttons Check boxes Dropdown menus
	Decoy effect	Presentation of decoy option(s) in: Radio buttons Check boxes Dropdown menus
	Primacy and recency effect	Positioning of presentation of desired option(s) Earlier (primacy) Later (recency)
	Middle-option-bias	Addition of higher- and lower-price alternatives around the preferred option Ordering of alternatives Modification of the option scale
Continuous	Anchoring and Adjustment	Variation of slider endpoints Use of default slider position Predefined values in text boxes for quantities

	Status quo Bias (Defaults)	Use of default slider position
Any Type of Choice	Norms	Display of popularity (social norms) Display of honesty codes (moral norms)
	Scarcity effect (loss aversion)	Use of default slider position

Table 1: Table of digital nudging design based on (Schneider et al., 2018)

As can be seen in the table, choice architects have a plethora of nudges to choose from; some of the options target the same heuristics therefore the same heuristic can be addressed using multiple nudges. Step 4 focuses on testing the effectiveness of the nudge in a digital environment using A/B testing or split testing (Schneider et al., 2018). While digital nudging can be effective, it should be noted that its success is still dependent on the context and goal of the choice environment as well as the targeted audience. Examples of such confounding factors may include the types of target users, colour schemes used in the user-interface interfering with other biases such as the affect bias (Dolan et al., 2012), or the uniqueness of the decision process (Schneider et al., 2018).

2.6 Decoy Effect

A large body of research has found user preference to be sensitive to the context of the available choices. Decoy effects are examples of preference reversal whereby the choice of a product is influenced by the context. Based on Huber et al. (Huber, Payne & Puto, 1982), consumers bypass rational choice theory which would otherwise dictate the decoy to be ignored. Two common types of decoy effects are the asymmetric dominance (Huber & Puto, 1983; Pettibone & Wedell, 2000), and compromise effects (Simonson, 1989).

Decoy effects usually involve the adding of an additional third option to an existing set of two alternatives. Based on Schneider et al., (2018), a decoy increases a target option's attractiveness by presenting it alongside an unattractive option that no one would reasonably choose – the decoy. The role of the decoy is to increase the attractiveness of a target option; but different types of decoys aim to achieve this using different methods.

Across various studies, there exist two general classifications for the relationships between the decoy and other variants of a set of choices. The first class consists of the dominated decoys such as the asymmetrically dominated (Huber & Puto, 1983) and symmetrically dominated decoys (Wedell, 1991), which share in the fact that they are dominated by one or more alternatives. The term dominated means that one feature is obviously worse than that of a competing choice whilst sporting a complete lack of

superior features. The asymmetrical dominance decoy is one of the most widely studied decoy effects (Pettibone & Wedell, 1996); an asymmetrical dominance decoy is defined as being dominated by at least one alternative and is simultaneously also not dominated by at least one alternative (Huber et al., 2016).

The second class of decoys are the non-dominant decoys. They all increase preference for a target option whilst simultaneously not being dominated by those target options. The compromise (Simonson, 1989), inferior (Huber & Puto, 1983), and phantom decoys (Pratkanis & Farquhar, 1992) are all examples of non-dominant decoys. The compromise decoy increases the preference for a target option by extending the range of evaluation on both dimensions rather than one; this means that the target option is placed in the centre between two alternative options, one of which is the decoy. For examples, when two options are given in a choice set where the target option is both a better and more expensive option than the competitor, then the implementation of a third option that is even better and more expensive than the target should result in a greater frequency of people choosing the target option. The compromise effect functions on the decision maker's desire to avoid extremes (Simonson, 1989).

The asymmetric decoy effect is most commonly implemented when a shop sells a target product and a competitor product. However, implementing an asymmetric decoy on store that sells different size variants of the same product could negatively affect the image of the store as customers might find it strange that the store is offering a variant (the decoy) that is more expensive but inferior in another dimension than any of the other alternatives as the price increase is not justified by a relatively inferior product.

2.7 Social norm nudge

Based on experiments, it has been shown that people conform to the opinions of others (Momsen & Stoerk, 2014). 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 & Trost, 1998, p. 152). Social norms have a variety of subcategories such as normative messages, normative appeals, social proof, social influence, social information, social contagion, or social comparison (Hummel et al., 2017). What they all have in common however, is that they all require the providing of some form of social information to yield a desired outcome. There are two categories of norms - descriptive and injunctive norms (Cialdini, 2003). Injunctive norms describe "…perceptions of which behaviors are typically approved or disapproved" (Cialdini, 2003, p. 105) whereas descriptive norms refer to the "…perceptions of which behaviors are typically performed"

(Cialdini, 2003, p. 105). The type of social norm that will be investigated in this thesis is known as a descriptive norm. The effectiveness of social norms nudges are especially high when the intended behavior is easy to engage in, is easy to understand, and is shown at the moment when the user has a decision to make (Richter, Thøgersen & Klöckner, 2018). Amazon implements the use of the social norms effect in text based nudges that recommend products that have been bought by other customers (“Customers who bought this item also bought…”) (Mirsch et al., 2017). The reference to the buying behaviors of other users is meant to nudge the target users along the same path.

3 Hypothesis Development

Nudging in e-commerce is still in its infancy, therefore, to overcome the scarcity of research that experimentally test the effectiveness of nudges in an e-commerce setting, a comprehensive theoretical model must be derived. Since the stimulus in question is psychological in nature, the Stimulus-Organism-Response Model (S-O-R), from environment psychology (Russell & Mehrabian, 1974), will be the model on which the hypothesis development is based. Based on this model environmental stimuli influence the psychological processes of organisms which impact the organism's response (Russell & Mehrabian, 1974). The stimulus is defined as the element that captures an individual's attention and thereby has the ability to influence the individual (Rossiter & Donovan, 1982). The organism is defined as the cognitive response to the stimulus and the response is defined as the behavior that results from the response to the stimulus (Rossiter & Donovan, 1982). A study utilized the S-O-R framework to test the effects of atmospheric ques on the cognitive states of shoppers (Eroglu, Machleit & Davis, 2003). Applying this model, the nudges are operationalized as the "stimuli", the user's cognitive reaction as the "Organism", and the willingness to buy or reject the target choice as the "Response" (Eroglu et al., 2003).

The S-O-R model has not only been applied to evaluate digital nudging (Hummel et al., 2017), but has also been widely applied in the e-commerce domain (Amirpur & Benlian, 2015; Eroglu et al., 2003; Peng & Kim, 2014; Sheng & Joginapelly, 2012) and therefore proves to be suitable for this study. This thesis will focus on applying two psychological effects, the decoy effect and the social norms effect. These effects will be operationalized as the stimuli and will be used to determine their effectiveness in shifting user preference away from a competitor option in a choice set. This thesis will use statistical hypothesis testing to access the statistical significance of the results.

3.1 Middle-option bias

To understand the decoy nudge that was implemented in the experiment, the middle-option-bias will first be disseminated. The middle-option-bias has been established as a digital nudge (Weinmann et al., 2016) and refers to the phenomenon whereby people - who are given an option of three or more choices organized sequentially (e.g. by price) - will select the middle option. This pattern has also been identified by Simonson (Simonson, 1989) as the compromise effect because the middle option resulting from implementing a compromise decoy may be viewed as a compromise between the two extreme options (Simonson & Tversky, 1992). The compromise effect is consistent with

Kahneman and Tversky's prospect theory, which refers to the phenomenon where if the middle alternative is a decision maker's initial point of reference from which the other alternatives are compared, then the justification of a switch to either extreme will be met with difficulty (Kahneman & Tversky, 1979; Simonson, 1989).

Preliminary evidence has shown the middle-option-bias to be significantly effective in nudging users in an online choice environment of a crowdfunding platform towards higher pledges. This bias isn't a new phenomenon, rather it's a decoy and falls into the family of non-dominating decoys. The middle-option-bias is another name for the compromise effect, and it has been found to be effective as a nudge in investment portfolios (Thaler & Benartzi, 2002). An explanation regarding the cognitive underpinnings upon which the compromise effect operates has yet to be conclusively identified; however several models have been proposed that attempt to explain the underlying mechanisms such as the changes in the subjective value of alternatives (Pettibone & Wedell, 1996), loss aversion (Kivetz, Netzer & Srinivasan, 2004; Tversky & Simonson, 1993), or reason based choice (Pettibone & Wedell, 1996).

Both the compromise effect and the middle-option-bias introduce extreme options into a choice set with the intent of shifting user preference into the middle and therefore it can be argued that while the middle-option-bias hasn't been classified as a decoy, it could be classified as non-dominating decoy. The justification in this proposal lies in the intent of a decoy which is to include additional options "to influence people in a predictably irrational way" (Hansen, 2016, pg. 12), and the middle-option-bias adheres to this paradigm (Simons et al., 2017). Therefore, the middle-option-bias compromise effect will hereafter be referred to as the decoy nudge. The use of a decoy nudge can prove to be effective as a digital nudge to sway user preference away from a cheaper competitor option and toward target options that are more expensive when a third and even more expensive alternative is introduced into the choice set. Therefore, the Null Hypothesis and Alternative hypothesis are given as follows:

H_0: The implementation of a digital nudge does not result in a statistically significant increase - at a confidence interval of 95 percent - in the average number of participants who select the target option.

$P > .05$; CI 95%

H_1: The implementation of decoy nudge causes statistically significant increase - at a confidence interval of 95 percent - in the average number of participants who select the target option.

$P < .5$ CI; 95%

3.2 Social norms

It has been shown that people tend to orient themselves based on how others behave (Mirsch et al., 2017). Social norms have proven to be effective in the context of reducing alcohol consumption at universities (Wechsler et al., 2003), and were also found to be effective in nudging people to behaving more sustainably (Goldstein, Cialdini & Griskevicius, 2008). Descriptive norms used in the latter case proved to be more effective. Descriptive norms aim to inform the recipient of the generally accepted paradigm of the greater population. Descriptive norms present a decision maker with standards that they do not want to deviate from (Schultz et al., 2007). Since people measure their behavior according to how far they are behaving from the accepted norm (Schultz et al., 2007), they might be more likely to respond to descriptive messages. Therefore, utilizing a descriptive normative message can provide a person or customer with a point of reference as to what the norm for a given situation is. Therefore, this thesis will test the effectiveness of a descriptive norm in the context of an e-commerce flower store.

H_2: The implementation of social norms nudge causes statistically significant increase - at a confidence interval of 95 percent - in the average number of participants who select the target option.

