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# The alliance between Digital Nudging & Persuasive Design

## The Complementary Nature of the Design Strategies

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# The alliance of Digital Nudging & Persuasive Design: The Complementary Nature of the Design Strategies

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ABSTRACT (MAX. 200 WORDS):
Design can steer individuals in different ways to guide them to perform an intended behavior and make certain decisions. *Persuasive design* and *digital nudging* refer to two design strategies, which both emphasize the concept of designing with intention. By guiding users through design within the process of decision-making. Digital nudging originates from the concept of *nudging* which is rarely mentioned in the online context or in the field of IS. In this case, the concept of digital nudging is a way to bridge the relationship between nudging and IS. Consequently, this study will allow digital nudging to be introduced into the area of study, through the lens of persuasive design. To support the investigation, the separate design principles regarding persuasive design and digital nudging was merged into the *intersection model*, which acted as a foundation towards the research. The research was conducted by a hybrid inspection method. The outcome of the evaluation demonstrates that persuasive design and digital nudging have the ability to complement and enrich each other, through six separate *intersection principles*.

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# 1    Introduction

There are various ways to steer people in order to make them do certain choices or change their behavior through design principles and strategies. Three examples of design strategies are persuasive design, nudging, and digital nudging, that all have the intention to guide peoples' decision-making through design. Persuasive design is widely used in the information system field (Oinas-Kukkonen & Harjumaa, 2009). Nudging is more connected to behavioral economics and social psychology (Eslambolchilar & Rogers, 2013) and digital nudging refer to nudging within the digital environment (Mirsch, Lehrer & Jung, 2017; Weinmann, Schneider & vom Brocke, 2016).

*Persuasive design systems* use psychological foundations to affect users in their decision-making. To create user engagement, designers labor with emotional and behavioral barriers in order to trigger a certain decision or behavior to occur (Gabrielsen, 2016). Persuasive design originates from the term *rhetoric,* which can be defined as one's action performed by the use of symbols with the purpose of communicating with one another (Tørning, 2008). Further, Tørning (2008) states that rhetoric and persuasive technologies are related since both share the belief of addressing persuasion in a deliberate fashion. In addition, he also states that computer-mediated persuasion is not that well-established.

Another approach that attempts to steer people to make a certain decision is *nudging* (Thaler & Sunstein, 2008). There are different approaches in how nudging can change a behavior or promote a certain outcome, for example by influencing the user with social norms (Kuhfuss et al., 2016) or choice-architecture (Avineri, 2012). Nudging implies influencing a group of people and individuals in the desired direction by giving small but definitive hints. Nudging can be related to usability, as both have the strategy of removing roadblocks and obstacles to make users reach the goal easier (Anderson, 2011; Janson & Laninge, 2017) but nudging has not been thoroughly investigated in the information system field (Mirsch, Lehrer & Jung, 2017). Moreover, individuals in this day and age make increasingly more decisions within the digital environment as nearly all decisions are being made on screens within the digital environment (Mirsch, Lehrer & Jung, 2017). Consequently, this has raised the interest to move from the concept of nudging towards *digital nudging*. Hence, digital nudging originates from the concept of nudging. According to Mirsch, Lehrer and Jung (2017) and Weinmann, Schneider and vom Brocke (2016) digital nudging is an approach that implements design elements in order to influence decision-making behavior in the digital environments.

Both persuasive design and digital nudging are based on psychological and social theories and is often used in e-commerce as well as organizational management since it requires people to make choices (Weinmann et al. 2016). As e-commerce and online shopping increase, the design elements and functionalities play an important role in order to convert visitors into paying customers (Winn & Beck, 2002). Since economy is a central objective within e-commerce, it plays a leading role within the demanding competitive market, companies are always looking for new possibilities to outperform their competitors (Felfernig et al., 2007). Persuasive design and digital nudging include both similarities and differences, in this case these are called the intersections. Persuasive design associates with attitudes and behavioral change (Segerståhl & Oinas-Kukkonen, 2007), which can be referred to an attitude-oriented design strategy. Further, digital nudging is associated with decision-making (Mirsch, Lehrer & Jung, 2017), and can be viewed as a decision-oriented design strategy.

However, both strategies emphasize an objective to contain, and not too coercive users. Thaler and Sunstein (2008) as well as Steiny (2008) suggest that nudging and persuasive design aim to steer user's attitudes, behaviors and decisions. Moreover, in order to take action and make a decision, attitudes have to be changed and be aligned with once beliefs and thoughts (Simons, Morreale & Gronbeck, 2001).

## 1.1  Problem

Mirsch, Lehrer and Jung (2017) claim that nudging has mainly been discussed outside the Information System (IS) and Human Computer Interaction (HCI) domain. Further, Weinmann, Schneider and vom Brocke (2016) mention that research concerning nudging primarily have been adopted in the offline contexts. In this case, the concept of digital nudging is a way to bridge the relationship between nudging and the field of IS. As Mirsch, Lehrer and Jung (2017) and Weinmann, Schneider and vom Brocke (2016) argues that digital nudging is a concept that is based on insights from behavioral economics, which applies user interface design elements in order to influence individual decision making in digital environments. Weinmann, Schneider and vom Brocke (2016) have earlier introduced digital nudging within HCI field through a study within the digital choice environment. Moreover, Mirsch, Lehrer and Jung (2017) also studied digital nudging from a digital environment point of view. In this case the research gap refers to the discussion introduced by Mirsch, Lehrer and Jung (2017) and Weinmann, Schneider and vom Brocke (2016) which argue that nudging is not widely mentioned in the scope of IS and HCI. Further, the identified research gap acts as inspiration for this study, and in order to address the research gap, digital nudging is introduced to the field of IS through the lens of persuasive design. Both to investigate the relation between digital nudging and persuasive design, as well as introduce within the IS field.

## 1.2  Purpose

Our one purpose is to contribute to the field of IS by applying digital nudging into the digital choice environment, with the support of persuasive design. Consequently, this study will allow digital nudging to be introduced into the area of study, which in this case is the field of IS through the lens of persuasive design. The relevance of this study is supported by the identified problem area, which has resulted in a research question that will be addressed and later on answered.

## 1.3  Research Question

*How can Digital Nudging and Persuasive Design enrich each other?*

## 1.4  Delimitation

In this paper ethical issue concerning digital nudging and persuasive design will not be taken into consideration. Further, one additional delimitation regarding persuasion is that the human to human interaction will not be addressed. Moreover, the research will not investigate the design concepts in the game environment. In this thesis, nudging refers to change human behavior, and not changing attitudes. The study will solely be based on design principles concerning primary task support.

# 2     Literature Review

## 2.1 Persuasive Design

Persuasive design is referred to *design with intent* (Tørning & Oinas-Kukkonen, 2009), as persuasion is based on intentions (Fogg, 2003). The purpose of persuasion is to modify attitudes and behaviors through technology interaction, without coercion or deception (Fogg, 2003). Fogg (2003) even mention that it is crucial to distinguish between *persuasion* and *coercion* as they sometimes get to be mistaken. Therefore, persuasion is defined as non-coercively changing an individual's attitude, behavior or both. Harjumaa and Oinas-Kukkonen (2007) argue that attitude change is one of the fundamental concepts of persuasion. Further, persuasion can be referred to a communication process in which there is an interaction between the persuader with the intent to convince and change the recipient's attitudes or behaviors (Harjumaa and Oinas-Kukkonen, 2007). This interaction is described by Harjumaa and Oinas-Kukkonen (2007) through different types of persuasion, and these are *interpersonal persuasion, computer-mediated persuasion* and *human-computer persuasion.* Fogg (2003) identifies human-computer persuasion as the study of how individuals are persuaded when interacting with computer technology, this reflects upon how persuasion will be addressed in this study. Moreover, Harjumaa and Oinas-Kukkonen (2007) argue that human-computer persuasion is different in comparison with the other two types of persuasion, as human-computer persuasion does not always explicitly determine who the persuader is. They suggest that computers do not have intentions of their own, at least as for now. Furthermore, according to Harjumaa and Oinas-Kukkonen (2007) persuasive technology refers to human-computer persuasion. Fogg (2003) suggests that persuasive technology associates with professionalism of design, as a factor in building trust between people and interfaces. Further, persuasive technology refers to technology that is specifically designed to persuade people (Fogg, 2003), in order to bring a desirable behavior and attitude change (Orji, 2014). Oinas-Kukkonen and Harjumaa (2009) suggest that information technology is never neutral, the design will always steer the user towards a certain decision or task. Presenting choices in a natural way is challenging since the design will affect the user somehow, and the users will be influenced by the intention of the designer (Mandel & Johnson 2002; Sunstein, 2015). Furthermore, persuasive design is based on the concept of persuasion, and persuasive technology acts as a construct, which makes persuasive design concrete.

### 2.1.1 Design Principles of Persuasive Design

In this section the various design principles of persuasive design will be presented, each of these is associated as design principles within the primary task support dimension, which stresses the target behaviors (Tørning & Oinas-Kukkonen, 2009). Moreover, according to Tørning and Oinas-Kukkonen (2009) and Oinas-Kukkonen and Harjumaa (2009) these design principles supports users to accomplish one's primary task.

#### 2.1.1.1 Tailoring

One of the most used principles in persuasive design is *tailoring* (Tørning & Oinas-Kukkonen, 2009), since customized information is more persuasive than generic information (Forget et al., 2008). Persuasive information can be tailored to individual characteristics with the use of computer technology, making the content and information more relevant for the users. By, customizing information toward potential needs, interests, personality or other

factors can increase the user's motivation to pay attention to it (Oinas-Kukkonen & Harjumaa, 2009). This can be seen on websites that provide different information for various user groups, for instance whether you are a member or not. The principle of tailoring information has a strong connection to the principle of *personalization* (Forget et al., 2008), which will be mention further below.

### 2.1.1.2 Tunneling

*Tunneling* is one of the most studied methods for persuasion, it supports users to reach their primary task (Tørning & Oinas-Kukkonen, 2009). Moreover, Oinas-Kukkonen & Harjumaa (2009) defines tunneling as persuasion method by using design elements to guide users through a process or experience. The researchers also claim that tunneling requires the systems to guide users within the attitude change process, by allocating support for actions in order to bring the users closer to the target behavior. One example regarding tunneling mention by Oinas-Kukkonen and Harjumaa (2009) suggest that through the presentation and visualization of appropriate information the user is supported.

### 2.1.1.3 Reduction

*Reduction* makes a target behavior easier to achieve by breaking complex activity into smaller steps and by remove those steps that are not relevant and unnecessary (Kraft, Drozd & Olsen, 2008). The greater the effort to accomplish a task, the less likely will the task be accomplished successfully because users often prefer the *path of least resistance* (Lidwell et al., 2012). The amount of information should help and support the user, it should also be focused to the specific activity or need of the user (Kraft, Drozd & Olsen, 2008). A system that reduces complex behavior into simple tasks will make it easier for users to perform the target behavior (Oinas-Kukkonen & Harjumaa, 2009). This principle is well established in e-commerce, for example Amazon.com is well known for their one-click shopping.

### 2.1.1.4 Self-monitoring

*Self-monitoring* allows users to monitor themselves, so they can modify their behavior in order to achieve their goals. Keeping track and supporting the users will make them more aware of their progress and it can trigger them to complete a predetermined outcome (Oinas-Kukkonen & Harjumaa, 2009). It can work as a reminder of ineffective or successful behavior and inspire the user to change or continue to behave in the same way (Lykke, 2009). For instance, progress bars and checklist are often used in websites with the purpose to track and monitor the status of the task completion.

### 2.1.1.5 Personalization

Another persuasive design principle is *personalization*, which is associated with the idea that a system that provides personalized content or even services has a prominent potential to persuade users (Oinas-Kukkonen & Harjumaa, 2009). Personalization has been questioned by research to intrude on individuals privacy, Volokh (2000) even ask the question if personalization jeopardize one's privacy. In this case, personalization is applied to the web, and therefore *web-personalization* is emphasized. Web-personalization can be viewed as an action that will make the experience personalized based on the user's thoughts and beliefs (Mobasher, Cooley & Srivastava, 2000). Further, the action ranges from easy to more complex, for example the action can be as simple as making the presentation of the web object more pleasing to an individual (Mobasher, Cooley & Srivastava, 2000).

### *2.1.1.6 Simulation*

The principle of *simulation* refers to a system that makes the users observe the link between the cause and effect, with consideration of users' actions and behavior (Oinas-Kukkonen & Harjumaa, 2009). Simulation can take the shape of mental simulation. Mental simulation refers to the mental representation of a set or a series of events that usually are formed as narratives or stories (Escalas, 2004). Further, the researcher mentions that when individuals simulate events or tasks, they often think about their own actual or potential behaviors. This simulation will generate behavioral stories, which the individual is the main character (Escalas, 2004). By offering simulations, the users can be convinced by presenting the cause and effect relationship that is presented in the behavioral episodes (Escalas, 2004). Further, simulations can be used in websites, showing before and after pictures (Oinas-Kukkonen & Harjumaa, 2009).

### *2.1.1.7 Rehearsal*

The design principle *rehearsal* refers to a system that provides users with the opportunity to rehearse a behavior in order to enable them to adjust their attitudes or behavior in practice (Oinas-Kukkonen & Harjumaa, 2009). Therefore, a system is required to offer means for rehearsing a target behavior to facilitate persuasion (Oinas-Kukkonen & Harjumaa, 2009). Further, the scholars provide an example of rehearsal and suggest that a flying simulator supports pilots to rehearse and practice difficult weather conditions. Rehearsal allows users to adjust their attitudes and behavior through rehearsing and practice of an action (Oinas-Kukkonen & Harjumaa, 2009).

## 2.3 Nudging

"Nudge" is a method of predictably changing a behavior without forbidding any options or significantly changing the incentives. The method is also known as choice architecture, which refers to the idea of different ways of presenting choices can have an impact on the decision-making (Thaler & Sunstein, 2008). This method is well established in the field of economics, used for steering people to make better decisions like saving for retirement, eat healthier food, or registering as an organ donor (Thaler & Sunstein, 2008). It must be possible for people to easily and cheaply avoid nudges, otherwise it is not nudging since it removes the freedom of choices (Thaler & Sunstein, 2008). Further, if the design takes away a user's ability to choose freely, it addresses the discussion whether or not nudging is unethical and manipulative. Wilkinson (2013) address this discussion in his article "Nudging and Manipulation" where he mentions that it is hard to determine if nudging is manipulative since the concept of manipulation is complex and difficult to apply. Moreover, he claims that manipulation can take various forms. Furthermore, Wilkinson (2013) argue that manipulation engages in deliberately influencing one's behaviors and intrude an individual's autonomy by violating their decision-making powers. Thaler and Sunstein (2008) define nudging as it allows individuals to deliberately leave, by allowing one to opt out. However, nudging can be manipulative according to Wilkinson, (2013) and he states that" a nudge would be manipulative only if the method prevented the target's decisions." However, the discussion if nudging is manipulative or not, will not be taken in consideration into this study.

