Tallinn University

School of Digital Technologies

Human-Computer Interaction

THE IMPACT OF INTERFACE ANIMATIONS ON THE USER EXPERIENCE:

DIRECTING CUSTOMER'S ATTENTION IN ONLINE SHOPPING SITES

Master thesis

Author: Piret Alvre

Supervisors: Sonia Sousa, PhD

Luís Borges Gouveia, PhD

Author: _____ " _____ " 2017

Supervisor: _____ " _____ " 2017

Supervisor: _____ " _____ " 2017

Head of the institute: _____ " _____ " 2017

Tallinn 2017

Author's Declaration

I declare that apart from work whose authors are clearly acknowledged, this manuscript is a product of the author's original work, and it has not been published before, neither is not currently being considered for publication elsewhere for any other comparable academic degree.

This master thesis document has been supervised by PhD Sonia Sousa (Tallinn University, Estonia) and PhD Luís Borges Gouveia (University Fernando Pessoa, Porto, Portugal).

Author: Piret Alvre

Date: 21.04.2017

…………………...

(signature)

…………………..

(date)

Non-exclusive license to reproduce a thesis and make thesis available to public

I, Piret Alvre (date of birth: 12.06.1990), grant Tallinn University a permit (a non-exclusive license) to reproduce for free and make public in the repository of Tallinn University Academic Library a piece of work created by me,

"The Impact of Interface Animations on the User Experience: Directing Customer's Attention in Online Shopping Sites",

supervised by Sonia Sousa and Luís Borges Gouveia.

I am aware of the fact that the author also retains the rights mentioned above.

I certify that granting the non-exclusive license does not infringe the intellectual property rights of other persons or the rights arising from the Personal Data Protection Act.

Tallinn, _____ 21.04.2017

Acknowledgement

Abstract

Interface animations are now used for different functional purposes in the web, whether to present the meaning in motion, to attract attention or to entertain. However, animation as a tool for engaging the user's attention has not been thoroughly studied.

This work attempts to find out how interface animation can be used for attracting and directing attention. The research goal is to investigate the effects of functional animation on the user experience and on how efficiently users solve different types of shopping tasks in web shops.

To investigate the effects of functional animation on user experience across different purchasing processes, various methods were used. A literature review for understanding the definitions and the essence of interface animations, animation principles, attention management and online shopping, was done. Then, a number of web shops were reviewed in order to find references of trending usage of animations. An experimental A/B Test using the web shop prototype created in Proto.io environment was carried out to understand whether animation affects user performance on animated and non-animated online shopping sites.

The results show that adding animation to certain purchasing processes could have some attention directing properties, but each interaction step needs to be separately approached because not all added motion had a positive effect on efficiency. Also, there was some evidence, that animated elements in the interface attract more attention and influence user's choices.

This study shows that it is reasonable to use only one animation at a time because several animated objects might have a confusing effect on the user. Furthermore, it also revealed that at some interaction steps, animation can have also a negative effect on participant's performance.

Table of contents

1 Introduction

Animations have an increasingly important part in graphical user interface designs. They can help to guide users' attention and highlight changes in the interface. Therefore, animations can be helpful in directing focus to the changes that occur while interacting with the website (Head, 2016). But, there is little empirical research on how such animations influence the users' perception of an interface and how adding animations can improve user's performance on the website (Merz et al. 2016)

The usage of interface animations expanded with the arrival of smartphones and native apps but animations are now considered an essential part of User Interface (UI) design of operation systems like Windows and OSX and corporations like Google. Windows UX Design Guidelines describe animations and transitions as "*an effective way to communicate information visually that would otherwise require text to explain or might be missed by users*" (Animations and Transitions, 2017). Google's Material Design Guidelines describe motion as a meaningful part of the core design. It is said that the aim of the motion is to "*serve focus attention*" and to "*maintain continuity*" (Material design guidelines, 2017).

Animations are now used for different purposes, whether to present the meaning in motion, to remind or to entertain. There is a list of benefits that animation provides, such as improving feedback, aiding in orientation, showing causality, expressing a brand's personality and making the product or service look trustworthy and sophisticated. In contrast, static interfaces can feel dated, broken and frustrating (Head, 2016). A study on zooming interfaces by Shanmugasundaram show, that animations can have significant benefits on user performance. Animations help to solve tasks twice as fast and make fewer errors than in the non-animated conditions (Shanmugasundaram, 2008). Ethan Marcotte describes how well-done little motion can add some playfulness and warmth to the interface and thereby help visitors feel comfortable using the products and services (Marcotte, 2016, xv). But one of the main reasons to use animation in interface design is directing the user's attention to

interactions that are most important for users and therefore help to serve the goal for both, the users and the providers.