$P < .5$ CI; 95%

Hypothesis H_0 states that the presence of a decoy nudge or a social norms nudge in the choice set does not significantly effective in shifting user preference away from a competitor option in a choice set. This hypothesis tests standard assertion that the digital nudges are irrelevant alternatives while H_1 and H_2 test the assertion that the decoy nudge and social norms nudge have a statistically significant effect in steering user's choice away from a competitor option in a choice set. An independents samples T-test is used to test for a significant difference in the means.

4 Research Methodology

4.1 Overall Approach

To test the hypotheses, two online field experiments were conducted concurrently on an e-commerce florist website “Jardins sur Perolles”. Experiments 1 and 2 test the effectiveness of the decoy effect and social norms nudges, respectively, in steering user preference away from the cheapest size variant of each bouquet on the store. The experimental design of this thesis mimics that presented by Tietz et al., (2016) who have also conducted an online experiment to test the effectiveness of the decoy effect. Contrary to this study, Tietz et al., (2016) tested the effectiveness of the asymmetric decoy effect in the context of crowdfunding. However, despite this difference, the same methodology can still be applied.

Another difference to their study is that this thesis aims to establish ecological validity and thereby employs the use of an active e-commerce website with real customers. Ecological validity refers to the method of designing a study in such a way as to predict behavior in a real-world settings (Gouvier, Barker & Musso, 2018). In most studies, testing environments are designed to minimize distractions, and fatigue of the participant whilst maximizing the performance of each test subject. Real world environments can be prone to distractions, confusion, and other form of confounding factors which are not accounted for in a controlled testing environment and therefore can reduce the ecological validity of an experimental design. As the aim is to determine the effectiveness of the digital nudges in a real world setting, the testing environment is not controlled as the experimenter will not have control over the location from which the users access the JSP website which in turn enhances the ecological validity of this experiment. The runtime of both experiments was from the July fourth until July Seventeenth. The following sub-sections describe the e-commerce store, the experiments, their treatments, how the results were measured and analysed.

4.2 E-commerce Store: Jardins-sur-Perolles

The author of this thesis discovered the e-commerce store Jardin-sur-perolles (www.perolles29.ch), hereafter referred to as JSP, through a former business college who’s sister (Deborah Piccinelli) currently runs the popular florist store located at the heart of Fribourg, Switzerland. JSP was founded by Nathalie Florio and run by the family duo Anne Bovay and Maurice Roseng until 2017 when Deborah Piccinelli became the manager of the store (Auzan, 2018).

A preliminary analysis of the website revealed that the store offers a total of nine bouquets, eight of which are offered in two size variants - a “small” variant and a larger “plus” variant. The existence of two variants per flower bouquet allows for the implementation of a third variant to test the decoy nudge. The store is also ideal for implementing the social norms nudge as the paradigm of buying and gifting flowers can be considered to have a social component and thereby be subject to the influence of a social norms nudge.

During the first meeting, Mrs. Piccinelli expressed interest in the testing of digital nudges on their e-commerce website. It was communicated that, on average, almost 90% of Mrs. Piccinelli’s customers chose the cheapest variants of each bouquet on the e-commerce store. Having people select a larger and more expensive variants was deemed an interesting proposition. It was communicated that JSP can make an average of 500,000CHF in annual revenue and has an average of 624 sales monthly. Additionally, JSP is looking to grow and is therefore interested in implementing digital nudging. The company delivers flowers within a 35-kilometer radius of Fribourg and therefore has a geographically specific target group. Additionally, some of their clientele browse the online catalogue on the e-commerce store and then call the store to place their order which could present to be a confounding factor as will be discussed later in this thesis.

The necessary sample size to get statistically significant results with a margin of error of +/- 5%, a confidence level of 95%, and an estimated population size of 10,000 is shown in the following calculation.

*Necessary Sample Size = (Z-score)2 * StdDev*(1-StdDev) / (margin of error)$_2$*

Therefore, a sample size of **370** is necessary to obtain statistically significant results. Since JSP has an average number of monthly sales of 624, it is possible to conduct the experiment and get statistically significant results. It was also mentioned that more people on the JSP store add products to their cart and fail to complete the checkout process as some customers prefer to order their bouquets by calling the shop.

It was agreed that an experiment could be run during the month of July, as July is not the most popular month for flower sales thereby minimizes risk to the shop should there be any technical problems. However, it was also mentioned that during the month of July, JSP will send e-mail newsletters to their customers with the new flower bouquets that are available in the store. This could not be circumvented for the sake of the experiment as the company still has to focus on generating revenue.

Research into the implementation of digital nudging on a florist e-commerce store is currently non-existent. The decoy effect would be ideal because in this case JSP’s

website only offers two variants of their flower bouquet sizes, therefore a third variant, the decoy, would allow the company to nudge their consumers away from the cheaper price variants of each product. Since the social norms nudges have been proven to be influential in earlier studies (Aimone et al., 2016; Ayres et al., 2013) and have also been proven to be important drivers in financial decision making (Hummel et al., 2017), it might prove to be effective in the context of increasing the sales of an online flower shop such as JSP.

4.3 Method of collecting data

Participants

As this experiment aims to establish ecological validity, all users of the JSP website are considered to be potential participants. A user is considered to be a participant if and only if the user has clicked on the button “Choisir cette Taille” (the French equivalent of “Select this Size”) - which will hereafter be referred to as the “add to cart” button - in the choice environment of the relevant products. Considering that the JSP store has more users who add products to their online cart than users who complete their purchase, it has been decided that adding a product to the cart is a sufficient requirement to be counted as a decision, as this experiment only aims to test the ability of the digital nudges to shift consumer decision. A further justification for utilizing the “add-to-cart” button as the response to the stimulus is that July is a month in which the JSP store often has fewer sales on their online store than during other months, this decision can aid in increasing the sample size of this experiment. This decision however reduces the ecological validity of the experiment.

Given that the website generates revenue for a real company, using the same participants for multiple treatment groups would make the JSP website seem inconsistent as users would see different choice environments on recurrent visits. This could potentially have a negative effect on reputation of the JSP company. Therefore, both experiments utilize a *single-factor between-subjects experimental design* with two conditions: a baseline and an experimental condition (decoy condition or social norms condition). While this deviates from the single-factor repeated-measure design used by Tietz et al., (2016), the decision to expose each user only once to each condition is justified as inconsistencies to the pricing of a product can negatively affect consumer trust thereby damaging JSP’s reputation. Sixty-eight observations were made in the control condition, eighty-six in the decoy condition and eighty-two in the social norms condition for a total of two hundred and thirty-six observations. Since both experiments were run

concurrently, and both experimental conditions are being compared to the same control condition, only one control group was required. Additionally, subjects were not informed that they are taking part in the experiments.

Users on the website were randomly assigned to either the control or the treatment group. Browser cookies were used to determine which participants had already taken part in the experiment and the group that they were assigned to. The number of times in which the choice of each participant is recorded was limited to one. Obstacles regarding the implementation of cookies will be discussed towards the end of this chapter.

4.4 Product scenarios

JSP already possess an online choice environment - their product description page. All that is required is the implementation of digital nudges. However, given that the JSP e-commerce store has nine products on display, not every product is a candidate for digital nudging. One of the nine products (“Jardin en boite”) is sold only in one size and price variant and therefore was excluded from the experiment.

Additionally, each of the products on display have different price ranges which introduces an additional confounding variable into both experiments. In an ideal situation, bouquets would be categorized by price (cheap, moderate, expensive), however, the decision was made to ignore the variability in price ranges between the products for three reasons. Firstly, during the two weeks of July, during which this experiment was active, the JSP shop planned on sending email newsletters to the clients. If the recipients clicked on a direct link to a product on the website, the implementation of google tag manager would not recognize which product the user is viewing as google tag manager was only set up to recognize the users who clicked on a given product from the “shop” page on the e-commerce store. Secondly, additionally testing the effectiveness of the decoy and social norms nudges on each of the price categories would reduce the sample size dramatically and therefore no longer provide significant results. Thirdly, since this thesis aims to determine whether the digital nudges are effective at shifting user preference away from the smallest variant, conclusions can still be drawn regarding the overall effectiveness of the digital nudges when compared to the baseline.

Due to the lack of control regarding the pricing of the products, only six products out of the possible eight were utilized for the experiments because they fit into three price categories. The implementation of selecting only two products per price scenario aims to reduce the variability in the products as it does not consider products that are either more or less expensive. The pricing structure for the products along in the baseline condition

(control group) depicted in *table 2*. A comparison between the pricing structure of the control condition and two experimental groups are outlined in the upcoming treatment sections for both experiments.

PRICING SCENARIO	**PRODUCT (NAME OF FLOWER BOUQUET)**	**BASELINE CONDITION (VARIANTS)**	
		Small size Variant	Normal size Variant
CHEAP	Jardin de Paeonia	*48 CHF*	*78 CHF*
	Jardin de Lathyrus	*48 CHF*	*78 CHF*
MODERATE	Jardins des Amoureux	*56 CHF*	*86 CHF*
	Le Jardin des Bois	*56 CHF*	*86 CHF*
EXPENSIVE	Jardin de Borneo	*68 CHF*	*98 CHF*
	Le Jardin du Sud	*68 CHF*	*98 CHF*

Table 2 Comparison of pricing structure between products in different pricing scenarios

4.5 Procedure

For both experiments, the digital nudges are located on the product description page for each of the products on the JSP store. Each product description page consists of a title, description, picture gallery and a choice environment (*see figure 1*). The title, description and picture gallery vary depending on the product chosen on the JSP e-shop. Participants have two methods with which they can land on the product description pages for any product on the e-shop. The first method is via the JSP e-shop. This e-shop contains a catalogue of all nine of the products that are sold by JSP (*see figure 2*). The second method with which participants can land on the product description is via a direct link.