The theory of nudging is based on the knowledge that individuals are characterized by limited rationality in their own decision making, where available information, social pressure and intuition takes over and steer the user to a certain decision. Changing what type and how information is presented can affect the individuals' choice, which means that designers or

developers can influence and steer the individual to make a certain decision (Thaler & Sunstein, 2008). Consequently, nudging is about steering people to a certain choice by reducing obstacles, so the desirable choice or behavior can be achieved (Janson & Laninge, 2017). People prefer the path of least resistance when making decisions since the greater the effort to accomplish a task, the less likely will the task be accomplished successfully (Lidwell et al., 2012). According to Weinmann, Schneider, and vom Brocke (2016), the six most common nudge principles are: *Defaults*, *Giving feedback*, *Understanding mapping*, *Incentive*, *Structured complex choices* and *Expecting Errors*. These principles are based on previous research made by Thaler and Sunstein (2008). Additionally, a seventh principle is mentioned by Lidwell, Holden, and Butler (2012), which is *Visible Goals*. These principles will be further described in section 2.5 *Design Principles of Digital Nudging*.

## 2.4 Digital Nudging

According to Mirsch, Lehrer and Jung (2017), digital nudging refers to an approach that applies user interface design elements in order to affect user's decision-making and to guide individual's behavior in digital choice environments (Weinmann, Schneider & vom Brocke, 2016). Further, digital nudging is based on insights from behavioral economics (Mirsch, Lehrer & Junget, 2017). Mirsch, Lehrer, and Jung (2017) suggest that user interface design elements can be associated with graphic design, specific content, wording or small features. Digital nudges in a digital choice environment may support designers to nudge users to the most desirable choice (Weinmann, Schneider & vom Brocke, 2016). In addition to being relatively simple and inexpensive, digital nudges can spread quickly throughout an organization to induce people to think or act differently (Weinmann, Schneider & vom Brocke, 2016). For instance, the default principle could steer customers to give tip more often by using the default setting, so the users must actively select a "no tipping" option (Weinmann, Schneider & vom Brocke, 2016). By using the default setting people are nudged to give more tip, which has been shown by an American company that raised their tip amounts using this technique (Carr, 2013). Weinmann et al. (2016, p. 434) even suggest that "user interfaces will always steer people in certain directions", and they also express that interface designers have to collect knowledge and understand the behavioral effects of the design elements in order to ensure that digital nudging does not occur in a random fashion and generate unintended effects (Weinmann, Schneider & vom Brocke, 2016). The fundamental emphasis of nudging as well as digital nudging is to facilitate decision-making through decreasing or diminishing obstacles, throughout guiding the behavior of individuals, in order to adjust human behavior into a desirable behavior (Weinmann, Schneider & vom Brocke, 2016). In this case, digital nudging originates from the concept of nudging, and refers to nudging in an online context.

### 2.4.1 Design Principles of Digital Nudging

In this section explanations of various design principles concerning digital nudging will be presented, and these principles will allow the design strategy of digital nudging to be realized. The strategy is viewed as a plan, and the design principles are applied in practice to a context and refers to applicable design features, which enables to fulfill the design strategy. The design principles concerning digital nudging refer to the *nudge principles* mentioned by Weinmann, Schneider, and vom Brocke (2016), which constitutes of six nudge principles namely: *Incentive, Mapping, Defaults, Feedback, Expecting error* and *Structure complex choices* and *Visible Goals* according to Lidwell, Holden, and Butler (2012).

### 2.4.1.1 Incentives

The design principle *incentives* were mentioned by Thaler, Sunstein, and Balz (2014), which stress the importance to ensure that designers make sure the planed incentives match up with the users. In order to make the design principle more effective, Weinmann, Schneider, and vom Brocke (2016) suggest that the incentive should be more salient. According to Thaler, Sunstein, and Balz (2014) salience can be manipulated, good design can direct individual's attention to incentives. One example concerning incentive was mentioned by Thaler, Sunstein, and Balz (2014), which explain when a home thermostat provides frequent information, the temperature will decrease. Salient incentives will provide greater behavioral effects, in comparison with just raising the cost of electricity as this will be presented rather reserved on a monthly bill (Thaler, Sunstein & Balz, 2014).

### 2.4.1.2 Feedback

The best way to help humans to improve their performance is to provide *feedback* (Thaler & Sunstein, 2008). Providing users with feedback when they are doing well or making mistakes, as this will raise their consciousness (Weinmann, Schneider & vom Brocke, 2016). An important kind of feedback is warnings when things are going wrong or about to go wrong. For example, the laptop warns the user before the battery runs out, so he or she has time to plug in the charger before the computer shuts down. By informing the user about what is going on by giving feedback, they can improve their behaviors (Thaler & Sunstein, 2008), and potentially also perform less errors.

### 2.4.1.3 Mapping

*Mapping* refers to a design principle with the objective to support and improve individuals' ability to map and then select options (Thaler, Sunstein & Balz, 2014). It is even more crucial to support mapping in complex settings, in order to evaluate and possibly take a crucial decision (Weinmann, Schneider & vom Brocke, 2016). Thaler, Sunstein, and Balz (2014) mention that one potential route to support and improve humans ability to map and select options is to make information more comprehensible. One example described through a scenario is, if an individual aim to purchase a camera it could be problematic for the user to translate megapixels into reasonable terms that help one order their preferences (Thaler, Sunstein & Balz, 2014), and possibly research their primary task. Further, they argue that mapping is a regular issue in consumer electronic decisions, and these scenarios are common in e-commerce environments.

### 2.4.1.4 Defaults

When presenting choices, there is no natural way because the design will influence the user's behavior through the design (Mandel & Johnson 2002; Sunstein 2015). All choice presentations have a *default*, even if it is often unspoken, the default option will be chosen more often than the other options (Johnson et al, 2012). According to Johnson and Goldstein (2003) the default option can save lives, in their study they changed the opt-in to opt-out, which resulted in that twice as many people become organ donors. The default option is often selected since people tend to take "the path of least resistance," and proceed in their standard habits, even when they can make improvements (Lee, Kiesler & Forlizzi, 2011). The implied popularity of the default option can also be perceived as a recommendation from the organization (Samuelson & Zeckhauser, 1988). Framing options in certain formats may unconsciously steer users with the combination with the opt-in setting (Lee, Kiesler & Forlizzi, 2011). The default is often preselected and refers to the option, which the users will

be assigned to if they do not make an active choice. However, designers must understand how they will influence users' choices and be aware of the ethical aspects of nudging (Sunstein, 2015).

### 2.4.1.5 Expecting Errors

According to Thaler, Sunstein, and Balz (2014) a well-designed system expects its users to make mistakes, and should therefore be as forgiving as possible, in order to support the fact that humans commit errors. One common mistake people execute is called a post-completion error, which was introduced by Byrne and Bovair in 1997. Post-completion error refers to the idea that once the main task is done, humans often forget things that relate to the previous steps (Thaler, Sunstein & Balz, 2014). One typical example of human error and especially post-completion error refers to human's ability to leave and forget their credit card in the ATM machine after withdrawing cash, which refers to the fundamentals concerning the task. Consequently, expecting errors have adjusted the design of several ATM machines, now the credit card is received immediately after the card is controlled (Thaler, Sunstein & Balz, 2014). In order to accomplish a desire, another step must first be performed, these ideas refer to another strategy namely *forcing function* and was presented by Norman (referenced in Thaler, Sunstein & Balz, 2014). Further, it is important to support and facilitate human failure through the design principle *expecting errors*.

### 2.4.1.6 Structured Complex Choices

According to Weinmann, Schneider, and vom Brocke (2016) *structured complex choices* refers to the principle to list and structure attributes of all the alternatives in order to let individuals make trade-offs when, and if necessary. Choices can be different concerning the level of complexity, which partially depends on the size of the accessible alternatives (Thaler, Sunstein & Balz, 2014). However, complexity can occur in many forms and do not only depends on size, but also the abstraction of the information, as well as the subtleness of the patterns within the data (Gleicher et al., 2011). Further, when the set of choice gets to large and complex Thaler, Sunstein, and Balz (2014) suggest that alternative strategies should be deployed. An alternative strategy can be *compensatory*, which refers to the idea that one attribute can compensate another (Thaler, Sunstein & Balz, 2014). Moreover, Thaler, Sunstein, and Balz (2014) suggest that tasks have to be simplified, and social science research reveals that as the choices become more complex humans are more likely to adopt simplifying strategies.

### 2.4.1.7 Visible Goals

Lidwell, Holden and Butler (2012), argue that another design principle concerning nudging refers to *visible goals*. Visible goals are viewed as the idea of present simple performance measures clearly, in order to allow people to immediately assess their performance in order to visualize their goals (Lidwell, Holden & Butler, 2012). Consequently, goals and performance status must be clearly visible for the user (Lidwell, Holden & Butler, 2012). This approach can be associated with information visualization or visualization. According to Gleicher et al. (2011), information visualization relates to comparison. Further Gershon, Eick and Card (1998) define information visualization as the process of transforming data, information and knowledge into visual representations in order to facilitate humans natural visual capabilities. Moreover, information visualization is known to improve decision-making (Speier, 2006) and according to Kerren et al. (2008) information visualization are admittedly associated with supporting users by creating value.

## 2.5 Intersection Model

The intersection of persuasive design and digital nudging refers mainly towards the "intersection-term" *change-oriented* (Figure 1), since both persuasive design and digital nudging have the same fundamental objective to influence behavioral change. However, there are also some differences within each design strategy. Persuasive design associates with attitudes and behavioral change (Segerståhl & Oinas-Kukkonen, 2007), and can be referred as an attitude-oriented design strategy. Digital nudging is traditionally associated with decision-making (Mirsch, Lehrer & Jung, 2017) and can be viewed as a decision-oriented design strategy. This distinction is illustrated within the intersection model (figure 1) by two statements. The first statement is "To change attitudes and behaviors" which is based on Fogg (2003) as well as Oinas-Kukkonen and Harjumaa, (2009). The second statement is "To steer users to targeted behaviors and decisions" that originates from Thaler and Sunstein (2008). Contrary, in order to take action and make a decision, attitudes have to be changed and be aligned with once beliefs and thoughts (Simons, Morreale & Gronbeck, 2001).

Thaler and Sunstein (2008) arguing that nudging can facilitate a behavioral change by removing obstacles, instead of trying to shove or force people in a certain direction. Consequently, the theory of nudging converges with the persuasive design principle *reduction*. The principle reduction aims to make it easier for the user to complete a certain task, by reducing complexity and hindrance (Tørning & Oinas-Kukkonen, 2009). Additionally, both strategies emphasize an objective to contain, and not to coercive users. Thaler and Sunstein (2008), as well as Steiny (2008), suggest that nudging and persuasive design aim to steer users attitudes, behaviors and decisions. This intersection is explained in the theoretical model (figure 1) and expressed as *free choices, change-oriented*, and *path of least resistance*. Persuasive design and digital nudging have similarities but also differences and these are distinguished in figure 1. Moreover, the theoretical model will introduce the intersection between persuasive design and digital nudging.
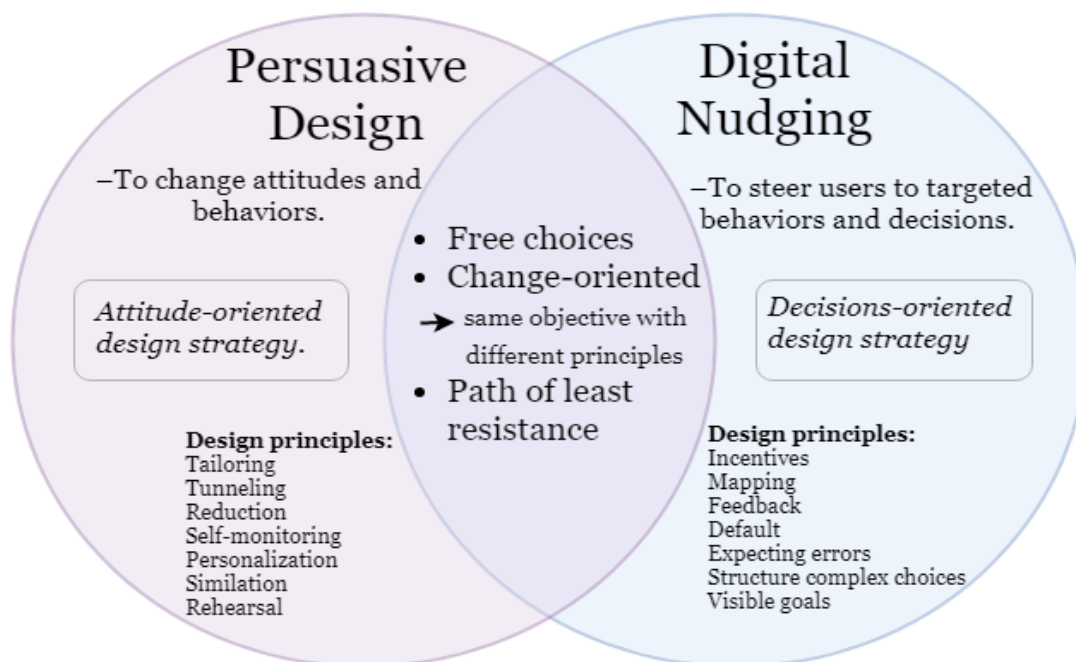


**Figure 1: Theoretical Intersection Model (based on Oinas-Kukkonen & Harjumaa, 2009 and Thaler et al., 2010).**

# 3   Methodology

## 3.1 Research strategy

The research strategy section refers to a presentation of how the study was planned to be performed. In this case, the research was performed through an evaluation methodology. Further, in this case the evaluation was investigating the two design concepts in an online setting. Conducting evaluation involves understanding what aspect to evaluate and how the evaluation should take place (Rogers, Sharp & Preece, 2011). Furthermore, when evaluating an information system, it is recommended to use a checklist (Oinas-Kukkonen & Harjumaa, 2009). In this case, the checklist refers to table 1 and table 2 which introduces a list of operationalized design principles. Further, the design principles were based on principles that are classified as primary task support. These principles are presented among others by Oinas-Kukkonen and Harjumaa (2009). The design principles concerning digital nudging were introduced by Thaler, Sunstein, and Balz (2014) and Lidwell, Holden, and Butler (2012). Moreover, applying a checklist to the selected websites made it was possible to systematically look at how the design principles were applied, and investigate how they might influence the behavior of users (Kelders et al., 2012). The aim of the study is to the bridge the gap between persuasive design and digital nudging by investigating and analyzing how digital nudging and persuasive design takes place within the field of e-commerce.

The evaluation approach was supported through the utilization of *usability testing*. This research method was chosen since it gave the opportunity to investigate the relation between persuasive design and digital nudging. Usability testing was supported by the design principles in order to act as a guideline for the study. Moreover, this allowed us to investigate how the strategies have the ability to enrich each other, as the evaluation of the usability revealed how the various design principles were featured. Usability testing is the most effective way to assess a website's usability (Battleson, Booth & Weintrop, 2001). It is interesting to observe the usability as the design focus has shifted from only emphasizing a product functionality towards a user-centralized view, where the user needs and ease of use, has become a part of interface development (Battleson, Booth & Weintrop, 2001). Further, usability is often mentioned in relation with design, and Nielsen (2000) mention web usability as "The practice of simplicity ". Consequently, this argument is aligned with the objective of digital nudging to nudge users through designing *the path of least resistance*, as well as the design principles of persuasive design, which persuade users through the concept of simplification. Oinas-Kukkonen and Harjumaa (2009) argue that simplicity is a part of persuasive system design development. However, usability testing refers to a set of methods for evaluating web usability (Battleson, Booth & Weintrop, 2001). In this research, we observed how various design principles took place in the context of a website. Through the identification of the design principles we compared and found the intersection of the two separate design strategies. According to Nielsen (1994), user-testing is a well-known, and popular method for collecting empirical data. With this in mind, we decided that usability testing was the most appropriate research methodology since it invites users or evaluators to test the usability.