The information age has brought with it a situation where there is too much information and people lack time. These limitations, considering the man's relatively poor ability to direct and maintain attention, have been a problem for some time, but the increasing amount of information challenges users and providers to direct and maintain attention.

The challenge for companies is how to maintain and manage the attention of people. Attention is now the most important value to the business and managing attention is a crucial activity for success (Davenport & Beck, 2001). In the online shopping industry, large portion of cart abandonments are simply a natural effect of how users browse online shopping sites – "*many users will be doing window shopping, price comparison, saving items for later, exploring gift options, etc.*" (Baymard Institute, 2017). According to Baymard Institute's quantitative study, 58.6% of US online shoppers had left the cart within the last 3 months because they were just browsing and weren't ready to buy (2017). As the rivalry in online shopping is so intense, providers need to pay close attention to the shop's usability.

The success of online shopping providers depends greatly on the web shop's visual comfortable feel and quick user-friendly service. Therefore, the retailers face the need to provide pleasant and frustration-free user experience to be successful in raising the profit. According to Baymard Institute, the problem can be recovered simply through better checkout flow and the design of the online shops (Baymard Institute, 2017).

In line with above ideas, the following sections present the research problem and underline the research goal, research question, research objectives and the description of the research methodology.

1.1 Research problem statement

Based on the Checkout Usability study by Baymard Institute, that considered 37 different studies containing statistics on web shopping cart abandonment, an average of 69% of all online shop visitors leave their shopping cart before fulfilling the purchasing process (Baymard Institute, 2017). Furthermore, to take into account the combined online shopping sales of around $738 billion in the US and EU (eMarketer, 2015), the lost orders are worth around $260 billion (Baymard Institute, 2017). According to Baymard, those issues can be resolved purely through design changes in the web shop's layout (2017).

Though designers and marketing professionals have provided new ideas and design patterns to lower the problem, the average dropout rate of online shopping has stayed the same for several years (Baymard Institute, 2017). However, animation as a tool for engaging the user's attention has not been thoroughly studied. Therefore, this work attempts to find out how interface animation can be used for attracting and directing attention.

The idea of adding animation to the online shopping website design comes from the motion's essence to draw attention to itself. For the human eye, motion is more catching than the static images or texts. Animation may help people better understand what's happening and to help them get through the buying process in a straight line without facing problems and getting frustrated by the complications.

While animations are a common element in many user interfaces, very little empirical evidence supports the effectiveness of such element (Shanmugasundaram, 2008). According to Merz et al. (2016), literature on interface animation suggests animation's effect on perception of hedonic and pragmatic quality, but few empirical research examines the effects of these animations in improving pragmatic qualities like efficiency and effectiveness. Therefore, some further research is needed.

1.2 Goal of the research and the research methodology

As claimed above sometimes in User Interface design, animated elements are tempting and powerful tools, but at the same time they can easily waste user's attention and time (Harley, 2014). Thus the general focus of this study is finding out which animated UI elements are effective on guiding the user to understand tasks.

The main goal of this research is to investigate the effects of functional animation on the user experience and on how efficiently users solve different types of shopping tasks in web shops. By the term "efficiency" it is meant how much time users required to solve the task. A well thought-out functional animation can enhance user experience by improving the customer interaction efficiency (Babich, 2017). As stated by Daliot (2015), functional animation is a tool in UX design field that serves a functional and logical purpose in supporting a design solution.

Also, more general focus of the study was to assess whether using animations help direct user's attention quicker to the important elements of the interface than using static objects.

The work is especially focused on finding out whether animations help to attract user's attention on the interactions that have the most importance in fulfilling the purchasing process.

1.2.1 Research question (RQ) and research objectives (RO)

The main aim of the research is to investigate the effects of functional animation on the user experience and on how efficiently users solve different types of shopping tasks in web shops.