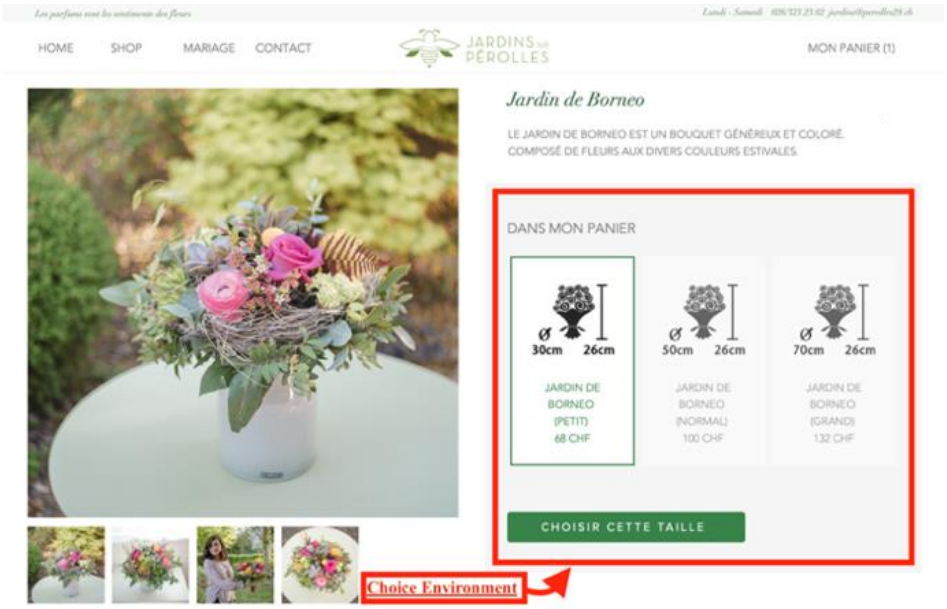

Figure 1 Product Description Page

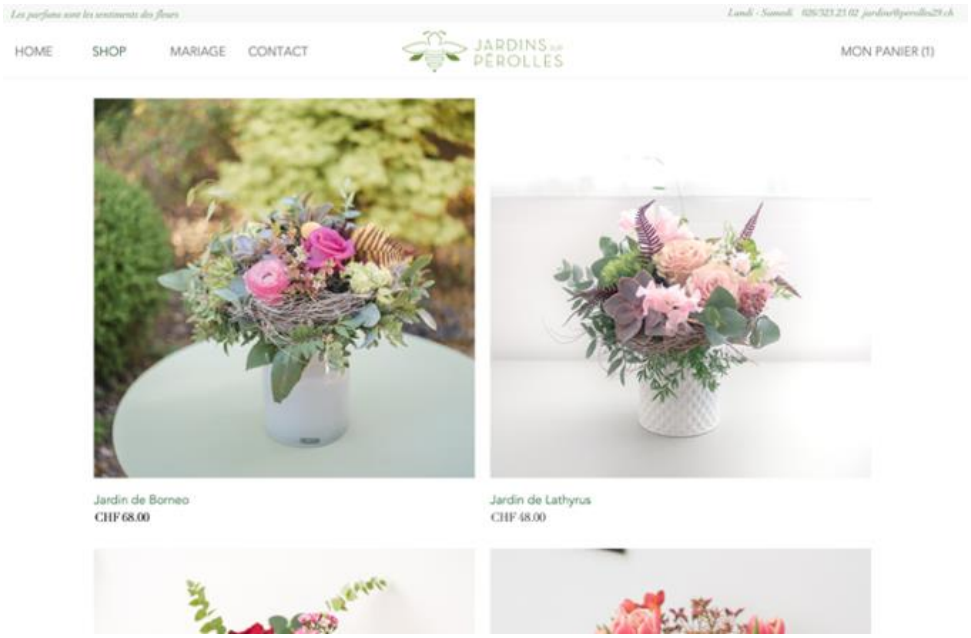

Figure 2 JSP e-shop product catalogue

Upon entering the product description page, google optimize randomly shows user one of three variants of the choice environment (control condition, decoy condition, social norms condition). While the term choice environment refers to the entire page, from this point forward, the choice environment will refer to the area within the red box depicted in *figure 1*.[1] The participant then has the option to make a selection and click on the “add to

[1] It should be noted that the red boxes and red text are annotations and are not present on both the website and the treatments to the website.

cart" button which adds the product to their shopping cart. The clicking of the "add to cart" button is regarded as a decision even if the participant doesn't complete the checkout process. The following section depicts the treatment groups for both experiments.

4.6 Treatment 1: Decoy nudge

The first experiment aims to determine the effectiveness of the decoy nudge in steering user preference away from the cheapest price variant when choosing a flower bouquet. Originally, the JSP store only sold two variants of each flower bouquet – a small variant and a normal variant. Therefore, the small variant and the normal variant will be the options presented in the baseline condition (control group). Choice alternatives for each product in the decoy condition consist of a target, a competitor, a decoy (Tietz et al., 2016). In each scenario the competitor (small variant) is comparatively cheaper than the target (normal variant) and the decoy is priced to be comparatively more expensive than the target. A third decoy option has to be created, to test the effectiveness of the decoy nudge in nudging people away from the small variant (see figure 1). Given that a third option isn't offered, it's price and size attribute had to be ascertained.

Since the sizes of the choices in the choice vary identically within all products in this experiment. The competitor, target and decoy option depicted as being products of the same height at 26cm tall; where they differ is in the diameter dimension. The competitor, target and decoy options are depicted as having diameters of 30cm, 50cm, and 70cm. Icons were used to depict the size difference in the choice sets, however each icon varied only in the diameter of the bouquet. The icon is visually exactly the same in all choices in the choice set.

To determine the price of the decoy, the same price difference ratio was applied as in the study by Simons et al. (2017); in their study they set the price of the decoy to be the difference between the competitor and the target options plus the price of the target option. The same logic was applied to determine the size difference that should justify the change in price. *Figure 3* depicts the choice environments that participants would see in either the baseline condition or the decoy condition.

Figure 3 Depiction of baseline (left) and decoy (right) choice environments

Participants in the baseline condition could decide between the competitor and the target options, while the participants in the decoy condition were additionally given a third option (the decoy). *Table 3* provides an overview for the choice sets for the products in the cheap price scenario.

Option in the choice set	**Baseline condition**	**Decoy condition**
Competitor	48 CHF - 30cm diameter	48 CHF - 30cm diameter
Target	75 CHF - 50cm diameter	75 CHF - 50cm diameter
Decoy	-	102 CHF - 70cm diameter

Table 3 Choice sets for flower bouquets in the cheap Pricing Scenario

Additionally, *table 4* presents an overview of each product that was used in the experiment along with their pricing scenarios and their corresponding choice sets for both the baseline condition as well as the experimental condition.

PRICING SCENARIOS	**CHOICE SETS**		
	Competitor	Target	Decoy (Experiment condition)
CHEAP	*48 CHF*	*78 CHF*	*108 CHF*
MODERATE	*56 CHF*	*86 CHF*	*118 CHF*
EXPENSIVE	*68 CHF*	*98 CHF*	*128 CHF*

Table 4 Choice sets for flower bouquets by Pricing Scenario

4.7 Treatment 2: Social Norms nudge

The second experiment aims to determine the effectiveness of the social norms nudge in steering user preference away from the cheapest price variant when choosing a flower bouquet. The control group for the second experiment is identical to the first experiment as both experiments are running concurrently and tested against the same baseline. However, the treatment in the social norms nudge is the addition of a descriptive norm message which aims to communicate popular behavior. To determine how to formulate the descriptive social norms message, the reason for the effectiveness of the social norms nudge was analysed in the literature and determined to that people tend to do what is popular (Cialdini, 2003); it was therefore decided to put the word “popular” above the target option *see figure 4*. Ideally, the colour of the message would be neutral so as to avoid a confounding factor, however the manager of the JSP store insisted on having the colour scheme match with the rest of the site.

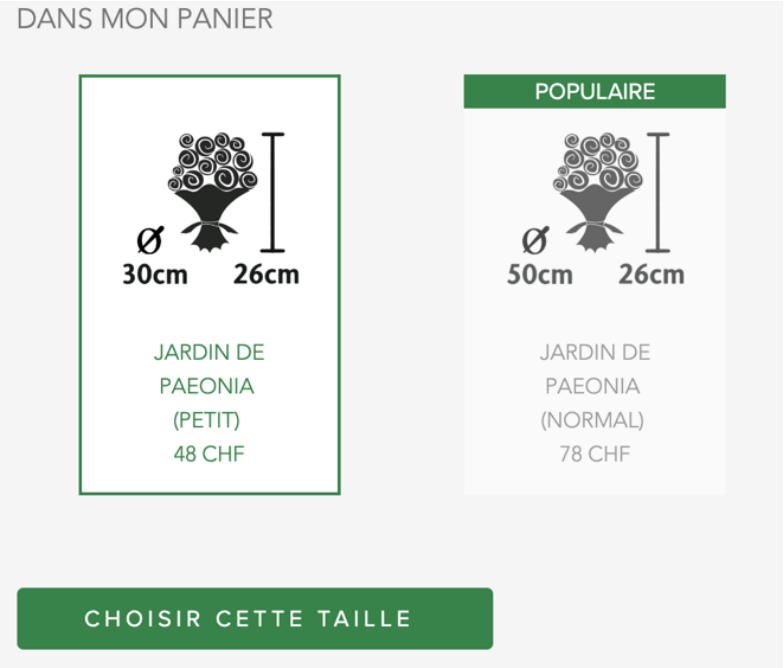

Figure 4 Depiction of social norms choice environments

4.8 Measure

Experiments one and two utilize the same method of measurement. As both experiments measure the effectiveness of nudging the participants away from choosing the cheapest alternative in the choice set, the dependent variable is dichotomous, therefore it was defined as a binary variable - participants in the baseline condition could choose between the competitor (binary value = 0) or the target (binary value = 1), which is consistent with

the method of measurement in the experiment by Tietz et al. (2016). In the decoy condition there was addition of a third and more expensive option. As with the previous experiments (Huber et al., 1982; Tietz et al., 2016), the decoy option and the target option were merged into a single target option. Therefore, whether the user clicks on the target variant or the decoy, the binary variable will be recorded as “1”. As the aim is to determine whether the decoy option effectively decreases the frequency with which participants choose the competitor option, the dependent variable was defined as the decision between the target and the competitor options (Tietz et al., 2016).

The variant of the choice environment is subsequently recorded in the user’s browser cookie so that, on recurrent visits, the participant would be shown the same variant of the experiment. Tags were fired by google tag manager to record the options that the participants click on. Each of these “click” tags records the user-ID (random six-digit integer), click label (the choice that the user made), identification number of the experiment and variant (control, or experimental condition). Once the user clicks on the “add to cart” button, another tag is fired to record this event; the data is subsequently store in google analytics. Clicks that were recorded were, clicks on the products in the e-shop catalogue, clicks on any of the alternatives in the choice environment as well as clicks on the “add to cart” button.