Worth mentioning is that this study takes distance from a benchmarking approach, as it does not aim to study the comparison between different e-commerce websites. Rather, the study was performed through a heuristic evaluation and cognitive walkthrough, since the purpose

of the research was to investigate the intersection between persuasive design and digital nudging, and not benchmark various websites.

## 3.2 Selection of E-Commerce Websites

The selection of the research object contained two e-commerce websites, in order to evaluate the design principles and address how the two different design concepts were used in practice. In favor of gathering more data in the evaluating of the design concepts, this study utilized two websites instead of only one. The aim of the research methodology was to find correlations between how the design principles were implemented and collect empirical data. We state that evaluating the principles in two websites with similar content, industry, vision and target group add more value to this study. Therefore, the websites Zalando and Asos were selected based on these criteria's, both are well established and is dependent on their e-commerce platform. As both firms are established e-commerce players, they do not have a wide range of physical stores at the moment. This implies that the companies do not utilize oral persuasion or nudging through face to face engagements or conversations. Instead, they communicate via their websites. As a deduction both Zalando and Asos rely on their separate e-commerce platform.

### 3.2.1 Background of Zalando

Zalando is a company from Germany, focusing on e-commerce by selling fashion products in fourteen countries where the firm operates in. It maintains a cross-platform online store, and by 2016 the company had more than 1600 IT developers (Zalando, 2016). Besides the investment in the technology and development of the platform, their competitive advantage comes through their free shipping, return and payment policies.

### 3.2.2 Background of Asos

The intention of Asos is selling products in fashion, their primary target group is young adults (Asos, 2017). It is a global online retailer with the headquarter in England, offering womenswear, menswear, footwear, accessories, jewelry and beauty products. According to their annual report for 2017, the revenue was just over 1,900 billion British pounds the past year (Asos, 2017).

## 3.3 Research Methodology

The research was introduced by the identified problem area that also acts as a foundation for the research question. In order to support the research question, appropriate scientific literature was introduced. According to Bhattacherjee (2012), this initial step refers to the *exploration*, which sets the foundation of the study.

At first, the design principles were identified in the context of a set of e-commerce websites, in order to acts as guidelines for the investigation. In order to perform the evaluation, the design principles were operationalized. The operationalization of the design principles can be found in table 1, which is introduced in section 3.4 *Operationalization of the Design Principles*. According to Bhattacherjee (2012) operationalization refers to the process of developing specific measures for abstract theoretical constructs. Consequently, the operationalization makes the various design principles into measurable constructors for the study.

Before the actual testing started, we carried out preparations. In this case, the preparations referred to *discussion and planning* of how the testing was supposed to be performed. The preparation was done to ensure that the data collection secured a level of consistency, as well as to provide guidance to the evaluators during the usability testing. Further, when the preparations were secured, there was an agreement between the evaluators when the actual testing began.

Moreover, the operationalization and preparation refer to the second step of the research process, which is called *research design* according to Bhattacherjee (2012). After the research design and all the planning was done the third step of the research process was introduced namely *research execution*, which in this case refers to usability testing, and data analysis (Bhattacherjee, 2012). Usability testing is viewed as the data collection method, the data analysis refers to analyzing the collected data in order to make sense of it, as well as mine value from the evaluation.

The start of the research execution referred to the appliance of each principle. They were evaluated separately to observe how they acted and if they were implemented. Further, table 1 worked as a checklist for the evaluators during the evaluation. The usability testing process was carried out by allowing the evaluators to take notes and use the separate operationalized design principles as guidance in order to identify the principles presence. Consequently, the design principles were evaluated independently, and the evaluation was divided into two different sessions. The design principles associated with persuasive design were first investigated and then in the second session, digital nudging was observed. Further, the operationalization of the design principles acted as a guideline for the evaluation, however, it did not replicate a forced process of the evaluation. Rather table 1 acted as a guide, and not as a strict way of actions. Further, the tasks were not strictly assigned to a specific selection of product, and therefore there were some deviations as well as iterations during the evaluation. Some design principles acted in various ways and were challenging to identify the first time, and in some cases they were not even present. In order to secure more collected data and eliminate possible deviation concerning the data collection, the two evaluators performed the evaluation individually. Later, the collected data from each evaluator was analyzed and compared, in order to identify how the design principles were emphasized. The data were cross-checked by the researchers, and the results were analyzed and discussed. The comparison of the two design strategies introduced both similarities and differences, which revealed how the intersection between the two strategies was played out. During the evaluation a set of screenshots were taken in order to facilitate the sensemaking, as well as to secure the validity of the evaluation. Moreover, the evaluation was performed in a natural setting and not in a controlled environment, to make sure that the design was not affected by a monitored setting. Consequently, a natural setting adds more value as the testing environment reflect upon reality, and a real user's actual behavior. To the contrary of studies performed in a natural setting are laboratory experiments. Meltzoff (1998, referenced in Scandura & Williams, 2000) argues that laboratory experiments bring evaluators into an artificial setting for the purpose of the research. Further, McGrath (1981) mentions that laboratory experiments offer maximize precision in measurement of behavior, however the trade-offs are low validity and low realism of context. The benefits of validity will be discussed in section *3.6 Research Validity*.

In this investigation the evaluator referred to the scholars themselves, which refers to one of the three usability testing approaches, the *inspection method*. This is also mentioned as

*usability inspection* by Nielsen (1994) and it is a usability method that does not include real users, instead specialists serve as testers (Battleson, Booth & Weintrop, 2001). Traditionally inspection is utilized in order to identify usability problems in a design (Nielsen, 1994). However, identifying problems is not the essential focus of the study, rather this research aims to identify and compare the two design strategies to find the bridge between persuasive design and digital nudging. Bhattacherjee (2012) states that research must carefully choose the sampling population, which they aim to collect data from. The main reason why usability inspection was selected for this research, was based on research made by Jeffries and Desurvire (1992). They claim that non-experts could lead to results that were unreliable since they did not know what to look for. Consequently, usability inspection was emphasized since we argue that we are the experts in these design strategies, within this specific context. The specific context refers in this case to the comparison and intersection of persuasive design and digital nudging. The reason why this research did not adopt external specialist, is mainly because of the design concept of digital nudging. Nudging is often investigated in an offline environment (Weinmann, Schneider & vom Brocke, 2016) and it is therefore not well established in the field of information systems, which makes it hard to find externals with this knowledge. Experts or specialists are defined as "a person who devotes himself or herself to one subject or to one particular branch of a subject "(Dictionary, 2018). Bhattacherjee (2012) mention that a researcher can be used as an instrument within a research study. However, when the researcher is used as instruments, researchers must be fully aware of their personal biases and preconceptions (Bhattacherjee, 2012).

This study was inspired by a *hybrid* inspection methodology. The hybrid inspection method refers to *heuristic evaluation* and *cognitive walkthrough*, both allow specialists to put themselves in the place of a user in order to perform various tasks (Battleson, Booth & Weintrop, 2001). According to Battleson, Booth, and Weintrop, 2001, cognitive walkthrough refers to experts that attempts to perform a traditional user task within a determined interface. Further, they suggest that a heuristic evaluation is defined as usability testing inspection method, where a specialist checks element regarding an interface in comparison with a list of heuristics or design principles. Further, the cognitive walkthrough has been demonstrated to be an effective inspection method that can be applied by both specialist and novice evaluators (Hollingsed & Novick, 2007). Another argument for the selected methodology, more precise the hybrid inspection is that there is a correlation between the design principles that are addressed in the heuristic evaluation, and the tasks that are performed in the cognitive walkthrough. Since the design principles should guide designers when develops an interface, we argue that the true value of the design principles was to study them by performing an actual task. This stress how the design principles acted in a specific interface and how the principles influence users towards a targeted behavior. Additionally, the design principles of persuasive design originate from the support dimension of primary task and the cognitive walkthrough emphasize a methodology that favors an evaluator to perform a specific task there is a correlation between the principles, actual tasks and the cognitive walkthrough methodology. After the evaluation was executed, the collected data was cross-checked, analyzed and later on presented. The collected data acted as the core of this paper's contribution to the scientific and practical field of IS.

### 3.3.1 Methodology Selection

In order to support the overview of the research methodology selection, a model over the selection was created and presented below in figure 2. Every construct was carefully picked

out, and separate motivations and arguments behind the selection of the methodology can be found directly above in section *3.3 Research Methodology*.



**Figure 2: Derivation Model of the Methodology Selection**

## 3.4 Operationalization of the Design Principles

Before the evaluation could be executed the design principles have to be operationalized, which means there is a need to identify specific measures for each principle (Bhattacherjee, 2012). The operationalization acted and provided an understructure to the evaluators to avoid misjudgments and collect data with control (Recker, 2013). The control of the data collection resulted in that the system was measured in a more precise manner. The operationalization defines how the design principle will be measured (Recker, 2013). The operationalization is presented in table 1 and 2 below. These tables provide separate descriptions of the operationalization, as well as individual explanations of how the various design principles will be evaluated. Further, the tables also describe how the design principles were evaluated through a certain task. The purpose of table 1 and 2, is to support the evaluation of the design principles.

**Table 1: Operationalization of the design principles concerning Persuasive Design**

| Design Principles of Persuasive Design | Operationalization | Task |
|---|---|---|
| Reduction | Does the website reduce obstacles for the users to perform the target behavior? | Select a certain product, add it in the shopping cart and continue the purchasing process until the last step. |
| Tunneling | Does the website guide the users, to reach their primary task? By giving the user sufficient support. | Select a certain product, add it in the shopping cart and continue the purchasing process until the last step |
| Tailoring | Does the website show different information for different users groups? | Sign in and see if you have any personalized content such as recommendations, and personal favorites. |
| Simulation | Does the website allow the user to observe the possible outcome of the actions/behavior? | Select a certain product, read the information and inspect the pictures in order to identify a possible outcome of the product. |
| Rehearsal | Does the website support the user to redo a task? | Add a certain product in the shopping cart, remove the product or change to |

| | | another size, and go back to the previous page. |
|---|---|---|
| Self-monitoring | Does the website support the users to track their progress, for instance by using progress bars? | Select a certain product, add it in the shopping cart and continue the purchasing process until the last step. |
| Personalization | Does the website have personalized information and recommendations? | Sign in and see if you have any personalized content such as recommendations, and personal favorites. |

**Table 2: Operationalization of the design principles concerning Digital Nudging**

| Design Principles of Digital Nudging | Operationalization | Task |
|---|---|---|
| Incentives | Does the website motivate the users to a targeted behavior by using discounts and offers? | Select a certain product, add it in the shopping cart and continue the purchasing process until the last step. |
| Feedback | Does the website provide feedback to the user? | Select a certain product, add it in the shopping cart and continue the purchasing process until the last step. |
| Mapping | Does the website facilitate sensemaking through product information? In addition, do the website's design facilitate sensemaking? | Select a certain product, read the information and inspect the pictures in order to identify a possible outcome of the product. |
| Defaults | Does the website use default buttons/checkbox that is already marked? | Select a certain product, add it in the shopping cart and continue the purchasing process until the last step. |
| Expecting Errors | Does the website help users to avoid and minimize errors and redo a task? | Add a certain product in the shopping cart, remove the product or change to another size, and go back to the previous page. |
| Structured Complex Choices | Does the website emphasize filtering in order to customize a selection? | Select a certain product and customize your selection by sorting the product based on various attributes. |
| Visible Goals | Does the website visualize performance through progress bars? | Select a certain product, read the information and inspect the pictures in order to identify a possible outcome of the product. |

## 3.5 Research Analysis

Each design principle was investigated separately by the parameters "existence" and "how it exists". The collected data from the evaluation consisted of data, which can be classified as both quantitative and qualitative data. Moreover, if the design principle exists or not represents the quantitative data and the text about how it took place, represents qualitative data. Further, to find patterns and correlations between the two design strategies, the qualitative data were analyzed by the open coding technique. Open coding is a process which aims to identify concepts or key ideas, in order to categorize them (Bhattacherjee, 2012; Petrie & Power, 2012). In the technique open coding, it is natural to categorize and connect concepts from different strategies (Petrie & Power, 2012; Rogers, Sharp & Preece, 2011). The aim of this study is to investigate if there is a link between two design concepts, and open coding was beneficial since it identified similar concepts, which could belong to a similar category. When analyzing and grouping the data, objectivity is needed to maintain data accuracy and avoid misguidance (Rogers, Sharp & Preece, 2011). This coding technique is called open, which means that the researchers must stay open and actively search for new insights that are relevant to the study (Bhattacherjee, 2012). The analyzed data will be presented in the results and discussion chapters.

## 3.6 Validity and Reliability

To achieve reliability, the study must support consistency (Bhattacherjee, 2012) this was done by engaging the evaluators with the operationalization guidelines, which emphasized the same specific tasks. The consistency or reliability of a method is referred to how well the study produces the same results on separate occasions and under the same circumstances (Rogers, Sharp & Preece, 2011). The evaluation of the two different concepts was evaluated in separate sessions in order to minimize the anchoring effect. The anchoring effect is when a person gets affected by previous information or past events, which may lead to issues regarding misguidance (Hammond, Keeney & Raiffa, 1998). It is hard to avoid being trapped in the anchoring effect and to not get affected by other ideas, but it can be minimized (Hammond, Keeney & Raiffa, 1998). To decrease the chance of being influenced by the other evaluator, they collected data individually. In the perspective of interaction design, is it often problematic to find non-objectively characteristics to measure, because users have different opinions and will experience design in different ways (Löwgren, 2002). All predictions from the evaluators were compared beforehand to determine whether they interpreted the operationalization guide in the same way in order to achieve replicability. HCI methods require a common structure to support replicable validation (Lavery, Cockton & Atkinson, 1997), in this case the common structure refers to the operationalization tables. According to Löwgren (2002) it is more reliable to measure design in a broader concept, in this case the research is measured in a broader sense, through the design principles. It is challenging to measure design in an objective manner, and Gummesson (2003) even states that most research is interpretive. Moreover, in order to secure the validity, screenshots were taken to capture and reflect upon the actual state of the design at the time the research was performed. According to Bhattacherjee (2012) validity should ideally be assessed by utilizing both empirical and theoretical approaches. In this study, validity is assured by emphasizing both theoretical and empirical approaches. The theoretical approach was emphasized by the heuristic evaluation method, as the design principles originate from previous studies and literature. The empirical approach was introduced in the cognitive walkthrough as empirical data were collected through the performance of actual tasks.

## 3.7 Research Ethics

Vetenskapsrådet (2017) mention that good research primarily depends on trust and this is built upon various requirements to conduct a proper research. Further, these requirements are based on society's general ethical norms and values (Vetenskapsrådet, 2017). Scholars do also have obligations to the scientific community to present both positive, unexpected, and negative findings (Bhattacherjee, 2012; Vetenskapsrådet, 2017), in order to stay truthful. The importance to be truthful was acknowledge, as the collected data that are presented regardless of if it is negative and positive. Consequently, this study will engage and emphasize openness. Moreover, research has an important position in today's society and there is great expectation of it (Vetenskapsrådet, 2017). Therefore, they suggest the importance for research to be aware and take ethical requirements into consideration. They also mention the importance for researcher to be detached from external influences, manipulation, as well as from private or other stakeholders interests. Bhattacherjee (2012) argues that research ethics is vital, however, science is not a stranger to manipulation, as science has been manipulated in unethical ways by researchers and organizations in favor of their own private agenda. These requirements were acknowledged in this study. The study does not engage in unethical manipulation or was influenced by external interests, as it did not emphasize a hidden agenda. Rather the study engages in theoretical and practical implication for designers, which in this case refers to the target group.