Firstly, there are four (4) research objectives established to understand the connection between the classical animation principles and modern interface animation, to determine the possible benefits of animation to user experience in the web, to understand the importance of attention management in e-commerce websites and to observe the current functional animation patterns used in online shopping sites. The

answers for the research objectives will be seeked during the literature review (chapter 2) and during the review on modern online shopping sites (chapter 3).

The research objectives (RO) are:

- RO1: To find out what are the classical animation principles implemented in modern interface animation.

- RO2: To determine the possible benefits of animation to user experience in the web.

- RO3: To understand the importance of attention management in e-commerce websites.

- RO4: To observe the current functional animation patterns used in online shopping sites.

The research study conducted after the literature review and after the review on modern web shops investigates the relationship between functional interaction animation and the level of user efficiency and user experience in the web shop.

The main research question (RQ) is:

- RQ: How functional interface animation affects the efficiency of users and the user experience across different types of shopping tasks in web shops?

Various methods are used in the thesis for seeking answers to above research objective and the research question. To facilitate the applied methodology the researcher used a table below (see Table 1.1) to illustrate the research procedure.

Table 1.1: Research Procedure

Research study phases	Research objective (RO) / Research question (RQ)	Method
Phase 1 **Theoretical Background** on Interface Animation, attention, e-commerce	RO1: To find out what are the classical animation principles implemented in modern interface animation. RO2: To determine the possible benefits of animation to user experience in the web. RO3: To understand the importance of attention management in e-commerce websites.	**Literature review** The literature review aims for understanding the definitions and the essence of interface animations, animation principles, attention management and online shopping.
Phase 2 **Theoretical Background** on online shopping site references	RO4: To observe the current functional animation patterns used in online shopping sites.	**Exploratory analysis** The exploratory analysis aims for seeking online shopping sites to find references of trending usage of animations
Phase 3 **The Experiment** on animated and non-animated online shopping sites	RQ: How functional interface animation affects the efficiency of users and the user experience across different types of shopping tasks in web shops?	**Experimental A/B Test, a study of user preference** The aims was to compare two versions of a animation patterns, to understand whether the animations has an impact on user's performance using the web shop prototype. A study of user preference aimed to seek further information from the users.
Section 4 **Results + discussion**		

1.3 The structure of the thesis

The thesis consists of seven (7) main chapters and is structured as follows:

Introduction - describes the context behind the work. It introduces the research problem and sets the research questions.

The second chapter - Theoretical Background - gives an overview on topics of interface animation, classical animation principles, attention management and attention economy based on academic literature and professional literature. This chapter seeks answers for the first 3 research objectives.

The third chapter reviews and outlines the functional animation usage examples and use-cases found in current e-commerce websites and seeks answer for the 4th research objective.

The fourth chapter introduces the experimental study and seeks answers for the main research question of the thesis.

The fifth chapter - Findings - introduces, compares and analyses the results from the experimental study.

The sixth chapter - Discussion - analyses the major findings and results of the study, reviews the chosen methods used in the thesis, explains the limitations of the study and gives input for the possible further research.

The last chapter - Conclusion - gives summary of the whole thesis.

2 Theoretical background

The following chapter will give an overview on topics of interface animation, classical animation principles, attention management and attention economy based on academic literature and professional literature.

The aim of this chapter is to seek answers for the first 3 research objectives (RO) of the thesis:

- RO1: To find out what are the classical animation principles implemented in modern interface animation.

- RO2: To determine the possible benefits of animation to user experience in the web.

- RO3: To understand the importance of attention management in e-commerce websites.

2.1 Interface Animation

Animations can be described in general terms as the *"simulated movement of objects using computer or video effects"* (England and Finney, 2002). The existing variety of animations techniques is rich, starting from traditional stop motion to 3D animations. Although the researcher do not aim focus the research in all of them, this thesis concentrates mainly on interface animation generated with Cascading style sheets (CSS) animations that are commonly used on web pages. As so to understand the nature of animation the classical principles of animation need to be understood, and not just Web interface animations.

Functional interface animation is a clever piece of motion added to User Interface (UI) layout to have a functional purposes like reducing cognitive load, preventing change blindness and establishing better recall in spatial relationships (Babich, 2017).

Functional animation differs from the animation made for cartoons, movies or computer games by its clear functional purpose in the interface design (Daliot, 2015).

Although the first animated feature films were created already in the early 20th century, animations still lead a very important role in different areas like cinematography and interface design.