4.9 Tools and Materials

The experiment was built upon the existing product offerings of the JSP e-commerce store and relied on the interplay between three applications: Google Optimize, Google Tag Manager, Google Analytics. Google optimize was used to create and design the three variants of the choice environment for the product description pages, one for the baseline condition and two other variants for both experimental conditions. When running an experiment in google optimize, it provides the option of randomly assigning variants of the choice environment and automatically keeps track of the variant that the user was previous shown.

Google Tag Manager (GTM) was primarily used to collect data by firing tags when users click on elements on the website. As described previously, three types of clicks were tracked and labelled – product selection (name of flower bouquet selected), size variant (small, normal, large) and the “choisir cette taille” (add to cart) clicks. Additionally, each of these tags that were fired had to contain additional dimensions such as the treatment group of the participant who made the click, the tag sequence number, and the number of purchases that have already been made by the participant. Table 5 summarizes the

purpose of the each of the specified dimensions contained within each tag before it is sent to google analytics for storage.

Custom dimension	**Description**
Treatment group	Describes whether the user who clicked on an item is part of the control group or either of the decoy or social norms experimental group.
User ID	A random six digit number stored in the user 1st party browser cookie used to identify the users associated with each tag.
Tag Sequence Number	Identifies the sequence number of the tag to determine the order with which the tags were fired for each user.
Number of Purchases	Identifies the number of purchases made by each user. Its purpose is to identify whether an “add to cart” tag has already been recorded to identify users who made multiple. As this experiment utilizes a between-subjects design, recurrent purchases were disregarded.

Table 5 Overview of the various dimensions recorded with each Tag from GTM

4.10 Obstacles

Several obstacles were present during the implementation of the experiment one of which pertains to the use of cookies to maintain records of each user. Custom 1st party cookies were coded and implemented using google tag manager. Cookies contained three custom variables – User ID, Tag sequence number, and number of purchases (*see table 5*). However, due to the recent implementation of Internet Tracking Prevention 2.1 (ITP 2.1), first party cookies are deleted after seven days on all safari browser versions 12.2 and up (Moffett, Liu & Khatibloo, 2019). Since the experiment ran for two weeks, if participant returned during the second week, the participant would be assigned a new User-ID and therefore erroneously be recorded as a unique user in the dataset. To circumvent this limitation, a server side script could be implemented as it would not be subject to deletion by the ITP 2.1 protocol (Rumble, 2019). However, the manager of the JSP store addressed concern regarding this implementation and therefore this solution wasn’t implemented.

4.11 Methods for data analysis

Empirical statistical analysis will be done to determine the effectiveness of each of the independent variables. The skew and kurtosis of the baseline and experimental data set will be measured, in order to determine whether the data set qualifies for an independent t-test. An independent t-test will be used to determine whether a significant difference exists between the means of both experimental groups and the baseline using a confidence interval of 95% to determine significance. Subsequently, the effect size will be calculated to yield a better representation of the meaning of the independent t-test. Should the results show that the effectiveness of the digital nudges is within a confidence interval of 95 percent, then the digital nudges will be deemed effective.

5 Results

5.1 Experiment 1: Decoy

The baseline group (N = 68) was associated with an average click on the target options of M = .19 (SD = .39). By comparison, the decoy group (N = 86) was associated with a numerically larger average click on target options of M = .32 (SD = .47). An independent samples t-test was performed to test the hypothesis that the decoy group and the baseline group were associated with statistically significantly different average selections of the target option. As can be seen in Table 5, the decoy and baseline distributions were appropriately normal to conduct a t-test (i.e., skew < |2.0| and kurtosis < |9.0|; Schmider, Ziegler, Danay, Beyer & Bühner, 2010). Additionally, the assumption of homogeneity of variance was tested and confirmed using the Levene's F test, F(152) = 15.43, p = .000. The independent samples t-test demonstrated a statistically insignificant effect at a confidence interval of 95%, t(152) = -1.88, p = .062. Thus, the decoy group was not associated as being statistically significantly more effective at nudging participants toward the target options and away from the cheaper competitor option. To determine the effect size, Cohens's d was estimated at .30, which is correlates to a small to medium effect based on Cohen's (Cohen, 1992) guidelines.

	N	**M**	**SD**	**Skew**	**Kurtosis**
Baseline group	68	.19	.39	1.60	.59
Decoy group	86	.32	.47	.75	-1.46

Table 6 Descriptive statistics associated with averages click on the target option

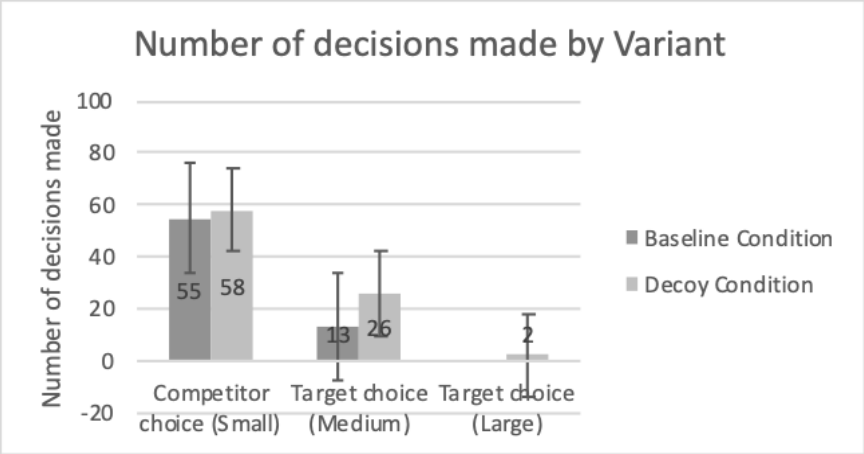

Figure 5 Baseline and Decoy comparison of number of clicks by option

Calculating the average prices of the small, normal and large variants across the three price scenarios as being 57 CHF, 87 CHF, and 118 CHF respectively, and the probability of users who are likely to click on the small and medium variants as .80 and .19 in the baseline group along with .67, .30 and .02 (large variant) in the decoy group, then extrapolating the two week combined sample size (N=236) of this experiment to 1 year yields a sample size of 5664. Based on this data, the average yearly revenue for the baseline group would result in 351,903 CHF and against 375,505 CHF for the decoy group. This shows a 6% increase in average yearly revenue under the assumption of all other conditions being equal.

5.2 Experiment 2: Social Norms

The baseline group (N = 68) was associated with an average click on the target options of M = .19 (SD = .39). By comparison, the social norms group (N = 82) was associated with a numerically larger average click on target options of M = .25 (SD = .43). An independent samples t-test was performed to test the hypothesis that the social norms group and the baseline group were associated with statistically significantly different average selections of the target option. As can be seen in Table 7, the social norms and baseline distributions were appropriately normal to conduct a t-test (i.e., skew < |2.0| and kurtosis < |9.0|; Schmider, Ziegler, Danay, Beyer & Bühner, 2010). Additionally, the assumption of homogeneity of variance was tested and not confirmed using the Levene's F test, $F(148) = 3.66$, $p = .057$. The independent samples t-test was associated with a statistically insignificant effect at a confidence interval of 95%, $t(146) = -.951$, $p = 0.343$. Thus, the social norms group was not associated as being statistically significantly more effective at nudging participants toward the target options and away from the cheaper competitor option. To determine the effect size, Cohens's d was estimated at .15, which is a small effect based on Cohen's (Cohen, 1992) guidelines.

	N	**M**	**SD**	**Skew**	**Kurtosis**
Baseline group	68	.19	.39	1.60	.59
Decoy group	82	.25	.43	1.13	-.72

Table 7 Descriptive statistics associated with averages click on the target option

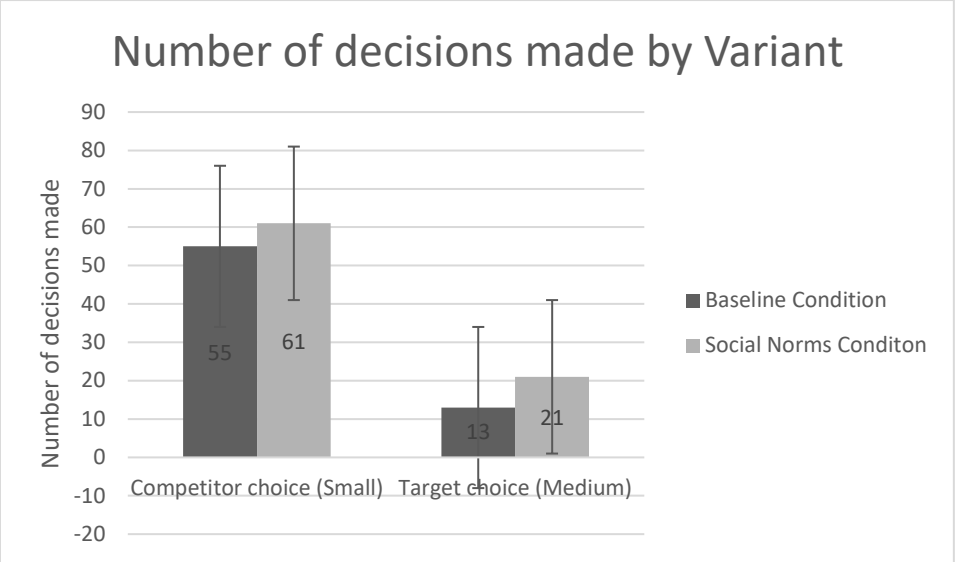

Figure 6 Baseline and Social Norms comparison of number of clicks per size variant

Based on figure 6, the results show that the number of participants who opted for the small and medium choices is 55 and 13 in the baseline and social norms condition, and 61 and 21 in the social norms condition. Calculating the average prices of the small, and normal variants across the three price scenarios as being 57 CHF, and 87 CHF respectively, and the probability of users who are likely to click on the small and medium variants as .80 and .19 in the baseline group along with .74, .25 in the social norms group, then extrapolating the two week combined sample size (N=236) of this experiment to 1 year yields a sample size of 5664. Based on this data, the average yearly revenue for the baseline group would result in 351,903 CHF against 362,099 CHF for the decoy group. This shows a 2.8% increase in average yearly revenue under the assumption of all other conditions being equal.