## 3.8 Methodology Overview

In this last section of chapter 3, the methodology overview is presented in order to facilitate the sensemaking of the various part of the study. This overview will be introduced by the model below (figure 3) which show the relation between the different steps of the methodology. It also presents the progress of the research process. Consequently, figure 3 acts as a summary of the research methodology.
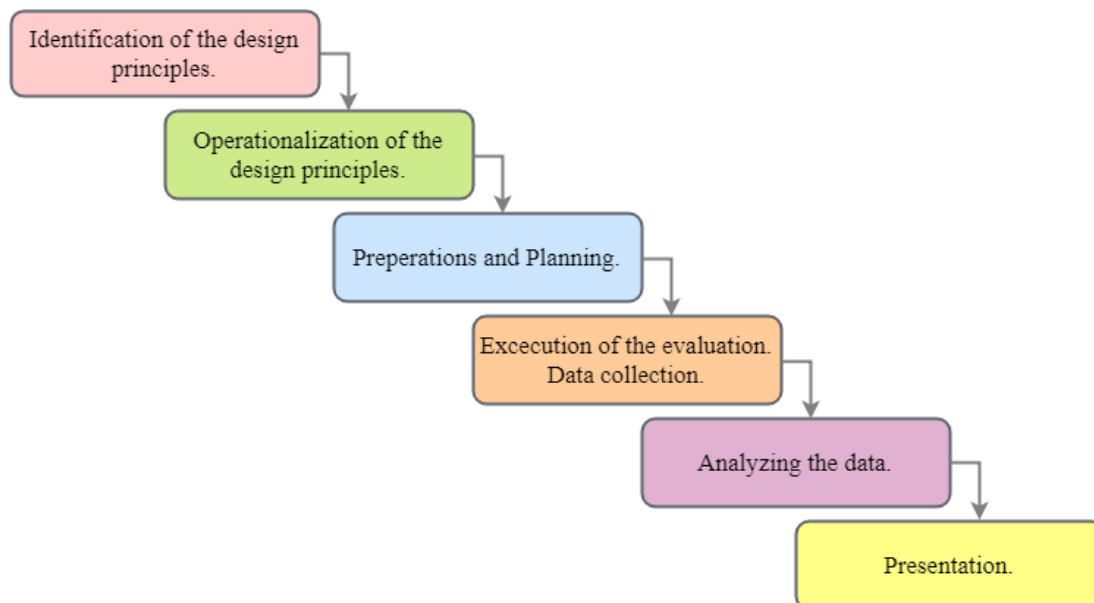


**Figure 3: Model of the Research Methodology Progress**

# 4    Results

## 4.1 Descriptions of the Results

The data collection represents a complete result in the sense that each of the design principles was identified in one way or another. Since the aim of the study was to evaluate the relation between the design strategies and persuasive design, and not the separate websites. Therefore, the data collection was introduced regardless of which website they were identified. Bhattacherjee (2012) defines the unit of analysis as either the person, collective or object that is targeted during the investigation. In this case, the unit of analysis that was targeted refers to the design strategies, digital nudging and persuasive design. Further, the research results were analyzed to secure a structured data collection. In this study, the results were structured through the utilization of two separate tables (table 3 and 4). Each table presents the various design principles, and the tables are distinguished from one another based on the separate design strategies. Consequently, table 3 refers to the evaluation results concerning persuasive design and table 4 concerns digital nudging. The fundamental part of this investigation was to find real cases that, which revealed how the principles actually unfolded. Therefore, table 3 and table 4 below contain a short description of how they exist within the settings of respective e-commerce when performing a task. Furthermore, each separate description is supported with screenshots, which can be found in the appendix *7.3 Screenshots for Persuasive Design and 7.4 Screenshots for Digital Nudging*.

## 4.2 Persuasive Design Results

**Table 3: Evaluation results on the Persuasive Design Principles**

| Persuasive design principles | How it exists (short description) |
|---|---|
| Reduction | Both websites collect data about the users, which makes it easier for the users to become paying customers. The user information makes it easier for users to find products and forms are already pre-filled in the checkout process. |
| Tunneling | Both websites create the tunneling effect by limiting and removing the header in the checkout process, inducing the user to feel like they only can go forward in the process. |
| Tailoring | The were some separation between members and non-members, as a member you get the extra feature of saving products, consequently was this principle only identified at one of the websites. Otherwise do these websites offering the same products and prices, independent if the user is a member or not. |
| Simulation | The websites provide product information, pictures, and videos with the purpose to simulate the possible outcome of what the user can expect of their action of buying a product. |
| Rehearsal | Rehearsal was supported and implemented at both websites, to a high degree. The companies supported this design principle in order to assist the users to redo or adjust a task, for instance by letting them remove and adjust their shopping cart. |

| Self-monitoring | In this case existed the principle by letting the user to monitoring and track the progress towards a target task, by dint of progress bars. The progress bars display how many steps the user has left until the purchasing process is completed. |
| --- | --- |
| Personalization | Both websites collect data through cookies, provides personalized recommendations and content. Based on the user information, recommended products the user might like are presented. Furthermore, the users' name is presented when the users sign in. |

## 4.3 Digital Nudging Results

**Table 4: Evaluation results on the Digital Nudging Design Principles**

| **Digital nudging principles** | **How it exists** (short description) |
| --- | --- |
| Defaults | The design principle was emphasized through pre-filled boxes and rows, which allowed the task to be performed more effortless. |
| Feedback | Feedback was presented to the user through popup windows, feedback messages that were present both via numbers, text. Moreover, colors were used to attract the users' attention in order to give feedback on one's actions. |
| Mapping | The existence of the design principle mapping was utilized through supportive data and information such as product information, pictures, and entire look/styles suggestions. |
| Incentives | In order to motivate the users, incentives were applied, and are unfolded through providing offers/deals, inspirations throughout styles, and current trends. Further, to a certain degree bragging was emphasized to motivate a user's behavior. |
| Expecting Errors | In these cases, both settings were forgiving and emphasized the belief that a user may do wrong. This was represented by error messages and various design elements that allowed a user to redo or adjust a certain task. This was shaped and presented to the users by symbols and options to either redo the task and start from the beginning, or through drop-down menus which allowed a user to either change color or size of an item. |
| Structured complex choices | The design principle structured complex choices are framed through segmentation opportunities by engaging a user to filter and categorize a user's individual selections. |
| Visible Goals | Goal visibility is present via a progress bar that informs the user how far along they are in their way to reach their primary task. |

## 4.4 Intersection Framework

Through the evaluation, it emerged that various design principles appeared in the same way even though they belonged to the different concepts. The insights about the link between the design principles led to a process of mapping and merging them into a framework (intersection framework). The framework is introduced in table 5 below, refers to the complementing merge of the design principles regarding the two investigated design strategies persuasive design and digital nudging. The persuasive design principles are listed randomly from one to seven, and the design principles regarding digital nudging are listed ranging from A to G. The mapping of the intersections is represented via a separate column within the table, named *Complementary Intersection*. Further, this column is presented in order to explain, as well as support the relation between persuasive design and digital nudging. These design principles are called the *intersection principles*, as these support the idea that there is an intersection between persuasive design and digital nudging. The inspiration behind the naming of the intersection principles was supported by the common aspect of the design principles that united the intersection. Further, the intersection is not only supported by combined design principles from both strategies, rather in cases where the intersection between persuasive design and digital nudging were not supported they were represented separately. This concerns the design principle *incentives,* which is represented individually, as well as *user-centered* which is supported only by the persuasive design principles *tailoring* and *personalization*. Motivations from the intersection design principles are found in the discussion, under section *5.1 Discussion of the Intersection*. This merge is based on the result of the evaluation and complemented by insights from previous research. With this merge, interaction designers can infuse the concepts into categories, making it easier for designers to get an overview and understand how to design with intention. Furthermore, the merge is mentioned in the *discussion*.

**Table 5: Intersection Framework**

| Design Strategies | Persuasive Design | Complementary Intersection | Digital Nudging |
|---|---|---|---|
| Design principles | 1. Reduction<br>2. Tunneling<br>3. Self-monitoring<br>4. Simulation<br>5. Rehearsal<br>6. Tailoring<br>7. Personalization | *Simplification* (1–2–A–B)<br>*Awareness* (3–C–D)<br>*Consequences* (4–G)<br>*Forgiving* (5–E)<br>*User-centered* (6–7)<br>*Incentives* (F) | A. Structure Complex Choices<br>B. Default<br>C. Feedback<br>D. Visible Goals<br>E. Human Error<br>F. Incentives<br>G. Mapping |

# 5    Discussion

## 5.1 Discussion of the Intersection

The evaluation revealed that there is a relation between the design strategies, an intersection was recognized. This intersection was acknowledged as there were relations and similarities between the design principles. Further, these relations were introduced in table 5 through six separate intersection principles: *Simplification*, *Awareness*, *Consequences*, *Forgiving*, *User-centered*, and *Incentives*. The intersection of the design principles supports the relation between persuasive design and digital nudging. The next sections will discuss and motivate how the intersection principles were paired. Further, the following sections will address how and why the framework arose.

### 5.1.1 Simplification

Regarding the intersection between *reduction, defaults, structure complex choices* and *tunneling,* these design principles wishes to steer users into a desirable behavior by simplifying the process of behavioral change. In this case, the behavioral change refers to when a customer makes a purchase at their e-commerce. Consequently, the design principles try to steer users by diminishing or even remove hurdles along the decision-making process. Reduction refers to reducing complex behavior (Oinas-Kukkonen & Harjumaa, 2009) and structure complex choices refer to support complex decision-making by applying an alternative strategy (Weinmann, Schneider & vom Brocke, 2016). Further, the design principles defaults facilitate and adjust behavioral change through providing preselecting options by setting default options (Weinmann, Schneider & vom Brocke, 2016). Furthermore, tunneling supports users to reach their primary task, by guiding users throughout the attitude change process with the support of allocating means for action toward the users goals (Oinas-Kukkonen & Harjumaa, 2009). All of these principles are valuable for the e-commerce industry, removing obstacles for the users in order to simplify the process of purchases products. In addition, this means that users must find what they are looking for, therefore design has to be supportive by offering options for structure and filtering out irrelevant products. The checkout process is where the user becomes a paying customer, and it includes options and inputting of information. However, to minimize the users efforts the websites are using default options, which refers to the preselected alternative so there was no need to type in customer information, only details about the order to specify. The design principles reduction was also supported, by introducing pre-filled rows with stored customer information, as well as stored data about previous user actions. The tunneling effect was adopted in both sites to reduce unnecessary information to make it easier for the user to keep focus and complete their primary task.

### 5.1.2 Awareness

There is a possibility to merge *self-monitoring*, *feedback*, and *visible goals* in one common intersection principles, namely awareness. Feedback supports users by raising consciousness, which supports and improve performance (Weinmann, Schneider & vom Brocke, 2016). Further, self-monitoring makes users more aware of their progress (Oinas-Kukkonen & Harjumaa, 2009), which relates to the principle visible goals. Both self-monitoring and visible goals are often illustrated through a progress bar, in the evaluated e-commerce platforms were the purchasing process supported by a progress bar to show the user how far

they are in the process. This can steer and motivate the user to continue the process since it provides real-time feedback about the user's progress. According to Thaler and Sunstein (2008), feedback is the best way to help users to improve their performance. Furthermore, providing users with feedback make them understand when they are doing well or making mistakes, by raising their awareness (Weinmann, Schneider & vom Brocke, 2016). Moreover, their relationship suggests that feedback may be provided in various ways to raise the user's awareness, and in this case self-monitoring and visible goals refer to two possible ways to provide feedback. However, feedback was also outplayed in this study by other design elements such as feedback messages, or even through symbols. Consequently, we argue that feedback is the general idea of awareness, and self-monitoring as well as visible goals represent potential options to give feedback towards a user.

### 5.1.3 Consequences

There was a link between the two principles simulation and mapping, the keyword of the link between them is consequences. Simulation is a method that is designed to identify the link between the cause and effect relationship (Oinas-Kukkonen & Harjumaa, 2009). According to Thaler, Sunstein, and Balz (2014) mapping refers to the idea to support the users ability to map the relation between a decision and its possible effects. Further, they argue that mapping is more effective if the content about various options is comprehensible to a greater extent. In practice, these principles were discovered in the product information of the two e-commerce platforms were the goal was to facilitate sensemaking by providing detailed information about the products. The fact that these two principles could be linked together refers to their existence, as they were presented in an equivalent way. Both allow the customer to understand what they are buying and what the outcome of the product might be. Hence, simulation and mapping were merged into one common intersection model *consequences*.

### 5.1.4 Forgiving

The design principle rehearsal can be enriched by the design principle expecting error as both principles emphasize the concept of human error and the fact that users make mistakes. According to Thaler, Sunstein, and Balz (2014) a system should therefore be *forgiving*. Rehearsal is forgiving as it refers to the idea to allow users to rehearse and adjust by practicing a behavior in order to support behavioral change (Oinas-Kukkonen & Harjumaa, 2009). Further, expecting error originates from the idea of expecting human errors (Thaler, Sunstein & Balz, 2014). Both rehearsal and expecting errors support users when errors occur. After the evaluation was conducted and the results from the two different evaluators were submitted, it was clear that these principles were implemented likewise. To illustrate, both websites support the user to redo a task or adjust an already achieved task, by removing products, change the size and the quantity.

### 5.1.5 User-centered

Tailoring is a design principle that requires a system to tailor information based on the user's potential needs and interests (Oinas-Kukkonen & Harjumaa, 2009). Further, personalization is defined as the idea of providing personalized content (Oinas-Kukkonen & Harjumaa, 2009). Hence, the design principles aim to adjust attitudes and behavior through supportive design in favor of the users. Moreover, these principles concentrate on the user and provide relevant information. In practice this is utilized by collecting user information and then

present relevant content for different users and user groups. Presenting products that the user clicked on before and recommend similar products is a common tool in many e-commerce platforms.

### 5.1.6 Incentives

The evaluation shows that *incentives* still can be viewed as a separate design principle as the collected data could not identify a strong relationship with any of the other design principles. Indeed, the design principle incentives do provide information, which stimulates awareness, however we argue that this have another agenda in relation to self-monitoring, feedback and visible goals. Since incentives wish to nudge users through the utilization of awareness with the emphasizes to offer users deals, inspire users through prominent pictures or messages informing users what the latest trends or recommended style suggestion, which in some cases even are personalized. In order to make incentives more effective they should be silent to get the user's attention Thaler, Sunstein & Balz (2014). Incentives is a design principle that aims to nudge a user by motivating one to perform a target behavior (Thaler, Sunstein & Balz, 2014). However, incentives do not have a clear relation with personalization and/or tailoring with the same argument that incentives have another agenda. Contrary to self-monitoring, feedback, visible goals, personalization and tailoring, incentives are designed in a more hortative and less innocent manner.

## 5.2 Enrichment, NOT exclusion

As there is a degree of relation between persuasive design and digital nudging there is also a possibility for an intersection. Worth mentioning is that this research supports the idea that the two design strategies have the opportunity to enrich each other. As the design strategies as well as their emphasized design principles encompass a complementary nature and not an excluding. Further, their similarities represent the intersection, and their differences represent the complementary nature of the design strategies. Consequently, the relation is not only vigorous because of their similarities, rather the differences emphasize a stronger intersection, as one's weakest spot may be the others primary source of power, and this engage a complementary relation.