To understand the nature of animation more deeply, the classical principles of animation need to be studied. Animations give interface option to create natural lifelike movements of objects and thereby be more connected to the users.

The following chapters will give overview of traditional animation principles, the essence of animated transitions and the negative and positive uses of the animations in today's world.

2.1.1 Classical Animation Principles implemented in modern Interface Animation

The interface animation nowadays uses mostly the fundamental principles of traditional animation dating back to the Disney area. Basics of motion graphics described by Disney's animators Ollie Johnston and Frank Thomas (1981) are the most famous principles to give a lifelike feeling to a motion and are very often referenced in the literature. Their book is considered to be the holy book of the animation industry.

The 12 principles of animation mentioned in the book "The Illusion of Life: Disney Animation" (Johnston and Thomas, 1981) are Timing, Follow-through and overlapping action, Anticipation, Secondary action, Arcs, Squash and Stretch, Slow In and Slow Out, Exaggeration, Straight Ahead and Pose to Pose, Solid Drawing, Appeal and Staging. Those principles are mostly universal, but some of them are meant for designing characters and character animation and don't have so much connection to interface animation and this work (see Figure 2.1 for an example).
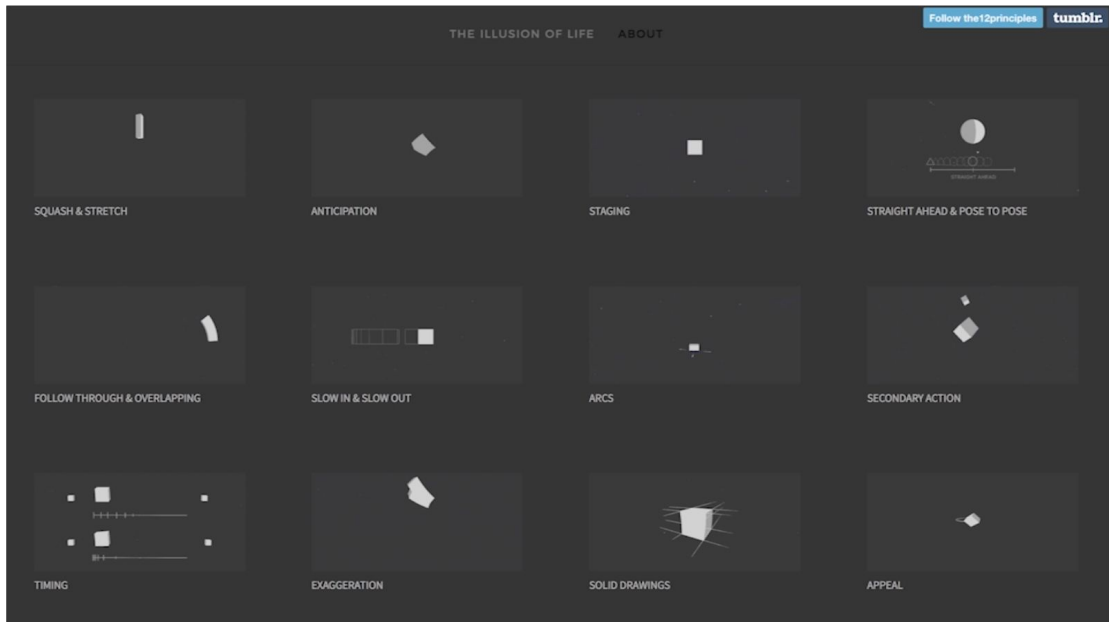
Figure 2.1: An example of 12 animation principles. Example retrieved from The 12 principles website[1].
Video example is shown here: https://youtu.be/WhxzmB-XfXk

In this chapter, only animation principles that have more connection to the interface animation, are described. The principles are the following:

Timing (Slow In and Slow Out)

Timing refers to the time how long something takes to happen. Timing is one of the most important principles because it gives meaning to movement. The speed of an action describes how well the idea will be understood by the audience.

As stated in the book (Johnston and Thomas, 1981), the characteristics of an animation are mostly affected by the number of frames placed between them. Meaning that less drawings and frames equals faster animation and vice versa - more drawings and frames equals slower animation.