6 Discussion

This thesis aimed to test the effectiveness of the decoy nudge and the social norms nudge in steering user preference away from the cheapest alternative – the cheapest option in a choice set – and towards the more expensive target variant. Online experiments were conducted on the e-commerce store of the florist shop Jardin-sur-Perolles as they have an active e-commerce website that generates revenue. Conducting a field experiment with an active e-commerce store provided a greater degree of ecological validity to the results of the experiment and, by extension, to the determining of the effectiveness of the decoy and social norms nudges in a real world setting.

Gardner and Altman (2010) proposed using confidence intervals rather than p-values when doing hypothesis testing as the resulting yes/no conclusion derived from the p-values are less informative than using alternative statistics – the use of confidence intervals. Common statistical statements such as “P<0.5” or “P>0.5” convey little information about a study’s findings as they rely on the convention of using the 5 percent level of statistical significance to determine whether an outcome was significant or not (Gardner & Altman, 2010). Gardner and Altman proposed that confidence intervals are more useful when the aim of the experiment is to make a statement that reflects an entire population as the confidence interval moves from a single value estimate, such as the sample mean, to a range of values that could be considered plausible if the entire population were studied. Given that the purpose of this thesis is to test two digital nudges in an e-commerce context and thereby associate the two nudges with ecological validity, confidence intervals are better suited to represent a larger population. As with the convention of using a 5 percent level statistical significance is used, so is a 95 percent confidence interval, however 99 percent or 90 percent can also be used for greater or less confidence (Gardner & Altman, 2010). Since 95 percent is the accepted convention for statistical hypothesis testing, it will be used as the confidence interval required to reject the null hypothesis in this experiment.

6.1 Decoy nudge

The variant of the decoy effect that was implemented was the compromise effect as first introduced by Simonson (1989) and has the same psychological underpinnings and purpose as the more recently defined digital nudge known as the middle-option-bias (Weinmann et al., 2016) as both aim to steer user preference away from the extremes and towards the middle of a choice set. The hypothesis (H_1) stated that the decoy nudge would have a statistically significant effect – with a confidence interval of 95% – at shifting

user preference away from the competitor alternative and towards the target alternative, while the null hypothesis assumes the lack of a statistically significant effect at a confidence interval of 95%. The results of the experiment have demonstrated a statistically insignificant increase in the average cases in which participants selected the target option when calculated at a confidence interval of 95% and therefore reject the alternate hypothesis (H_1).

t(152) = -1.88; p = .062

Based on this result, it can be said that there is more than a five percent chance that the results were due to chance. While the increase in the average number of users who selected the target option with the implementation of the decoy nudge is not statistically significant at a confidence interval of 95 percent, a confidence interval of 90 percent would prove the results to be statistically significant. Selecting a confidence interval of less than 95 percent provides excessive uncertainty regarding the effectiveness of the decoy nudge. A 95 percent uncertainty was chosen for this study due to the accepted convention that when a study is being conducted with the intent of bringing in unique results, the standard convention is to utilize a 95 percent confidence interval (Ellis, 2010). Given that research into the effectiveness of the decoy nudge in an e-commerce flower store is non-existent, the 95 percent confidence interval persists to be the viable option. However, it is possible that confounding factors were responsible for a type II error causing the false acceptance of a false null hypothesis. Confounding factors will be outlined later in the discussion section as the majority pertain to both experiments due to the similar nature of their experimental designs.

To determine the real world application of this research, effect size should be considered as the use of effect size shifts the conversation from "'Does it work?'" (Coe, 2002, p. 1) to the more effective, "'How well does it work in a range of contexts?'" (Coe, 2002, p. 1). To determine the effect size for the decoy nudge, Cohen's d was estimated at 0.3 which - according to Cohen's guidelines where .2 and .5 are considered to be small and medium effect sizes respectively - is considered to be between a small to medium effect but veering towards small (Cohen, 1992). Based on this information, it can be said that the overall effectiveness of the decoy nudge in shifting user preference away from the smaller variants is small. To further contextualize the effectiveness of the decoy nudge, the average yearly revenue for the JSP store was estimated from the results of this experiment and extrapolated to a year. Doing so indicates a six percent increase in revenue when the decoy nudge is implemented, which can be significant to JSP as they have an average yearly revenue of around 500,000 CHF. Despite this, the results are

inconclusive as this experiment presents insufficient evidence to confirm its effectiveness across a larger sample size. The minimum sample size that would render the result to be representative to the population, where the population is estimated to be 10,000 people, would be N = 370. This experiment only managed to get a sample size of N = 154.

The results of this experiment are consistent with those from the preliminary research conducted by Simons et al., (2017) who has observed a statistically significant increase in user preference away from the competitor alternative in the context of crowdfunding. Similarly, this experiment does show a measurable increase in user preference away from the competitor, however it does not do so at a confidence interval of 95 percent. Simons et al., (2017) used an online survey platform, and the creation of fictitious and simplified crowdfunding campaigns in their experiment which limited the ecological validity of their results; additionally, the users of their study did not self-select into supporting any of the crowdfunding campaigns and the money used was fictitious. While Simons et al., (2017) are in the process of conducting a field experiment that test the ecological validity of the middle-option-bias in the context of crowdfunding, such research is currently not available to compare against.

It is unclear whether implementing more alternatives would be more effective at nudging consumers away from the cheapest option despite the research conducted by Simons et al., (2017) testing the effectiveness of the middle-option-bias across a varying number of alternatives. Their results showed that regardless, whether the users are given three, five, or seven alternatives, the middle option would consistently be the most selected option overall. Future research into the decoy nudge could test the effectiveness of presenting the user with more than three options. Again, Simons et al., (2017) conducted their experiment under laboratory conditions, so under non-laboratory conditions, everyday stress and tiredness may cause the middle option bias to backfire as users might experience the tyranny of choice (Schwartz, 2004) or choice overload (Iyengar & Lepper, 2000).

Additionally, it would be beneficial to test the effectiveness of the number of choices as older people may have less processing capacity and therefore have been shown to prefer to be given fewer choices when compared to younger people (Reed, Mikels & Simon, 2008). Even though there has been research conducted that investigates the effects that the number of alternatives has on decision behavior, it is still unclear what the optimal number of alternatives is that should be presented to the user (Payne, Sagara, Shu, Appelt & Johnson, 2013). For now, according Johnson et al., (2012), when deciding on the number of alternatives to provide in a choice set in the context of nudging, one should

choose the “fewest number of options that will encourage a reasoned consideration of tradeoffs among conflicting values and yet not seem too overwhelming to the decision maker” (Johnson et al., 2012, p. 490).

6.2 Social norms nudge

The hypothesis (H_2) stated that the social norms nudge would have a statistically significant effect – with a confidence interval of 95% – at shifting user preference away from the competitor alternative and towards the target alternative, while the null hypothesis assumes the lack of a statistically significant effect at a confidence interval of 95%. The results of the experiment have demonstrated a statistically insignificant increase in the average cases in which participants selected the target option when calculated at a confidence interval of 95% and therefore reject the alternate hypothesis (H_2).

$t(146) = -.951, p = 0.343$

Based on this result, it can be said that there is almost a thirty-five percent chance that the results were due to chance. The effect size using Cohen’s d was estimated at 0.15 which, according to Cohen’s guidelines, is too low to qualify as having a small effect. Therefore, it can be said that the social norms nudge is less effective at nudging users of the JSP shop away from the competitor alternative. Currently research on the social norms nudge in an e-commerce setting is lacking and therefore the results cannot be compared to existing studies in the context of e-commerce. Additionally, extrapolating the expected annual revenue given the data would suggest a 2.8 percent increase in revenue for JSP. This is likely due to random error based on the individual samples t-test and therefore provides inconclusive evidence for the effectiveness of the social norms nudge in an e-commerce context for an online flower store.

Social norms nudges can backfire. Default nudges are easy to design while social norms require specialized knowledge to be implemented effectively otherwise the nudge might backfire (Schultz et al., 2007). Therefore, the way that the descriptive message of the social norms nudge is selected, needs to be done carefully. In conclusion, great responsibility falls upon the choice architect when selecting a digital nudge as the architect not only has to consider both the target group as well as the method for constructing the nudge (Thaler & Sunstein, 2008). The author may have selected the wrong message to be conveyed in the social norms nudge despite the findings of the literature review which may have resulted in the lack of evidence into the effectiveness of the social norms nudge, but it could also be because of the cultural background of the

recipient. The findings in this experiment show that nudges from an offline context cannot be simply transferred to the digital environment.

The position of the products could be varied in future research. The primacy and recency effect refer to the heuristic where people pay more attention to options that are at the beginning or the end of a selection and are therefore more likely to pick those options (Kahneman, 2011). Given that the selection of options on the JSP store vary by size and price, presenting the target option (the “Normal” variant) before the “small” variant (primacy effect) may strike customers as befuddling.

6.3 Strengths and Limitations

Research into digital nudging is not ubiquitous. Experiments are typically carried out in controlled testing environments. Therefore, the research conducted in this thesis is unique in that it tests the ecological validity of the decoy nudge and social norms nudge in shifting user preference towards a target option in an e-commerce setting. This experiment did not use fictitious products or fictitious e-commerce platforms, and the users were free to self-select any product and option on the website and users who failed to select any option were not regarded as participants of this study. A strength of this study is the use of a real e-commerce store with its real clientele buying real products. Despite the benefits of being able to test the effectiveness of the decoy and social norms nudges in a real world setting, conducting a field experiment that ranks high in ecological validity comes with its own set of limitations such as a greater difficulty to control variables, lower reliability of the results when compared to laboratory experiments and difficulty replicating the same conditions.

Another limitation is presented as the author of this experiment had no method of assessing whether people in either of the experiments actively recognized the digital nudges. Given that the choice environment in this experiment was limited to a small box on a webpage, it is not likely that participants didn’t register the digital nudges. A benefit of testing the effectiveness of the decoy nudge on the JSP website is that the intended decision makers are successfully targeted. Despite the strengths of the experiments, they are overshadowed by their limitations.

6.4 Sample size

Both experiments had a small sample size of N = 68, 86, and 82 for the baseline, decoy and social norms conditions respectively. This limits the power of the study while

simultaneously increasing the risk of a type II error. Therefore, both experiments could benefit from larger sample sizes to provide conclusive evidence of their ineffectiveness.