In this case the design strategy digital nudging is fundamental objective to guide and influence a user's behavior in a digital choice environment (Mirsch, Lehrer & Jung, 2017; Weinmann, Schneider & vom Brocke, 2016). Further, persuasive design refers to a design strategy with an objective to modify attitudes to influence one's behavior (Fogg, 2003). Consequently, both persuasive design and digital nudging strive toward the common objective to change human behavior, but with different approaches and design principles. Their separate descriptions reveal that there are both similarities as well as some differences between these two. As persuasive design is fundamentally attitude-oriented, and digital nudging is decision-oriented they have a great possibility to enrich each other. Our investigation suggests that their similarities identify an intersection, and their differences support a complementary nature. The two separate design principles can enrich one another by complementing each other. They complement each other by their similarities as well as by their differences. The complementary nature between the design strategies depends on that they separately have different approaches in order to adjust users online actions. The complementary nature secure that the relation between the two design strategies in fact enrich each other by both complementing ones another's strength and weaknesses. Persuasive design encompasses attitudes, and digital nudging does not. In contrary to digital nudging

emphasizes decisions, which is not as central concerning persuasive design.  In order to act and make a decision, one's attitude must change (Simons, Morreale & Gronbeck, 2001). This emphasizes the importance of the two and shows that they a complement to one another, and they do not act as a substitute for one another. As one strategy encompasses what the other might needs.

## 5.3 Two becomes One

In order to support designers when developing interfaces, a certain degree of awareness is important. Support regarding design can facilitate through digital software applications, however in this case the awareness is fundamental, and this is supported through knowledge as well as a helping hand of guidelines. Moreover, in this case the helping hand is distributed through the *intersection framework*. The intersection framework aims to both explain how the relationship between the two design strategies is framed, as well as a guideline for designers, in order to support them during the design process. Further, another aspect concerning the intersection framework is that it allows designers to confide in one common framework, the *intersection* framework, instead of two separate design strategies. This framework will enable designers to speak the same "design language", with the same terms and design principles. Consequently, designers will understand each other, as well as be secure as they are being guided by one broad but specific design strategy concerning designing with intention. Moreover, this is important in order to avoid steering users randomly and unintended. Since unintended steering may lead to unexpected consequences, which can result in negative outcomes for the user as well as for the designer responsible for the design of the interface.

Finally, persuasive design and digital nudging have the ability to complement and enrich one another through the power of their strengths, weaknesses, similarities, and dissimilarities. Designers can be engaged in designing with intent, which secures potential outcomes. However, worth mentioning is that neither of the two design strategies has been replaced of one another, they are enriched by each other and supports design that guides as well as steer users, in a deliberate fashion, with no intent to force a user into a human behavior and decision.

# 6    Conclusions

The aim of this study is to introduce digital nudging into the field of information systems, through the lens of persuasive design, and investigate if the design concepts can enrich each other. Since digital nudging originates from the concept of nudging, which has traditionally flourish within the field of economics. Consequently, this research attempts to emphasize the intersection between digital nudging and persuasive design by addressing the research question: *How can Digital Nudging and Persuasive Design enrich each other?* (as this will enable digital nudging to become more familiar within the IS field. The research claims that there is a link between persuasive design and digital nudging as some of the design principles, shown to be implemented in a similar manner. The discovered link between the principles was mapped in order to seek patterns and further relationships as well as differences between the two design concepts. In order to facilitate sensemaking, the mapped design principles are demonstrated through an intersection framework was the relationships were further described and motivated. The evaluation identified the relationship between the design concepts in practice, and the research results were proven to be in line with the previous literature research. Further, the identified relationship pioneered the foundation of the intersection framework. The fundamental benefit of merging the two concepts refers to the fact that they can enrich one another by complementing each other's strengths and weaknesses. Since digital nudging focuses on behavior change while persuasive design also applies to attitude change. This framework leads to a more comprehensive way that covers more aspects of behavior design, which refers to the foundation towards a more united design language where all interaction designers use the same terms and follow the same design principles. In addition, the merge gives rise to the fact that designers can embrace and learn and understand the basics of behavioral design. As a designer, it is important to have knowledge about behavioral design, because a design is never neutral, it always steers the users towards a certain behavior or decision.

Further studies are needed in order to investigate *if* this framework may work as a guide for interaction designers, by introducing them to behavior design by providing a comprehensive overview of the power of design choices. Therefore, further studies and discussion with designers could complement this study in order to evaluate the intersection framework which was produced as a result of this study.

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# 7 Appendix

## 7.1 Data Collection regarding Persuasive Design

Below a presentation of the collected data regarding persuasive design at Zalando and Asos will be presented. The presentation will be featured by tables, which stores the raw data collection concerning the usability testing that was performed.

*7.1.1 Collection of Data based on the Principles of Persuasive Design at Zalando*

**Appendix 1: Data collected by Evaluator 1**

| Persuasive design principles | Existence (Yes/No) | How it exists (short description) |
|---|---|---|
| Reduction | Yes | Few clicks, the checkout layout, it is very clear. If you already are signed in, you only need to select payment method since they remember where you want it shipped. Otherwise you need to type in all of your customer information |
| Tunneling | Yes | In the purchasing process, the menu disappears. The user gets the feeling that it is only possible to go forward, but it is also possible to go backwards. There is a button the user can click if you want to exit the check out, but it is in the footer. |
| Tailoring | No | Do not matter if the user is signed in or not, the prices and content stay the same. All the products recommendations are dependent of the customer data, that the website collect by using cookies. When removing the cookies/cached memory, it does not show any recommendations, even if the company have user information from previously orders and "wish list". |
| Simulation | Yes | The user gets information about the product and pictures, (even video of some products) show how it looks on the model, could be a simulation. |
| Rehearsal | Yes | Possible to remove products but did not get the change to change size or quantity in the checkout process. Otherwise, it was possible to go backwards and repeat steps |

| Self-monitoring | Yes | When purchasing a product, there is a progress bars and its includes four steps. It is also possible to see status of orders. |
| Personalization | Yes | If the company have user information, collected with the help of cookies, the website provides recommendations. It is also possible to save products in a wish list. The products will stay there for about 60 days. |

**Appendix 2: Data collected by Evaluator 2**

| Persuasive design principles | Existence (Yes/No) | How it exists (short description) |
|---|---|---|
| Reduction | Yes | The website makes it easier by categorize products and reduce obstacles by identifying the user as a customer. For example, by selecting the nearest or most appropriate post office to collect the package/order, which makes it more effortless for the user to reach their primary task (see screenshot).<br><br>Personal information is stored and are introduced by pre-filled columns (see screenshot). This makes the experience more effortless and supportive towards the customer, which saves time, energy and reduce hurdles.<br><br>The website also offers customers to utilize the website in their native language, which reduce the language barrier, and makes it easier for the user. |
| Tunneling | Yes | The users are guided to reach their primary task to perform a purchase, by allowing the user to directly go to the checkout after placing a product in the shopping cart. Consequently, there is a shortcut on this website that allows the users to skip steps in order to reach their primary task of submit an order (see screenshot x). |
| Tailoring | Yes | The website provides generic offers such as trends right now. Further, the site offers customers with personal recommendations as well as recently visited products (see screenshot xx).<br><br>The website does not adjust their interface based on signed in customer or only visitors as it stores information through cookies and cached memory. |
| Simulation | Yes | The interface offers customer to simulate the possible outcomes by providing several pictures of the product both on a model as well as alone (screenshot). It also provides the customer with more detailed product information such as material and suggestions on how to take care of the product (screenshot). |
| Rehearsal | Yes | The website offers the customer to immediately remove an item that |

| | | |
|---|---|---|
| | | have just been placed in the shopping cart (screenshot). It harder to adjust a task, but it is possible to change the quantity of a product or remove an item. However, it is not possible to change size if something has gone wrong (screenshot). In this case the customer is instead invited to redo a task from the beginning. Zalando also allow the customer to immediately regret a task by offering the customer the opportunity to regret removing an item from the shopping cart (screenshot). However, this is set on a short period of time then the site offers the user to continue shopping. |
| Self-monitoring | Yes | The user is able to follow their progress as the website provide information that an item is placed in the shopping cart immediately in several ways. By adding a number onto the shopping cart symbol, by presenting information that the product is placed, as well as by introduce information about which product are added in the cart, with appurtenant information (see screenshots). Further, as soon as the user continue the process towards "checkout" the website provides a progress bar to enable the customer to track their progress (see screenshot). |
| Personalization | Yes | Users are offered personalized content through personal recommendations (screenshot). Zalando also invite customers to save the item in what they call a wish list, but in order to utilize the wish list you have to be a member (screenshot). |

*7.1.2 Collection of Data based on the Principles of Persuasive Design at Asos*

**Appendix 3: Data collected by Evaluator 1**

| Persuasive design principles | Existence(Yes/No) | How it exists (short description) |
|---|---|---|
| Reduction | Yes | No unnecessary information or commercial in the checkout process, it is easy to see the order. When selecting payment method, the only thing you need to do is type in your personal number and then click the next step to place the order. |
| Tunneling | Yes | In the checkout process, the top menu disappears and create a tunneling effect, the user gets the instinct that it is only feasible to go forwards or backwards. |

| | | |
|---|---|---|
| Tailoring | Yes, *but to a low degree* | When signed in or if you are a member, you can receive birthday discounts, as well as tailored rewards. But, it seems like they treat and have the same information and prices for everyone, not depending on a specific user group. |
| Simulation | Yes | The products have pictures, text information and some have a short video were the model show the clothing. |
| Rehearsal | Yes | It is possible to remove a certain product or change to another site, easy to change to another size. It is very easy to cancel an order if something went wrong. |
| Self-monitoring | No | No progress bars. Did not find anything about self-monitoring at this page |
| Personalization | Yes | The website provides recommendations based on what the user have clicked on before. But it is not very clear, and the recommendations are presented in the bottom of the page.<br>The company send out coupons at birthday and when signed in, the user is welcomed by a text including the users name. As a customer, you can put products in a wish list/saved item. |

**Appendix 4: Data collected by Evaluator 2**

| Persuasive design principles | Existence (Yes/no) | How it exists (short description) |
|---|---|---|
| Reduction | Yes | If you already are a customer the website reduce effort for the users by identifying personal information, which allow the user to have a smoother experience and purchase (see screenshot).<br><br>However, the customer is forced to sign in to secure the identification of the customer, to make the experience more effortless (see screenshot).<br><br>In the last step all necessary personal information is already pre-filled for a returning or new customer (see screenshot). This generates to comfort for the users as the experience are perceived as effortless. |
| Tunneling | Yes, *to some degree* | There is no specific information. When placing an order, the shopping cart moves and adds a number which tells the customer how many products are placed in the cart (see screenshot).<br><br>This website is very frugal with their information, and if the |

| | | customer is curious or unsure of for example the estimated delivery time are not shown in the second step (see screenshot), the customer has to have patient and receive that information in the next step (see screenshot). |
|---|---|---|
| Tailoring | No | There is no personalized content for ether a signed in user or a visitor. There are only provide generalized offers (see screenshot).

The website does not provide personal content as they offer information about the latest trends regardless of personalized taste, based on the users online behavior. |
| Simulation | Yes | The website supports simulation as it provides the user with pictures which reveals the outcomes with the product as well as more specified product details (see screenshot). |
| Rehearsal | Yes | The design is forgiving as it allows a user to remove items or adjust something if it has gone wrong, however it is not offered immediately, the customer has to take actions a continue to the shopping cart in order to remove an item or change the size and/ or quantity (see screenshot).

And if a user by accident removed an item on the website the customer is able to access saved item where the recently added product are stored (see screenshot). However not all products are stored. The customer can also save the product for later, but this is caused by an intended action.
On this site users are allowed to save products regardless if they are signed in or not (see screenshot). |
| Self-monitoring | Yes, *but to a lower degree* | The website lets the user detect that an item is added into the cart by introducing numbers onto the shopping cart as soon as an item are placed (see screenshot).
However, the website does not provide any other features to make sure that the user can track their progress. |
| Personalization | Yes, *to a certain degree* | The users are allowed to personalize their own content by having the opportunity to save item in a sort of wish list of saved items (see screenshot). |

## 7.2 Data Collection regarding Digital Nudging

This section will present the collected data regarding Digital Nudging at Zalando and Asos. The presentation will be featured by tables, which stores the raw data collection concerning the usability testing that was performed.

*7.2.1 Collection of Data based on the Principles of Digital Nudging at Zalando*

**Appendix 5: Data collected by Evaluator 1**

| Digital nudging principles | Existence (Yes/No) | How it exists (short description) |
|---|---|---|
| Default | Yes, but to a low degree | When register as a new customer, the checkbox is not marked. In the checkout process, the standard-choice is "standard choice" because they do not have the ability to send express to Sweden. |
| Feedback | Yes | When clicking and hovering over elements, the system show feedback by changing color or showing popups. Did not get any information about the system were loading. |
| Incentives | Yes | It is clear that deliveries and returns are free, they also motivate and inspire users by showing pictures of products that are relevant and "in season" at the start page. In addition, if a product is about to be sold out, the user gets a notice (for instance "*only* 2 products left") |
| Expecting Errors | Yes | The website design makes it possible to remove products, to go backwards and if typing the wrong personal number in the "payment" process, the user gets an error messenger. <br> Otherwise, when adding a product in the cart, you must select a size (the popup forces the user to select size) |
| Structured complex choices | Yes | It is possible to use filters in order to find a certain product or category. |
| Visible Goals | Yes | A progress bar is visible in the checkout process, representing how close the user is to reach and fulfil the goal of buying a product. |
| Mapping | Yes | Users can get information about the products in the product information, which allow for sensemaking. It is possible to see what type, material, reviews and other things about the product. There is also, notes about the sizes (for instance, this is bigger than usual, select a smaller size) |

**Appendix 6: Data collected by Evaluator 2**

| Digital nudging principles | Existence (Yes/No) | How it exists (short description) |
|---|---|---|
| | | |

| Default | Yes | The website is using defaults by the utilization of pre-filled lines and rows with customer information (see screenshot). |
|---|---|---|
| Feedback | Yes | On this website feedback is featured in various way both by numbers, text and by introducing pop up window to get the users attention. In this case when adding an item in the shopping cart feedback will be brought to the customers attention through numbers onto the shopping cart that reveals how many items that are added into the cart. More feedback is presented towards the customer by immediately inform the customer that the item is added. This are presented in two separate ways, by changing color and give feedback on the recently pushed button, as well as through a pop-up window that gives further detailed information about the item (see screenshots).<br><br>The also lets a customer know how much they are saving if an item are on sale (see screenshot). |
| Mapping | Yes | The website emphasizes the principle of mapping by offer users product information, and it is also features through pictures (see screenshots).<br><br>Zalando also emphasize the understanding of the effects of the products by introducing style suggestions (see screenshot). |
| Incentives | Yes | The website motivates the user, by designing a separate tab "outlet" (see screenshot). It emphasizes incentives by trying to motivate a user to become a customer by offering deals on free delivery and returns. They even emphasized this by adding contrast through color differences (see screenshots). |
| Expecting Errors | Yes | The website emphasizes a forgiving design as it allows users to remove item easily and quite immediately after adding an item into the shopping bag. It is also possible to remove an item later on in the process of purchase. It is even possible to adjust the quantitative. However, it is not possible to change the size or color of an item regardless if it is in stock or not (see screenshots). |
| Structured complex choices | Yes | The website utilizes the design principle by featuring a filtering design element that lets the user customize a selection. The filtering is emphasized either by a pop-up window that appear if the user hover over the head menu, or if the customer at first select a broader category and then make a segmentation (see screenshots). |
| Visible Goals | Yes | The website provides the user with a progress bar, which let the users know how they are progressing within the buying process (see screenshot). |