In web design, timing function indicates the speed curve of an animation (W3Schools, 2017). The speed curve defines the time an animation uses to make changes and is used to make the changes smooth. According to W3Schools[2] (2017), different manners timing can be used are the following:

---

[1] *12 animation principles: http://the12principles.tumblr.com/*

[2] *W3Schools: https://www.w3schools.com/*

- Linear - motion has the same speed from start to end
- Ease - motion has a slow start, then fast, before it ends slowly
- Ease-in - motion has a slow start
- Ease-out - motion has a slow end
- Ease-in-out - motion has both a slow start and a slow end

Slow In and Out is often referred to as "easing" in the digital world, this is how to make objects appear to follow the laws of inertia (Sciullo, 2017). Slowing in and slowing out, alike timing principle, give more smoothness to the object's movements (see Figure 2.2 for an example).
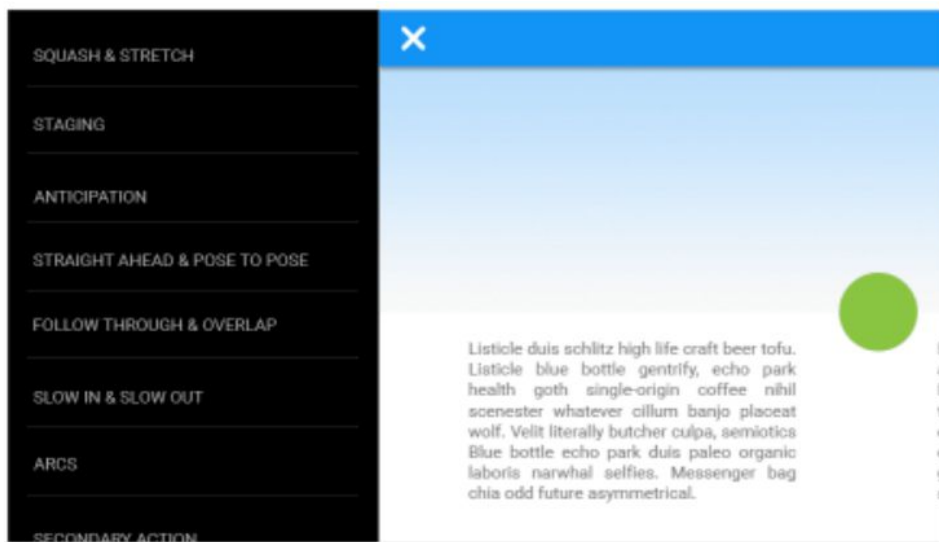
Figure 2.2: An example of Easing animation. Example retrieved from TandemSeven website[3].
Video example is shown here: https://youtu.be/2H2UlfgP-5g

Follow-through and overlapping action

Follow-through refers to the ending of an action. Objects have the centre body part with the greatest mass and also the appendages that anchor to the body. When the

---

[3] *"How to Use Disney's Principles of Animation to Improve UX" by Mark Di Sciullo from TandemSeven:*
http://www.tandemseven.com/experience-design/how-to-use-disneys-principles-of-animation-to-improve-ux/

main body performs an action, it drags the attached appendage with itself. In real life, it evokes overlapping actions because of physics (Johnston and Thomas, 1981).

In animation world, overlapping action imitates the reality and makes the movement more interesting and gives the object some personality (see Figure 2.3 for an example). Actions don't usually stop completely, but are generally carried forward past their ending stop (Johnston and Thomas, 1981).

Figure 2.3: An example of Follow-through and overlapping animation. Example retrieved from Medium.com article created by Kit Oliynyk[4]. Video example is shown here: https://youtu.be/osLldfybhjM

Anticipation

Anticipation refers to the movements that give hints and prepare viewers for the actions that are going to happen next (Johnston and Thomas, 1981). These movements give character or object more personality and give the audience some clear tips for predicting further actions (Lasseter, 1987). See Figure 2.4 for an example.

---

[4] *"Jedi Principles of UI Animation" by Kit Oliynyk:*
https://medium.com/@adaptivepath/jedi-principles-of-ui-animation-2b88423b1dac

Figure 2.4: An example of Anticipation animation. Example retrieved from Medium.com article created by Kit Oliynyk[5]. Video example is shown here: https://youtu.be/d7-MGIhF8Zs

Secondary action

Secondary actions are important because they supplement the main actions with some extra gestures and therefore adding some further dimension to the animation (Johnston and Thomas, 1981). They are details that add complexity and reality to the animation (see Figure 2.5 for an example).