6.5 The default interference

One of the three options in the choice environment was always selected by default. Since there exists a status quo nudge that utilizes the power of setting defaults in swaying user preference towards specified target (Weinmann et al., 2016), this was a confounding factor in the experiment as the default was always set to the cheapest size variant (the competitor). Based on how the e-commerce store was set up, one of the options in the choice environment always had to be selected by default. Therefore, the author made the decision to select the cheapest variant as the default. It has been shown in an environmental context that switching from a pre-selected default option introduced a cognitive burden on the part of the consumer (Campbell-Arvai, Arvai & Kalof, 2014). Therefore, given the design of the experiment, it is difficult to determine how much of an influence that the default option had in skewing the results of both experiments. It remains to be determined whether the decoy nudge and social norms nudges were competing with the status-quo-bias.

6.6 Add to Cart limitation

For both experiments, the “Add to Cart” button was utilized to determine, whether or not a user made a decision. The author wasn’t given access to the e-commerce infrastructure that is responsible for handling transactions, which would have helped determine which participants actually bought the product instead of just placing it into their cart. This explains the author’s decisions to use the “Add to Cart” button as a determiner of a decision. However, this raises the question whether intention or behavior was being measured by the experiment. The experiment doesn’t measure, how many people made a purchase, it only measures how many unique participants added a product to their cart. However, given as the author intended to measure the effectiveness of both nudges in shifting user preference away from the smallest option, the results should still be considered a demonstration of the degree to which both nudges influence choice.

6.7 Multiple pricing scenarios

This study aimed to determine the ecological validity of both the decoy and the social norms nudges. In doing so, the difficulties of real-world testing were introduced. The JSP

store has nine products on their e-commerce store. Most of these products have varying starting prices. The small variant of one flower bouquet was differently priced to the small variant of another flower bouquet in another pricing scenario. Given that the participants could self-select, the number of samples for each pricing scenario varied across the three experiments. Normally, a scientific experiment aims to control all variables and alter only the independent variable. This was not possible given the time span of the experiment coupled with the utilization of an active e-commerce platform that generates revenue. One solution would have been to select only the most popular option for testing and only measure the clicks within that option. However, due to the limited time, the results would have yielded a very small sample size and therefore reduce the significance of the experiment. To attain a larger sample size whilst minimizing the interference of this pricing factor, the author selected only six of the products which fit into three price categories as described in the experimental design. The effectiveness was therefore studied as an overall effect in the given time span. Alternatively, the author could have tested whether the overall effects of both nudges are consistent across the various pricing categories using a mixed effects logistical regression (Tietz et al., 2016). Not doing so due to the limited samples for each individual product is arguably the biggest limitation of this thesis.

6.8 Returning customer

Based on the implementation of the tracking of clicks via Google Tag Manager, the experimenter could not ascertain whether the participants of the study were familiar with the products on the website, or whether they were new users of the website. It has been found that nudges can prove to be more effective when the decision is unique or complex (Thaler & Sunstein, 2008). Returning users of the JSP shop may be familiar with the products and may choose the product variant that they have historically chosen without regard for the alternatives. Their decision would therefore be based on habit.

6.9 Takeaway

The implementation of the decoy nudge could prove to be effective in increasing revenue when an e-commerce store offers products with multiple variants for each product outlined in the same choice environment. While the results for both experiments are not conclusive, the decoy nudge shows the greatest likelihood for being an effective candidate. However it cannot be said that the effectiveness of nudges translates across contexts or domains as the effectiveness of nudges is context dependent (Thaler, 2012).

For example, what might work for an e-commerce florist store might not work for an e-commerce clothing shop.

When considering the implementation of nudging, it is important to consider the price of the product. An expensive car and a flower bouquet are not likely to be equally effected by nudging. An expensive product causes people to actively consider the best rational option given that it may be a comparatively more important decision when compared to a flower bouquet. The author of this study has yet to identify research that test the effectiveness of digital nudging on products that vary on such a large price scale.

6.10 Ethical consideration

When Thaler and Sunstein (2008) first introduced the concept of nudging, they intended it's used to help people make better choices. Every nudge was meant to lead a decision maker to the option that is in their best interest; Thaler and Sunstein termed this philosophy as libertarian paternalism (Thaler et al., 2012). The problem with this is that it violates an individual's right to freedom because, in a nudge regime, people essentially don't make their own choices anymore; instead, the government nudges people to make the decision that it deems fit for its people.

It has been shown in various studies that nudges can have unintended consequences (Liu et al., 2016; See et al., 2013). In digital nudging, a digital choice environment's design has the potential to yield unintended results. Therefore, as digital nudging is becoming more widely studied and applied it is the responsibility of the designers to be equipped with a thorough understanding of the heuristics and biases that plague human decision making. It is important that choice architects understand the effects that their designs can have on the user. A choice architect should follow a subjective assessment of how to most ethically design the choice environment so as to prevent unintended and perhaps even unethical consequences. A choice architect should also be aware that their subjective assessment of ethics is subject to personal bias and motivations. Another important consideration that choice architects should heed is the ethical implication of their nudges. Some implementations of digital nudges may only be in the best interest of the company as has been the case in both of the experiments in this thesis (Simons et al., 2017; Tietz et al., 2016).

The implementation of the decoy nudge and social norms nudge has not been made with regard to the ethical implementations - rather with scientific curiosity. While unethical nudges can result in short term gains (e.g. financial) for a company, there are potential long-term side-effects. In the case of the JSP store, nudging users to pick a larger variant

with a conspicuous “popular” label above the desired option can result in the participant feeling pushed into a direction as it might be clear to some people as a marketing tactic. The repercussions of this could include and are not limited to: loss of goodwill, loss of trust and negative publicity. As in the case of the social norms nudge, the decoy nudge is also subject to the possibility of repercussions. Flowers can be considered being luxury goods and therefore could be tied to social status. It is possible that people who buy flowers for others might be happy that there are only two options on the JSP shop, because when there are three options, the buyer might be afflicted with guilt when buying the cheapest flower bouquet for someone else when there are two larger but also more expensive variants. This feeling could then be associated with the store and possibly negatively affect the relationship between the store and the customer in the long term. Assuming that some people buy flowers as gifts to others, showing those people the decoy option in the setting of a flower e-store might guilt them into choosing larger options and therefore leave a bad memory of the experience. It should be noted that this thesis does not advocated the use of ethically questionable behavior.

7 Conclusion

This thesis demonstrated that e-commerce is a prominent and popular form of commerce. It is therefore in the interest of owners of e-shops to design and presents options for their individual products in such a way that increases the profitability of their business. E-commerce was studied through the point of view of behavioral economics and the potential for implementing nudging in an online context was thereby identified. Dual-process theory was used to demonstrate the potential of buyers on e-commerce stores to be prone to system 1 processes – the use of heuristics and biases that aid in decision making which are associated with various cognitive biases (Kahneman, 2011). It was outlined that the lack of reference points makes decision making harder, which has the tendency of causing people to become more reliant on heuristics and biases for the sake of cognitive efficiency.

Specifically, this thesis studied the effectiveness of the non-dominant decoy nudge which was identified by Simonson (1989) as the compromise effect and by Simons et al., (2017) as the middle-option-bias. Both dictate the shift in user preference away from extremes and towards middle option. As both involve the implementation of a supplementary “decoy” option within a choice set, this thesis referred to this nudge as the decoy nudge. It was hypothesized that - by deliberately designing the choice environment – customers of the JSP e-commerce store would shift their selection away from the cheapest size variant when presented with a third non-dominating decoy option.

The social norms nudge was the second nudge that was studied in the context of an e-commerce store. It was hypothesized - by deliberately designing the choice environment – customers of the JSP e-commerce store would shift their selection away from the cheapest size variant when implementing a descriptive social norms nudge. Two empirical studies were conducted on the active e-commerce site of JSP, in order to test the effectiveness of both nudges using statistical hypothesis testing at a confidence interval of 95 percent. The results of the first empirical study showed that the decoy nudge is not considered to be statistically effective within a 95 percent confidence interval and therefore led to the subsequent rejection of the alternate hypothesis (H_1). However, the results showed that at a confidence interval of 90 percent, the results would prove the decoy nudge to be statistically significant. An extrapolation of the results showed that, based on the results, the decoy nudge could increase the average revenue of the JSP store by 6 percent annually. This can have a significant effect for the store owner. The social norms nudge, however, only marginally demonstrated a shift in preference away

from the cheapest option. The social norms nudge proved to be ineffective at shifting user preference away from the cheapest size variant.

Though these studies were limited in their sample size, users of the JSP flower store may be more prone to the decoy nudge. Therefore, designing their product description page's choice environment to include three size variants in ascending order of price, may prove to be effective at increasing the annual revenue of the JSP e-commerce store. It is still possible that the perceived effectiveness of the decoy nudge over the social norms nudge is due to some factor outside the scope of this research. Therefore, further research is recommended into the decoy nudge as well as the social norms nudge in an e-commerce context.

Against this background, the findings presented in this thesis only serve to suggest - and do not confirm - the possibility of preliminary evidence regarding the effectiveness of the decoy nudge in an e-commerce context specific to online flower stores. To provide more proof and ecological validity for the decoy and social norms nudges, the experiments should be repeated with a larger sample size and a longer run time as July is notoriously known among flower stores as being a sub-optimal month for flower sales. As heuristics and biases are more often employed by decisions makers under situations of stress (Kahneman, 2011), the decoy and social norms nudges could be paired with the scarcity effect or even tested for their effectiveness when paired with limited time offers. It would be beneficial to conduct experiments with other nudges that rely on other cognitive biases as they may prove to be more effective in the context of an e-commerce flower store than the digital nudges tested in this thesis. The author believes that this would allow for a more holistic understanding of the effectiveness of digital nudges as well as the cognitive biases that are at play for users of such e-commerce stores. Further research could also seek to experiment with the wording of the social norms nudge as simply stating that an option is "popular" may seem insincere to customers. Further research into the effectiveness of the decoy nudge as well as the social norms nudge could be tested when compounded with the status-quo-bias, which has been deemed to be very effective (Hummel , Dennis ; Toreini , Peyman , Maedche, 2018; Mirsch, Lehrer & Jung, 2018).

This thesis contributes to existing research of digital nudging in the context of e-commerce by evaluating the effectiveness of the social norms nudge and the decoy nudge in nudging user preference away from the cheapest size variant on an e-commerce florist store.

8 References

A. Simon, H. (1982). *Models of Bounded Rationality* (Band 2). Cambridge: MA: MIT Press.

Amirpur, M. & Benlian, A. (2015). Buying under Pressure : Purchase Pressure Cues and their Effects on Online Buying Decisions. *International Conference on Information Systems*, (April), 1–18.