*7.2.2 Collection of Data based on the Principles of Digital Nudging at Asos*

**Appendix 7: Data collected by Evaluator 1**

| Digital nudging principles | Existence (Yes/No) | How it exists (short description) |
|---|---|---|
| Default | Yes | The website use defaults in the checkout process, when selecting delivery and in the account settings, it is preselected that the user will receive newsletter. (see screenshot) |
| Feedback | Yes | Feedback is given when clicking and hovering over design elements. When putting product in basket, the text on the button "add to basket" is changed to "added". When the system is loading, a symbol is presented. |
| Incentives | Yes | The website is very clear by showing the discount of "20% at big brands". (see screenshot) Which stress and steer users by take the chance to buy something before it expires. The website has free deliveries and returns to influence the customer to purchasing products, but it is shown in the product information (see screenshot). At the front page, pictures inspire the user to buy the same products. |
| Expecting Errors | Yes | It is easy to remove a product, change the size, quantity and cancel an order. When selecting a product, the user must select size. If size is not selected, the user cannot continue, and an error messenger is shown in red text. |
| Structured complex choices | Yes | Yes, possible to use filters in order to find a certain product or category. This make the choice easier for the user, since the user do not need to look at all products, instead they can sort out and get more relevant content. |
| Visible Goals | No | The website does not use progress bar in the checkout process. Did not find a clear motivation that the website uses this design principles |
| Mapping | Yes | Yes, the website facilitates sensemaking though product information. It is possible to see what material, size and colors. |

**Appendix 8: Data collected by Evaluator 2**

| Digital nudging principles | Existence (Yes/No) | How it exists (short description) |
|---|---|---|
| Default | Yes | The website is using defaults features by using pre-filled boxes, and in this case the delivery was set by default on "Standard Pick Up Point (Free)" (see screenshot). |
| Feedback | Yes | Feedbacks is provided by inform the users with information if a product are low in stock. They are also providing feedback to the users by adding a number to the shopping cart symbol as well as give immediate information that the item was added. Further, the site also give feedback if the customer wish to remove an item within the cart (see screenshots). |
| Mapping | Yes | The website emphasizes the principle of mapping by offer users product information and it is also features through pictures. The website also provides the user with the opportunity to match the product with the style, or even shop the entire look (see screenshots). |
| Incentives | Yes | Asos interface emphasize incentives by introduce design features for example that are present on the first page through discounts. They also try to motivate a user to purchase over a specific amount in order to get free delivery (see screenshots). |
| Expecting Errors | Yes | Asos lets the customer redo or adjust a task by allowing him/her to remove an item from the shopping bag (see screenshot). The design is even more forgiving as it let a user to change both quantity and size in a later stage within the shopping bad if it has gone wrong or the user has any regrets (see screenshot). |
| Structured complex choices | Yes | The website utilizes the design principle by featuring a filtering design element that lets the user customize a selection, based on one's own preferences.

Asos also emphasize the categorization and structuring by a pop-up window, or through drop-down boxes that allow a user to customize the choice of item to look at (see screenshots). |
| Visible Goals | No | The website does not provide design elements that emphasize goal visibility, instead the user is forced to assume how they are doing and how far along they are to reach their primary task (see screenshot). |

## 7.3 Screenshots for Persuasive Design

*7.3.1 Tailoring*
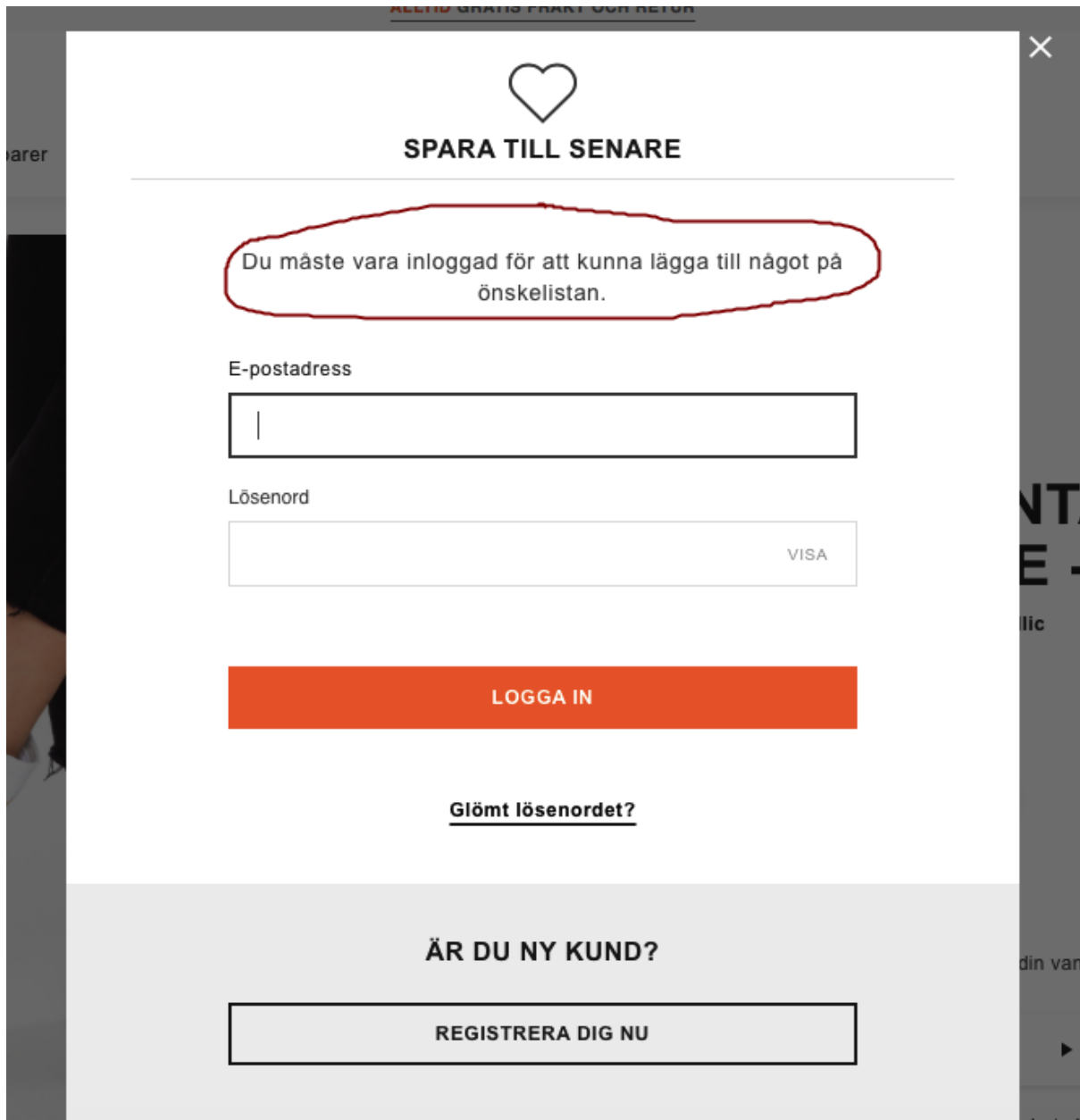


Screenshot 1: Zalando offers a special function towards users that is signed in customers, namely they have the ability to save items in a wish list, and consequently tailor their interface towards members.

### 7.3.2 Tunneling
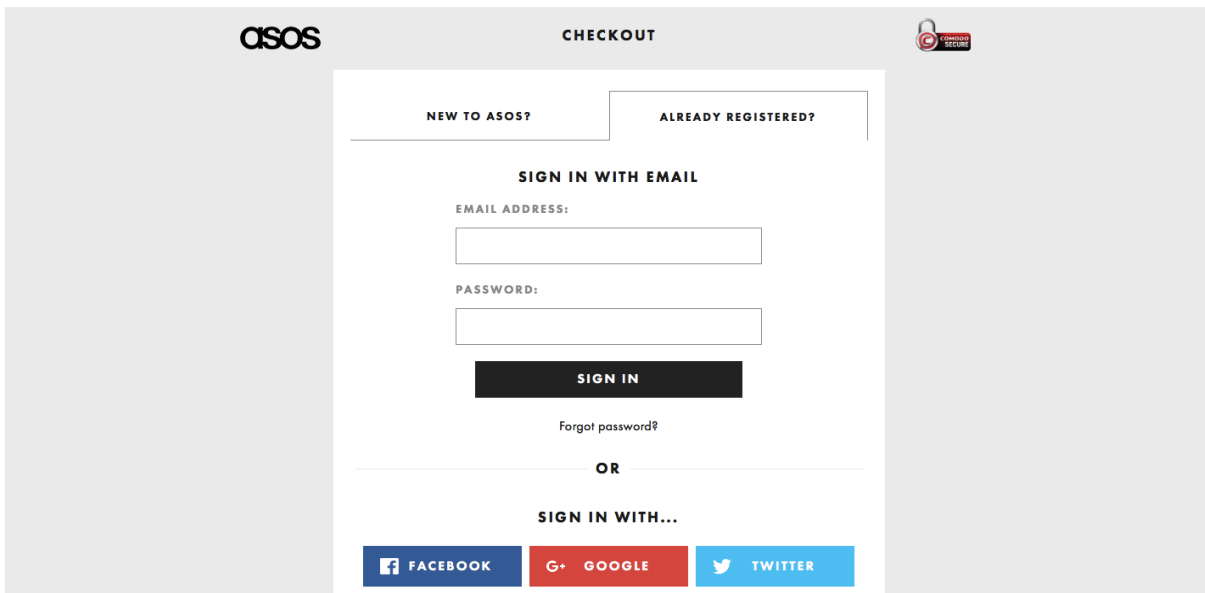


Screenshot 2: At Asos they emphasize tunneling by removing the menu element, which supports a design that nudge a user to go forward, as they have a harder time to go backwards.

### 7.3.3 Reduction
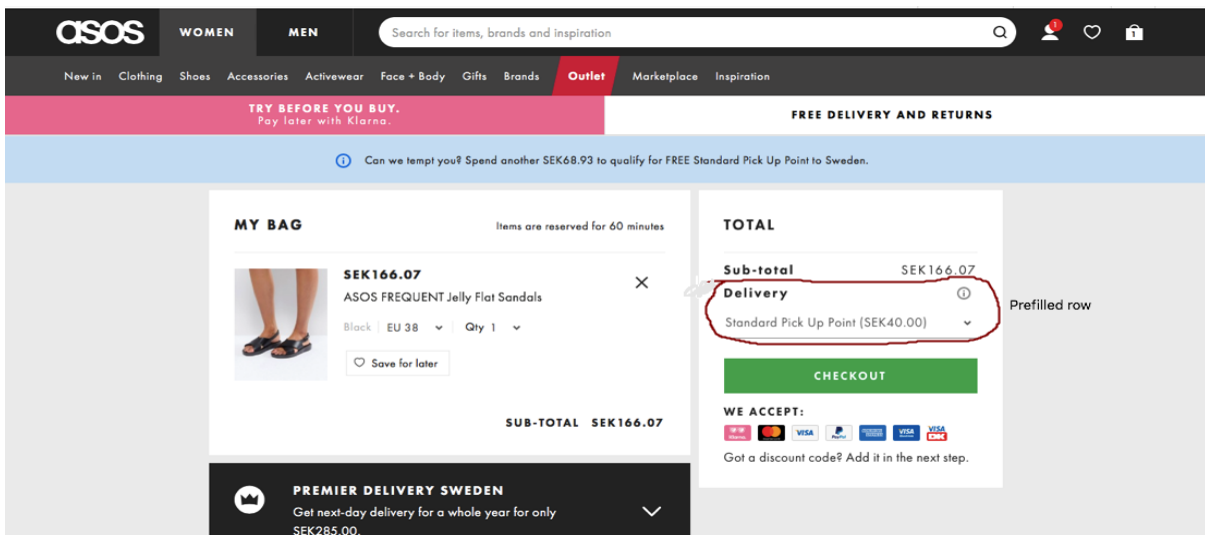


Screenshot 3: In this case the delivery row was already prefilled and set on a specific opinion, which make it more effortless to perform the task, however it is optional to change delivery method.

## 7.3.4 Self-monitoring
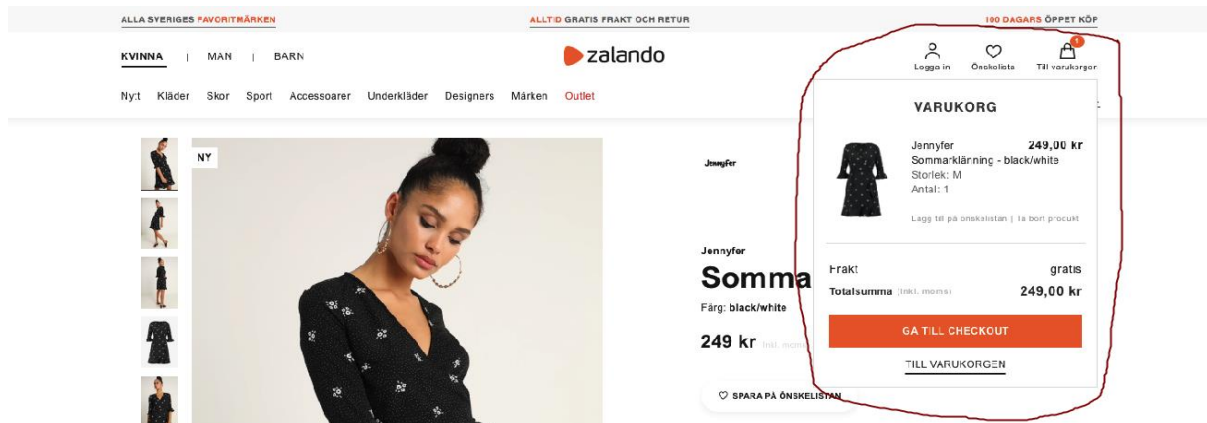


Screenshot 4: This interface lets the user monitor their progress when performing an action or task, by showing that an item is added into the shopping bag.
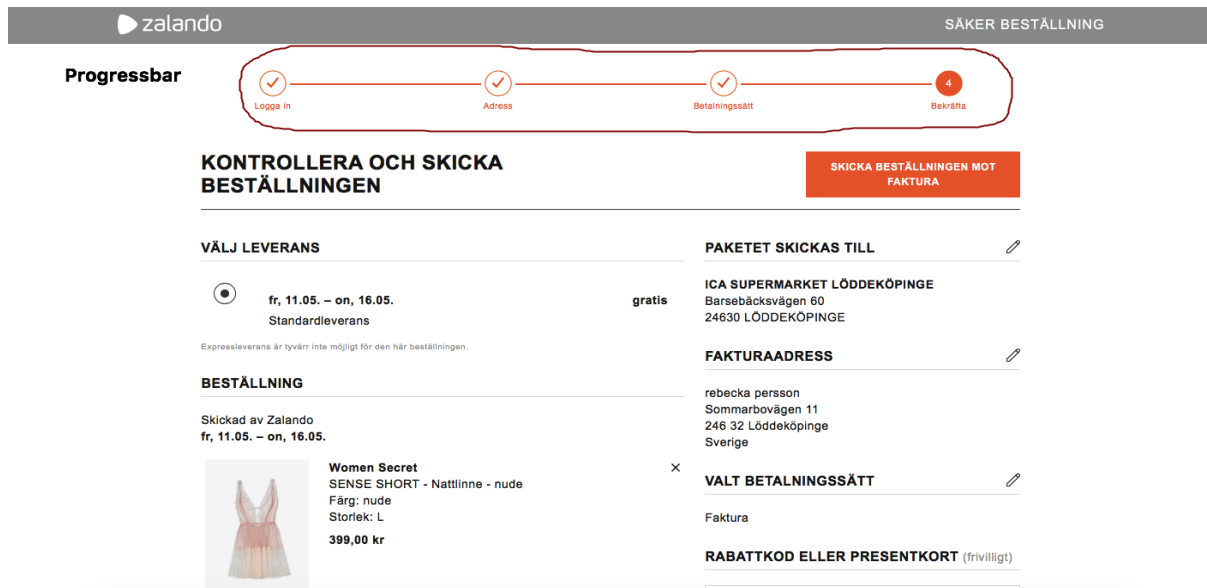


Screenshot 5: Here is another example of how the design allow the user to understand how they are performing, by integrating a progress bar.