Figure 2.5: An example of Secondary action animation. Example retrieved from Medium.com article created by Kit Oliynyk. Video example is shown here: https://youtu.be/4b-78GaW7Ws

---

[5] *"Jedi Principles of UI Animation" by Kit Oliynyk:*
https://medium.com/@adaptivepath/jedi-principles-of-ui-animation-2b88423b1dac

Arcs

The route of the object's movement in always described by an arc (Johnston and Thomas, 1981). A smooth arched movement presents the most economical route that object can take when moving from one position to another (Lasseter, 1987). Using arched movement in animation instead of cornered clumsy movement gives animation an actual lively feeling (see Figure 2.6 for an example).
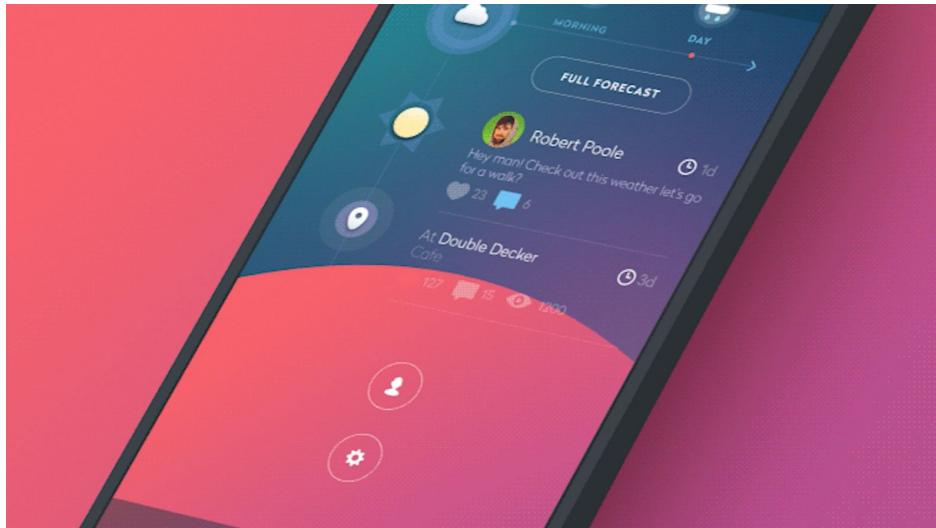

Figure 2.6: An example of Arching animation. Example retrieved from Medium.com article created by Kit Oliynyk[6]. Video example is shown here: https://youtu.be/DejxwZOixOA

Squash and Stretch

Squash and stretch indicates qualities like speed, momentum, weight and mass (Johnston and Thomas, 1981). The amount of squashing and stretching of the moving object depends on its characteristics. For example, a softer object squashes and stretches more than a stiffer object (see Figure 2.7 for an example).
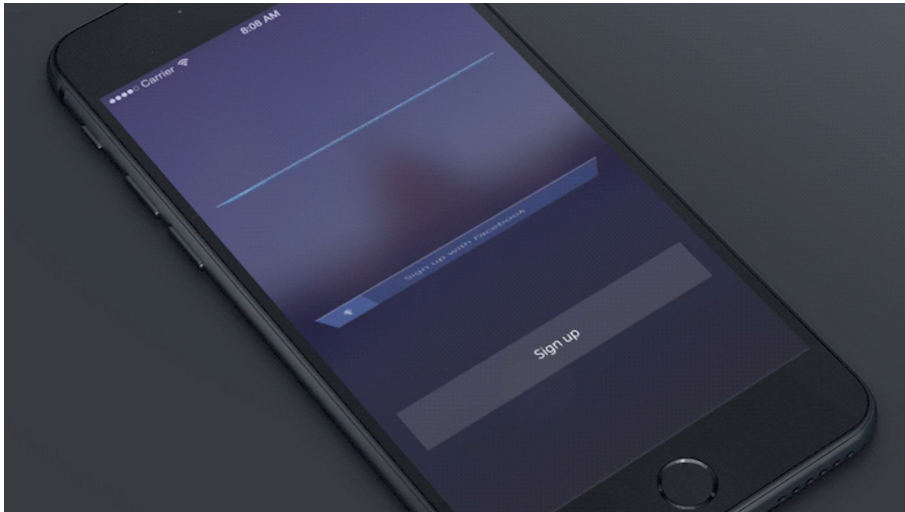