Auzan, J. J. (2018). Déborah piccinelli: Jardins sur Pérolles Boulevard de Pérolles 29. *Les Fribourgeois*. Verfügbar unter: http://www.lesfribourgeois.ch/portraits/deborah-piccinelli/

Ayres, I., Raseman, S. & Shih, A. (2012). Evidence from Two Large Field Experiments that Peer Comparison Feedback Can Reduce Residential Energy Usage. *The Journal of Law, Economics, and Organization*, *29*(5), 992–1022. https://doi.org/10.1093/jleo/ews020

Ayres, T. (2013). Warnings, Anti-Warnings, and Pacifiers. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, *57*(1), 1698–1701. https://doi.org/10.1177/1541931213571378

Babić Rosario, A., Sotgiu, F., Valck, K. & Bijmolt, T. (2016). The Effect of Electronic Word of Mouth on Sales: A Meta-Analytic Review of Platform, Product, and Metric Factors. *Journal of Marketing Research*, *53*, 297–318. https://doi.org/10.1509/jmr.14.0380

Behavioural Insights Team. (2011). Behavioural Insights Team Annual update 2010 – 11. *Cabinet Office: London, UK*, 1–30.

Benartzi, S., Beshears, J., Milkman, Katherine L., Sunstein, C. R., Thaler, R. H., Shankar, M. et al. (2017). Should Governments Invest More in Nudging? *Psychological Science*, *28*(8), 1041–1055. https://doi.org/10.1177/0956797617702501

Benartzi, S., Beshears, J., Milkman, Katherine L, Sunstein, C. R., Thaler, R. H., Shankar, M. et al. (2017). Should Governments Invest More in Nudging? *Psychological Science*, *28*(8), 1041–1055. https://doi.org/10.1177/0956797617702501

Bettman, J. R., Luce, M. F. & Payne, J. W. (1998). Constructive Consumer Choice Processes. *Journal of Consumer Research*, *25*(3), 187–217.

Camerer, C. F., Loewenstein, G. & Rabin, M. (2004). *Advances in Behavioral Economics*. New York: Princton University Press.

Campbell-Arvai, V., Arvai, J. & Kalof, L. (2014). Motivating Sustainable Food Choices: The Role of Nudges, Value Orientation, and Information Provision. *Environment and Behavior*, *46*(4), 453–475. https://doi.org/10.1177/0013916512469099

Cialdini, R. B. (2003). Crafting Normative Messages to Protect the Environment. *Current Directions in Psychological Science*, *12*(4), 105–109. https://doi.org/10.1111/1467-8721.01242

Cialdini, R. B. & Trost, M. R. (1998). *Social influence: Social norms, conformity and compliance.* (D. T. Gilbert, S.T. Fiske & G. Lindzey, Hrsg.)*The handbook of social psychology*. New York: McGraw-Hill.

Coe, R. (2002). It's the effect size, stupid: What effect size is and why it is important. *Educational Research*, 1–18.

Cohen, J. (1992). A power primer. (power analysis) (Quantitative Methods in Psychology). *Psychological Bulletin*, *112*(1), 155.

D'Adda, G., Capraro, V. & Tavoni, M. (2017). Push, don't nudge: Behavioral spillovers and policy instruments. *Economics Letters*, *154*, 92–95. Elsevier B.V. https://doi.org/10.1016/j.econlet.2017.02.029

Djurica, D. & Figl, K. (2017). The Effect of Digital Nudging Techniques on Customers' Product Choice and Attitudes towards E-Commerce Sites. *Americas Conference on Information Systems (AMCIS)*, (Kahneman 1973), 1–5.

Dolan, P., Hallsworth, M., Halpern, D., King, D., Metcalfe, R. & Vlaev, I. (2012). Influencing behaviour: The mindspace way. *Journal of Economic Psychology*. https://doi.org/10.1016/j.joep.2011.10.009

Doucouliagos, C. (1994). A Note on the Evolution of Homo Economicus. *Journal of Economic Issues*, *28*(3), 877–883. Association for Evolutionary Economics.

Ellis, P. D. (2010). *The Essential Guide to Effect Sizes Interpretation of Results* (First edit.). Cambridge: Cambridge University Press.

Eroglu, S. A., Machleit, K. A. & Davis, L. M. (2003). Empirical Testing of a Model of Online Store Atmospherics and Shopper Responses. *Psychology and Marketing*, *20*(2), 139–150. https://doi.org/10.1002/mar.10064

Esposito, G., Hernández, P., Van Bavel, R. & Vila, J. (2017). Nudging to prevent the purchase of incompatible digital products online: An experimental study. *PLoS ONE*, *12*(3). https://doi.org/10.1371/journal.pone.0173333

Gardner, M. J. & Altman, D. G. (2010). BMJ Publishing Group Confidence Intervals Rather Than P Values : Estimation Rather Than Hypothesis Testing Statistics in Medicine Confidence intervals rather than P values : estimation rather than hypothesis testing. *British Medical Journal*, *292*(6522), 746–750.

Goldstein, N. J., Cialdini, R. B. & Griskevicius, V. (2008). A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels. *Journal of Consumer Research*, *35*(3), 472–482. https://doi.org/10.1086/586910

Gouvier, W. D., Barker, A. A. & Musso, M. W. (2018). Ecological Validity. *Encyclopaedia Britannica*. https://doi.org/10.1007/978-3-319-31075-6_2

Gregor, S. & Lee-Archer, B. (2016). The digital nudge in social security administration. *International Social Security Review*, *69*(3–4), 63–83. https://doi.org/10.1111/issr.12111

Halpern, D. (2015). *Inside the Nudge Unit: How small changes can make a big difference*. London: WH Allen.

Hansen, P. G. (2016). The Definition of Nudge and Libertarian Paternalism: Does the Hand Fit the Glove? *European Journal of Risk Regulation*, *7*(1), 155–174. https://doi.org/10.1017/s1867299x00005468

Huber, J., Payne, J. W. & Puto, C. (1982). Adding Asymmetrically Dominated Alternatives: Violations of Regularity and the Similarity Hypothesis. *Journal of Consumer Research*, *9*(1), 90. https://doi.org/10.1086/208899

Huber, J., Payne, J. W., Puto, C., Huber, J., Payne, J. W. & Puto, C. (2016). Similarity Hypothesis Linked references are available on JSTOR for this article : Adding Asymmetrically Dominated Alternatives : Violations of Regularity and the Similarity Hypothesis. *Journal of Consumer Research*, *9*(1), 90–98.

Huber, J. & Puto, C. (1983). Market Boundaries and Product Choice: Illustrating Attraction and Substitution Effects. *Journal of Consumer Research*, *10*(1), 31–44. Oxford University Press.

Hummel , Dennis ; Toreini , Peyman , Maedche, A. (2018). Improving Digital Nudging Using Attentive User Interfaces : Theory Development and Experiment Design.

Hummel, D., Schacht, S. & Mädche, A. (2017). Designing Adaptive Nudges for Multi-Channel Choices of Digital Services: A Laboratory Experiment Design. *Proceedings of the 25th European Conference on Information Systems (ECIS)*, *2017*, 2677–2688.

Hutchinson, J. M. C. & Gigerenzer, G. (2005). Simple heuristics and rules of thumb: Where psychologists and behavioural biologists might meet. *Behavioural Processes*, *69*(2), 97–124. https://doi.org/10.1016/j.beproc.2005.02.019

Iyengar, S. S. & Lepper, M. R. (2000). When choice is demotivating: Can one desire too much of a good thing? *Journal of Personality and Social Psychology*, *79*(6), 995–1006. https://doi.org/10.1037/0022-3514.79.6.995

Johnson, E. J., Shu, S. B., Dellaert, B. G. C., Fox, C., Goldstein, D. G., Häubl, G. et al. (2012). Beyond nudges: Tools of a choice architecture. *Marketing Letters*, *23*(2), 487–504. https://doi.org/10.1007/s11002-012-9186-1

Kahneman, D. (2003). A Perspective on Judgment and Choice: Mapping Bounded Rationality. *American Psychologist*, *58*(9), 697–720. https://doi.org/10.1037/0003-066X.58.9.697

Kahneman, D. (2011). *Thinking, Fast and Slow* (1st Editio.). New York: Farrar, Straus and Giroux New York.

Kahneman, D. & Tversky, A. (1973). Judgment Under Uncertainty: Heuristics and Biases. *Judgment Under Uncertainty: Heuristics and Biases*, *185*(November), 1124.

Kahneman, D. & Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. *Econometrica*, *47*(2), 263–292.

Kivetz, R., Netzer, O. & Srinivasan, V. S. (2004). Alternative Models for Capturing the Compromise Effect. *Ssrn*, (November). https://doi.org/10.2139/ssrn.515965

Kosters, M. & Van der Heijden, J. (2015). From mechanism to virtue: Evaluating Nudge theory. *Evaluation*, *21*(3), 276–291. https://doi.org/10.1177/1356389015590218

Laudon, K. C. & Traver, C. G. (2016). *E-commerce 2016: business. technology. society*. Verfügbar unter: www.pearsonglobaleditions.com

Levin, J. & Milgrom, P. (1969). Introduction to Choice Theory. *The Journal of the American Dental Association*, *79*(5), 1116. https://doi.org/10.1006/obhd.2000.2941

Liu, C., Gao, G. & Agarwal, R. (2016). The Dark Side of Positive Social Influence. *Thirty Seventh International Conference on Information Systems*, 1–14.

Martin, S. J., Bassi, S. & Rupert, D. R. (2012). Commitments, norms and custard creams - A social influence approach to reducing did not attends (DNAs). *Journal of the Royal Society of Medicine*, *105*(3), 101–104. https://doi.org/10.1258/jrsm.2011.110250

Maslowska, E., Malthouse, E. C. & Bernritter, S. F. (2017). Too good to be true: The role of online reviews' features in probability to buy. *International Journal of Advertising*, *36*(1), 142–163. https://doi.org/10.1080/02650487.2016.1195622

Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W. et al. (2013). The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions. *Annals of Behavioral Medicine*, *46*(1), 81–95. https://doi.org/10.1007/s12160-013-9486-6

Mirsch, T., Lehrer, C. & Jung, R. (2017a). Digital Nudging: Altering User Behavior in Digital Environments. *Proceedings of 13th International Conference on Wirtschaftsinformatik*, (February), 634–648.

Mirsch, T., Lehrer, C. & Jung, R. (2017b). Digital Nudging: Altering User Behavior in Digital Environments. *Proceedings of 13th International Conference on Wirtschaftsinformatik*, 634–648.