## 7.3.5 Personalization
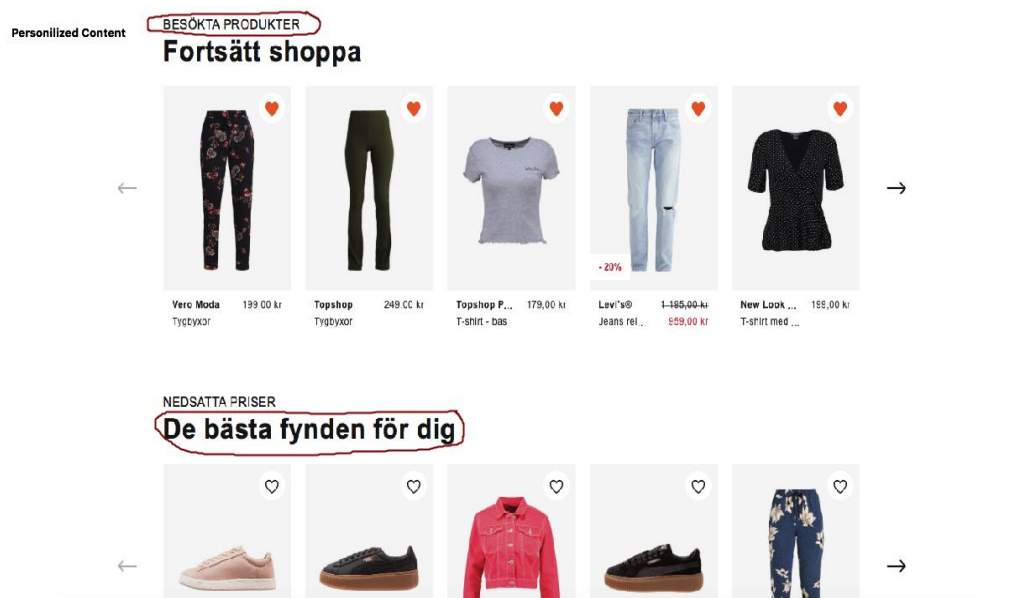


Screenshot 6: Here are examples on how the design principles personalization is emphasized, since the interface engage in presenting personalized content.
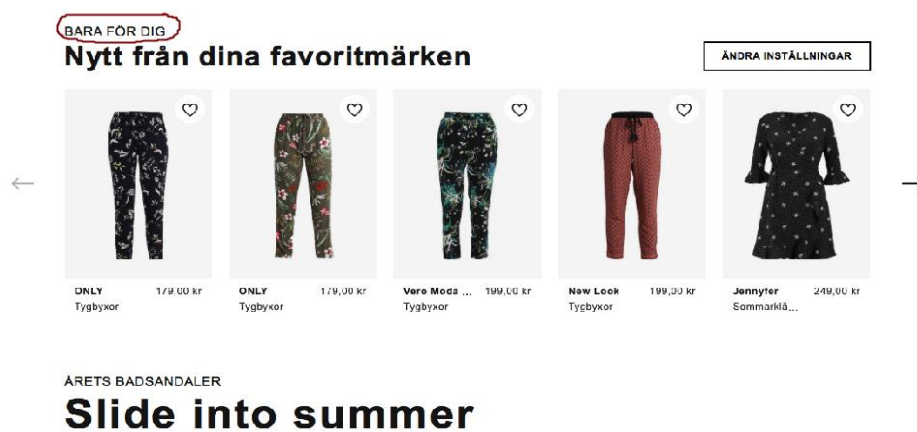


Screenshot 7: This screenshot does also show that the site offers personalized content, as it present optional items that is selected "just for you".

## 7.3.6 Simulation
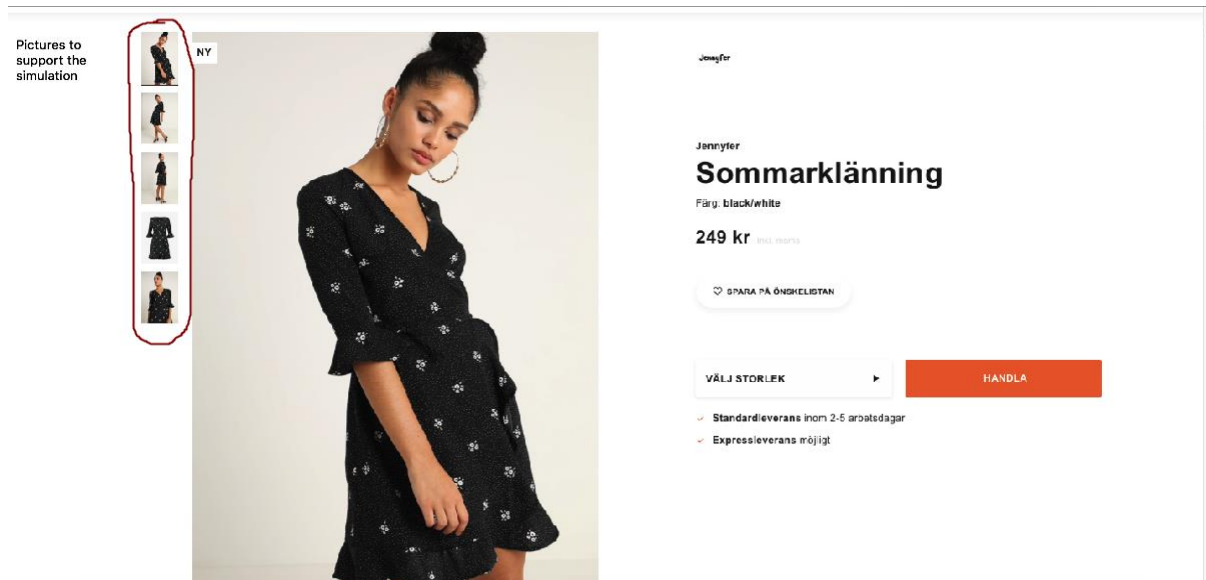


Screenshot 8: The user is engaged in simulation, as the interface allow the user to access several pictures of an item to secure that the cause and effect relationship are informed, in order to engage the user to simulate how this particular item may match up to one's expectations.
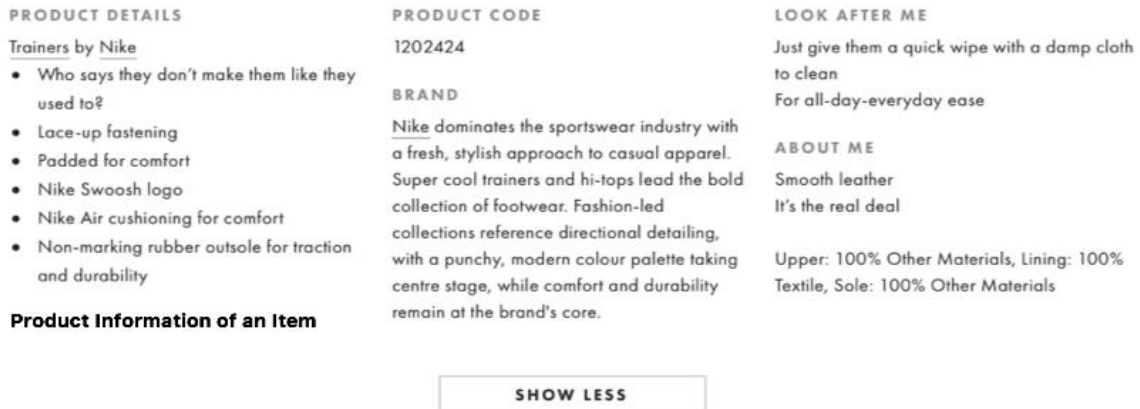


Screenshot 9: This screenshot refers to simulation as the product information/product details, will improve a user's understanding about the possible effects of an item.

## 7.3.7 Rehearsal
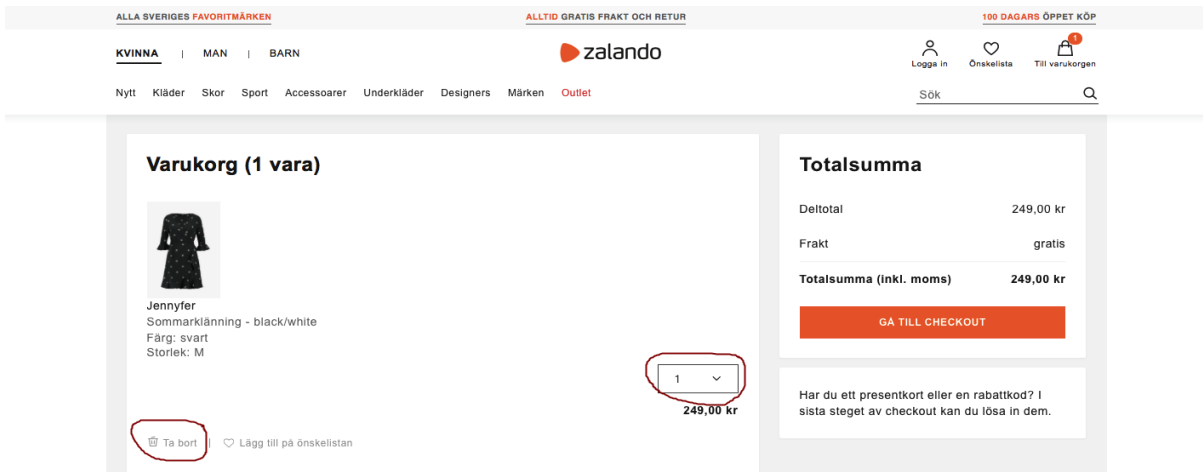


Screenshot 10: Here is an example on an interface that has applied the design principle rehearsal as this design is forgiving and let the user redo or adjust an action. This forgiving design has been highlighted by red circles in order to emphasize them in this case.
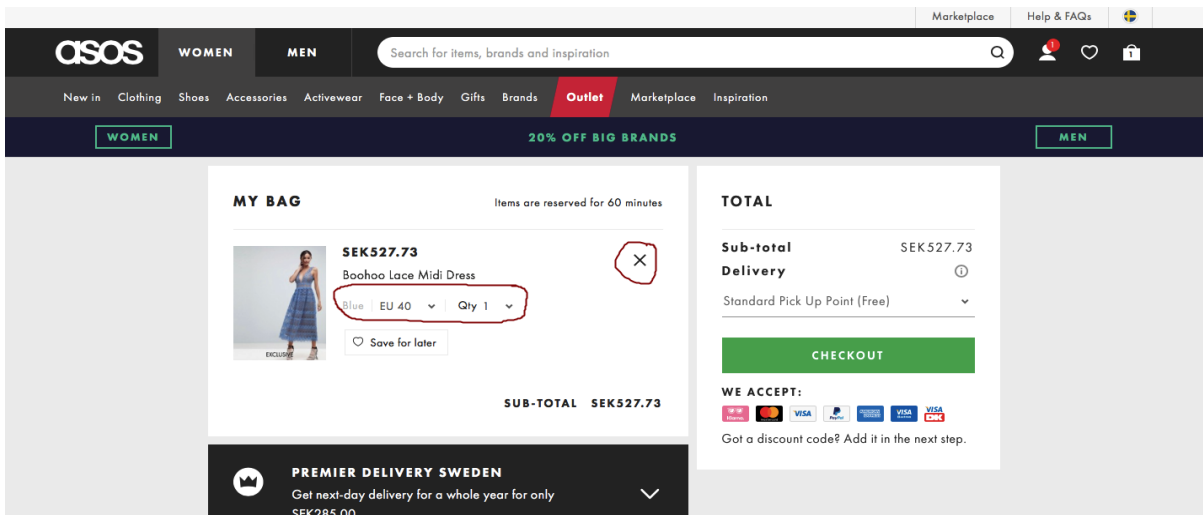


Screenshot 11: As the red circles implies Asos interface also engage in a forgiving design as it allows the user to change the size, quantity, and if possible color, or even delete the added item if something has gone wrong.

## 7.4 Screenshots for Digital Nudging

### 7.4.1 Incentives
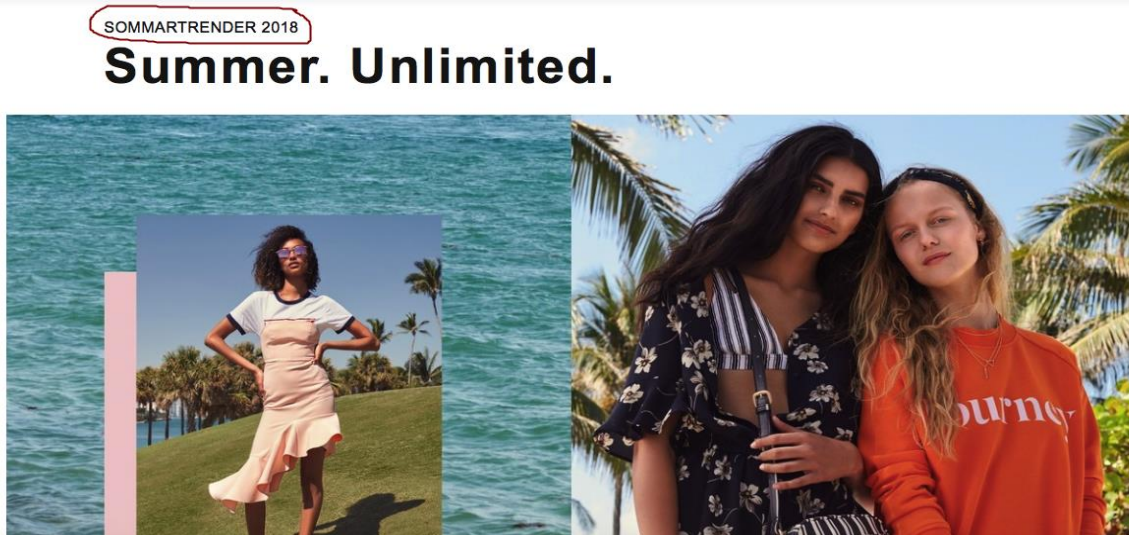


Screenshot 12: Zalando tries to motivate a user by adding design elements that emphasize trends, and this is highlighted by the red circle.
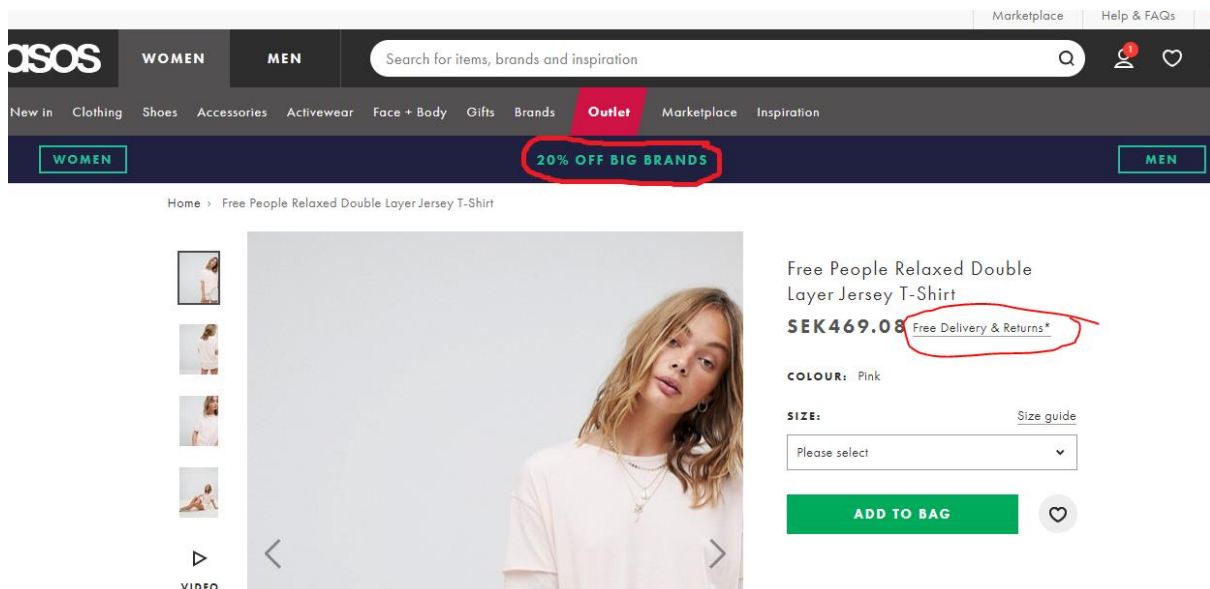


Screenshot 13: The principle incentives were implemented by trying to motivate the user to become a customer by offering deals on free delivery and returns.

## 7.4.2 Feedback
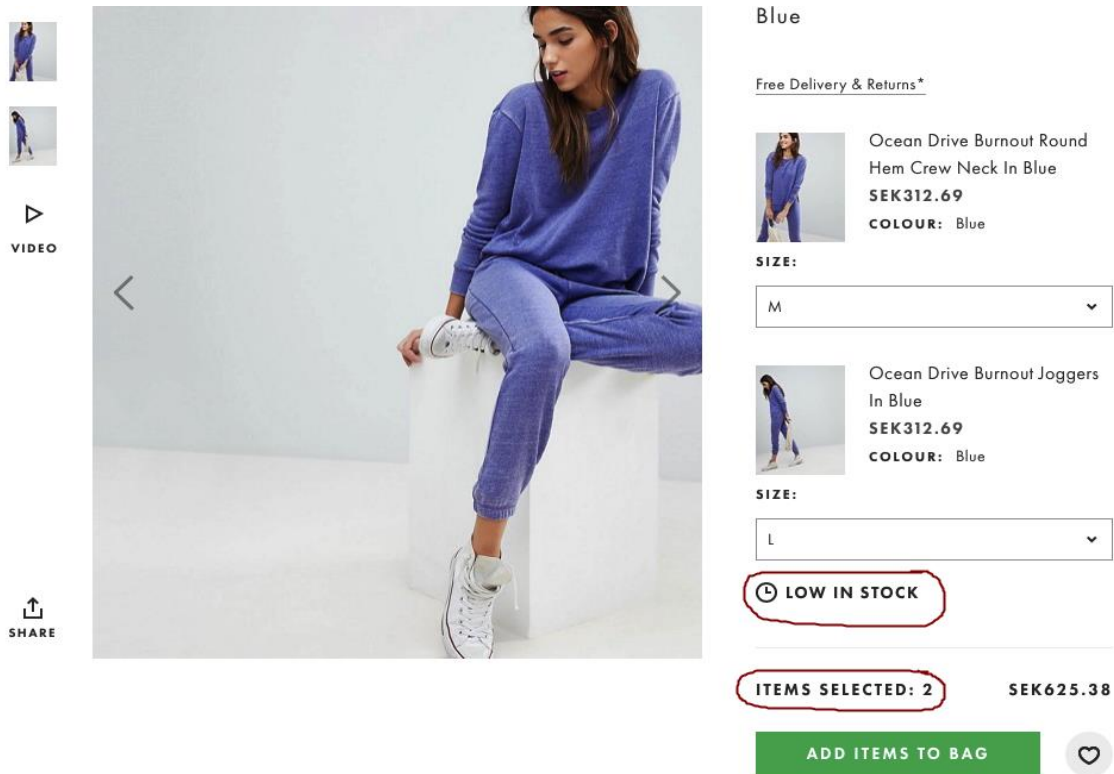


Screenshot 14: This picture of the interface reveals one example on how feedback was applied. The interface lets a user know that the item is low in stock, as well as two items is selected.

## 7.4.3 Mapping



Screenshot 15: This shows that the design supports the user to understand the possible effect of this specific item by providing pictures to the user, as well as possible styles options concerning the picked item.

## 7.4.4 Defaults
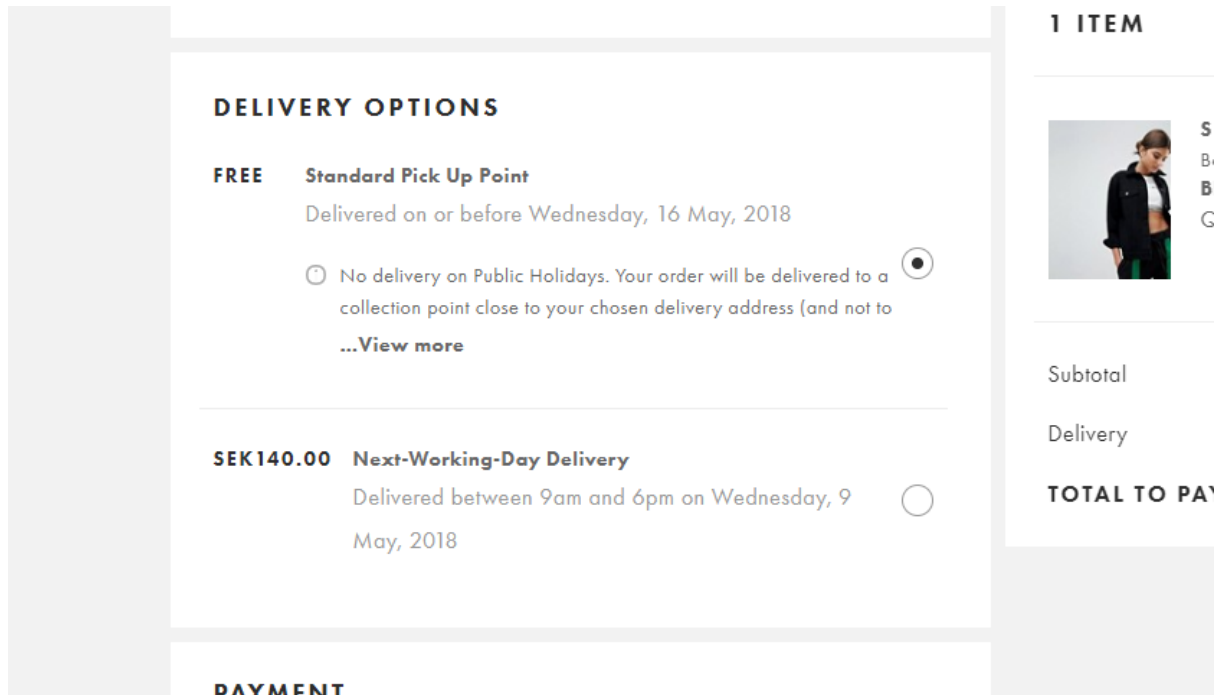


Screenshot 16: This screenshot demonstrates the default principle at asos.com, as the standard delivery is preselected.

## 7.4.5 Expecting Errors
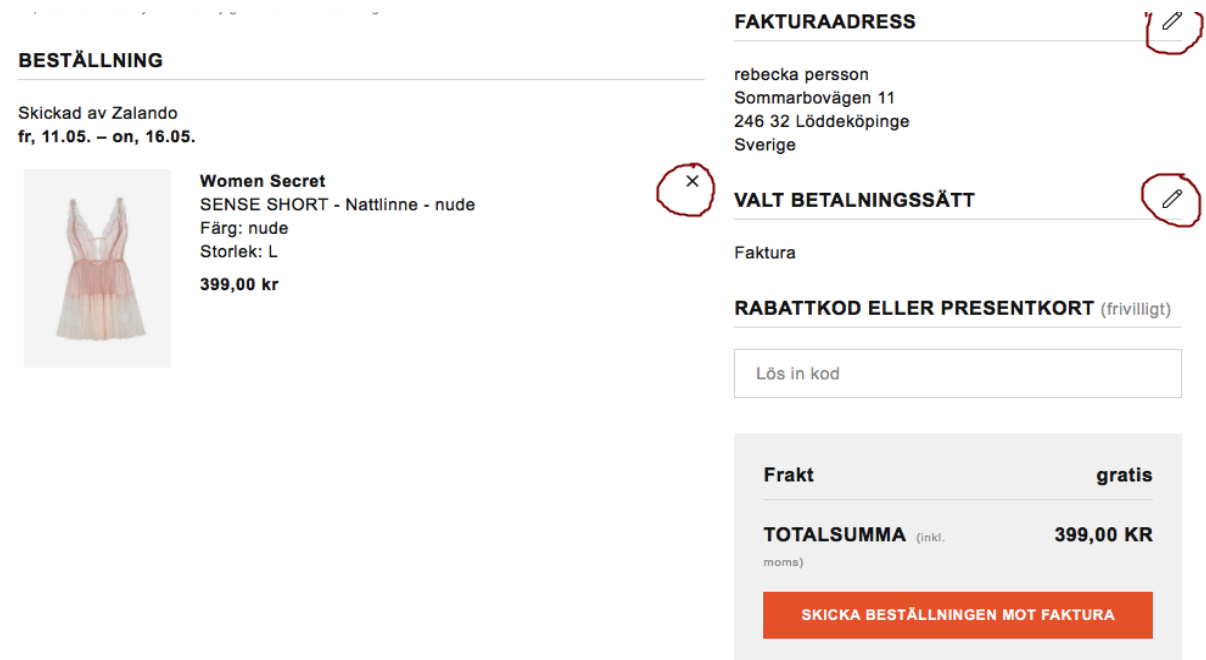


Screenshot 17: This picture shows the interface emphasis on the design principle expecting error as it is prepared that a user possibly has made a mistake earlier. The interface allows the user to edit as well as remove an item from the order.

## 7.4.6 Structured Complex Choice
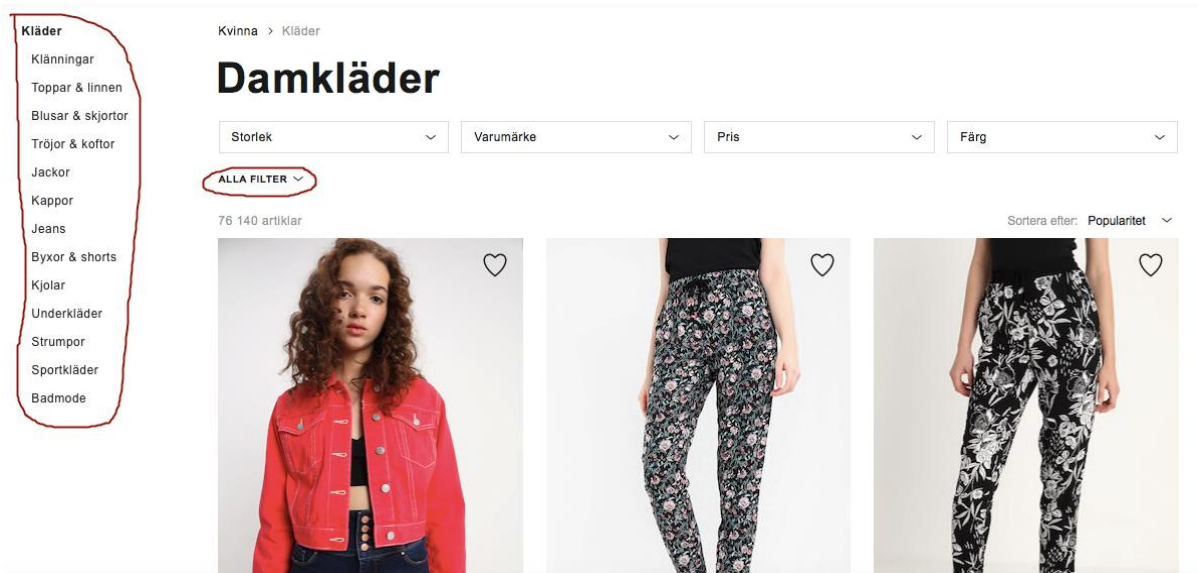


Screenshot 18: This screenshot reveals that the e-commerce website embraces the user ability to structure complex choices as it allows him/her to filter and categorize their selection depending on interests. Both in the left menu and through a set of drop-down menus.
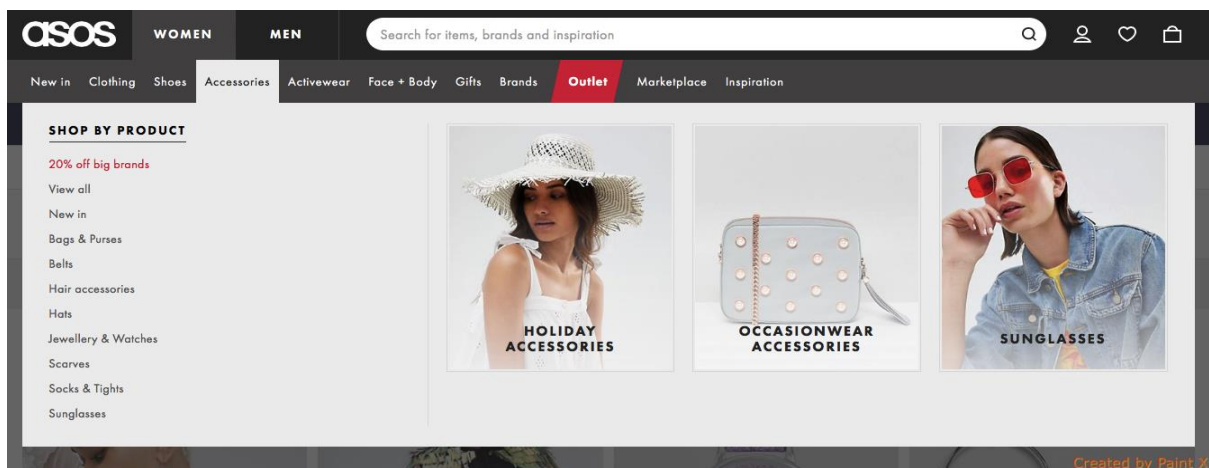


Screenshot 19: This screenshot shows that the interface enables users to structure and make sense of their selection of choice by a pop-up window that appear when hovering over a specific and quite broad category of items.

## 7.4.7 Visible Goals



Screenshot 20: This screenshot demonstrate how Zalando are using the principle Visible Goals. The principles are implemented by a progress bar in the header in the checkout process, which help the user to track their journey towards the goal.