Mirsch, T., Lehrer, C. & Jung, R. (2018). Making Digital Nudging Applicable: The Digital Nudge Design Method. *39th ICIS*, (2009), 1–16.

Moffett, T., Liu, S. & Khatibloo, F. (2019). Apple ITP 2.1: What It Is, What It Means, And Why It Matters. *Forrester Research*. Verfügbar unter: https://go.forrester.com/blogs/apple-itp-2-1/

Momsen, K. & Stoerk, T. (2014). From intention to action : Can nudges help consumers to choose renewable energy ? *Energy Policy*, *74*, 376–382. Elsevier. https://doi.org/10.1016/j.enpol.2014.07.008

Mullainathan, S. & Thaler, R. H. (2000). Behavioral Economics. *Nber*, *3*.

Payne, J. W., Sagara, N., Shu, S. B., Appelt, K. C. & Johnson, E. J. (2013). Life expectancy as a constructed belief: Evidence of a live-to or die-by framing effect. *Journal of Risk and Uncertainty*, *46*(1), 27–50. https://doi.org/10.1007/s11166-012-9158-0

Peng, C. & Kim, Y. G. (2014). Application of the Stimuli-Organism-Response (S-O-R) Framework to Online Shopping Behavior. *Journal of Internet Commerce*, *13*(November 2014), 159–176. https://doi.org/10.1080/15332861.2014.944437

Pettibone, J. C. & Wedell, D. H. (1996). Using Judgments to Understand Decoy Effects in Choice. *Organizational Behavior and Human Decision Processes*, *67*(3), 326–344.

Pettibone, J. C. & Wedell, D. H. (2000). Examining Models of Nondominated Decoy Effects across Judgment and Choice. *Organizational Behavior and Human Decision Processes*, *81*(2), 300–328. https://doi.org/10.1006/obhd.1999.2880

Pratkanis, A. R. & Farquhar, P. H. (1992). A Brief History of Research on Phantom Alternatives: Evidence for Seven Empirical Generalizations About Phantoms. *Basic and Applied Social Psychology*, *13*(1), 103–122. Routledge. https://doi.org/10.1207/s15324834basp1301_9

Reed, A. E., Mikels, J. A. & Simon, K. I. (2008). Older adults prefer less choice than young adults. *Psychology and Aging*, *23*(3), 671–675.

Richter, I., Thøgersen, J. & Klöckner, C. (2018). A Social Norms Intervention Going Wrong: Boomerang Effects from Descriptive Norms Information. *Sustainability*, *10*(8), 2848. https://doi.org/10.3390/su10082848

Rossiter, J. R. & Donovan, R. J. (1982). Store Atmosphere: An Environmental Psychology Approach. *Journal of Retailing*, *58*(1), 34. https://doi.org/Article

Rumble, S. (2019). ITP 2.1: New iOS cookie limitations restrict attribution, and a workaround for Snowplow users. *Snowflake Analytics*. Verfügbar unter: https://poplindata.com/privacy/itp-21/

Russell, J. A. & Mehrabian, A. (1974). *An approach to environmental psychology.* Cambridge: US: The MIT Press.

Schmider, E., Ziegler, M., Danay, E., Beyer, L. & Bühner, M. (2010). Is It Really Robust?: Reinvestigating the robustness of ANOVA against violations of the normal distribution assumption. *Methodology*, *6*(4), 147–151. https://doi.org/10.1027/1614-2241/a000016

Schneider, C., Weinmann, M. & Brocke, J. vom. (2018). Digital Nudging: Guiding Online User Choices through Interface Design. *Communications of the ACM*. Verfügbar unter: http://10.0.4.121/3213765%0Ahttp://search.ebscohost.com/login.aspx?direct=true&db=iih&AN=130478725&lang=pt-br&site=ehost-live

Schultz, W. P., Nolan, J. M., Cialdini, R. B., Goldstein, N. J. & Griskevicius, V. (2007). The Constructive, Destructive, and Reconstructive Power of Social Norms. *Psycological Sciences*, *18*(5), 429–434.

Schwartz, B. (2004). *The paradox of choice: why more is less*. New York: Harper Perennial.

See, Y. H. M., Valenti, G., Y. Y. Ho, A. & S. Q. Tan, M. (2013). When Message Tailoring Backfires: The Role of Initial Attitudes in Affect-Cognition Matching. *European Journal of Social Psychology*, *43*. https://doi.org/10.1002/ejsp.1967

Sheng, H. & Joginapelly, T. (2012). Transactions on Human - Computer Interaction. *AIS Transactions on Human-Computer Interaction*, *4*(2), 25–44. https://doi.org/10.5121/ijfcst.2014.4403

Simon, H. A. (1955). The Prussian Income Tax Author (s): Joseph A . Hill Source : The Quarterly Journal of Economics , Vol . 6 , No . 2 (Jan ., 1892), pp . 207-226 Published by : The MIT Press Stable URL : http://www.jstor.org/stable/1882547. *The Quarterly Journal of Economics*, *69*(1), 99–118.

Simon, H. A. (1959). Theories of Decision-Making in Economics and Behavioral Science. *The American Economic Review*, *49*(3), 253–283.

Simons, A., Weinmann, M., Tietz, M. & vom Brocke, J. (2017). Which Reward Should I Choose? Preliminary Evidence for the Middle-Option Bias in Reward-Based Crowdfunding. *Proceedings of the 50th Hawaii International Conference on System Sciences (2017)*, (Hicss). https://doi.org/10.24251/hicss.2017.526

Simonson, I. (1989). Choice Based on Reasons: The Case of Attraction and Compromise Effects. *Journal of Consumer Research*, *16*(2), 158–174. https://doi.org/10.1086/209205

Simonson, I. & Tversky, A. (1992). Choice in Context : Tradeoff Contrast and Extremeness Aversion. *Journal of Marketing Research*, *29*(3), 281–295.

Stanovich, K. E. & West, R. F. (2003). "Individual differences in reasoning: Implications for the rationality debate? *Behavioral and Brain Sciences*, *26*(4), 527. https://doi.org/10.1017/S0140525X03210116

Sunstein, C. R. (2014). Sunstein - Nudging A Very Short Guide, *37*(4), 583–588.

Thaler, R. H. (2012). Smart disclosure: The regulatory future.

Thaler, R. H. & Benartzi, S. (2002). How Much Is Investor Autonomy Worth? Shlomo Benartzi ∗. *Journal of Finance*, *LVII*(4), 1593–1616.

Thaler, R. H. & Benartzi, S. (2004). Save More Tomorrow: Using Behavioral Economics to Increase Employee Saving. *Journal of Political Economy*, *112*(S1), S164–S187. The University of Chicago Press. https://doi.org/10.1086/380085

Thaler, R. H. & Sunstein, C. R. (2003). Libertarian Paternalism. *American Economic Review*, *93*(2), 175–179. https://doi.org/10.1257/000282803321947001

Thaler, R. H. & Sunstein, C. R. (2008). *Nudge*. Michigan: Caravan Books.

Thaler, R. H., Sunstein, C. R. & Balz, J. P. (2012). Choice Architecture, 428–439.

Tietz, M., Weinmann, M., Simons, A. & vom Brocke, J. (2016). The Decoy Effect in Reward - Based Crowdfunding: Preliminary Results from an Online Experiment. *Proceedings of the 37th International Conference on Information Systems, AIS*, 1–11.

Train, K. E. (2003). Discrete choice methods with simulation. *Discrete Choice Methods with Simulation*, *9780521816*, 1–334. https://doi.org/10.1017/CBO9780511753930

Tversky, A. & Kahneman, D. (1986). The framing of decisions and the evaluation of prospects. *Studies in Logic and the Foundations of Mathematics*, *114*(C), 503–520. https://doi.org/10.1016/S0049-237X(09)70710-4

Tversky, A. & Simonson, I. (1993). Context-dependent Preferences. *Management Science*, *39*(10), 1179–1189.

Wechsler, H., Nelson, T. E., Lee, J. E., Seibring, M., Lewis, C. & Keeling, R. P. (2003). Perception and reality: a national evaluation of social norms marketing interventions to reduce college students' heavy alcohol use. *Journal of Studies on Alcohol*, *64*(4), 484–494. https://doi.org/10.15288/jsa.2003.64.484

Wedell, D. H. (1991). Distinguishing Among Models of Contextually Induced Preference Reversals. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *17*(4), 767–778. https://doi.org/10.1037/0278-7393.17.4.767

Weinmann, M., Schneider, C. & Brocke, J. vom. (2016). Digital Nudging. *Business and Information Systems Engineering*, *58*(6), 433–436. https://doi.org/10.1007/s12599-016-0453-1

Weinmann, M., Simons, A., Tietz, M. & Brocke, J. (2017). Get It before It ' s Gone ? How Limited Rewards Influence Backers ' Choices in Reward-Based Crowdfunding. *Icis*, 1–10.

9 Appendices

Appendix A: [CSV Document]

Appendix A: [Digital Nudging_RAW_DATA.csv]

This is the RAW data collected from the experiment and has been sorted by “UserId”. It has been attached as a separate document.

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Die Informationswissenschaft ist in der Schweiz noch ein relativ junger Lehr- und Forschungsbereich. International weist diese Disziplin aber vor allem im anglo-amerikanischen Bereich eine jahrzehntelange Tradition auf. Die klassischen Bezeichnungen dort sind Information Science, Library Science oder Information Studies. Die Grundfragestellung der Informationswissenschaft liegt in der Betrachtung der Rolle und des Umgangs mit Information in allen ihren Ausprägungen und Medien sowohl in Wirtschaft und Gesellschaft. Die Informationswissenschaft wird in Chur integriert betrachtet.

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Der Studiengang Informationswissenschaft wird seit 1998 als Vollzeitstudiengang in Chur angeboten und seit 2002 als Teilzeit-Studiengang in Zürich. Seit 2010 rundet der Master of Science in Business Administration das Lehrangebot ab.

Der Arbeitsbereich Informationswissenschaft vereinigt Cluster von Forschungs-, Entwicklungs- und Dienstleistungspotenzialen in unterschiedlichen Kompetenzzentren:

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Institutsleitung

Prof. Dr. Ingo Barkow
Telefon: +41 81 286 24 61
Email: ingo.barkow@fhgr.ch

Sekretariat

Telefon: +41 81 286 24 24
Fax: +41 81 286 24 00
Email: clarita.decurtins@fhgr.ch