Figure 2.7: An example of Squash and Stretch animation. Example retrieved from Medium.com article created by Kit Oliynyk. Video example is shown here: https://youtu.be/LP4H1Iu2Grc

---

[6] *"Jedi Principles of UI Animation" by Kit Oliynyk:*
https://medium.com/@adaptivepath/jedi-principles-of-ui-animation-2b88423b1dac

Appeal

Appeal is a principle that mainly affects character animation, but has also important role in interface design. According to Johnston and Thomas (1981), viewers like to see charming, pleasant design that uses variety of shapes and propositions but is yet simple and clean. Shapes that are clumsy and hard to read are not appealing (see Figure 2.8 for an example).

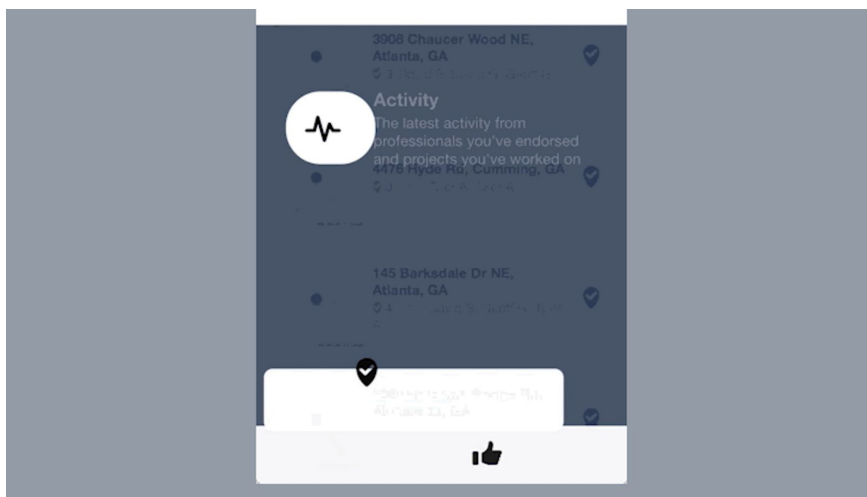*Figure 2.8: An example of appealing animation. Example retrieved from Medium.com article created by Kit Oliynyk[7]. Video example is shown here: https://youtu.be/lb_dk0HEESo*

Staging

Staging or demonstration is a completely clear presentation of any idea, action, concept or emotion (Johnston and Thomas, 1981). The aim of staging is to quickly present an action, whose meaning would be obvious and unmistakable to the whole audience (see Figure 2.9 for an example).

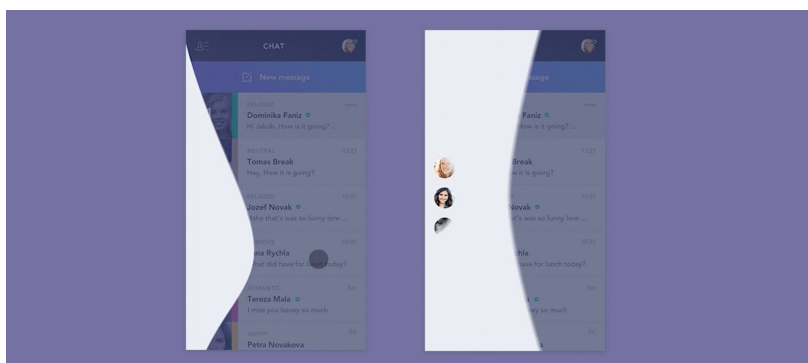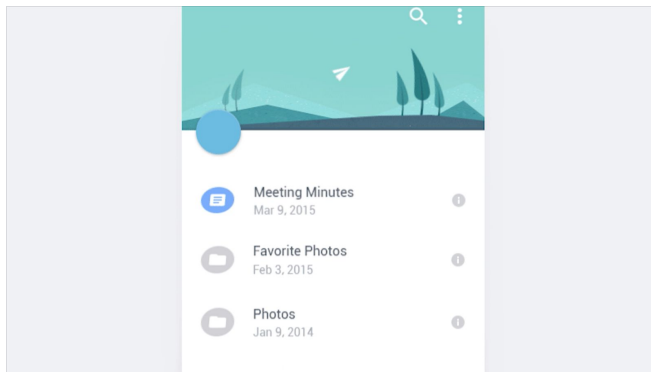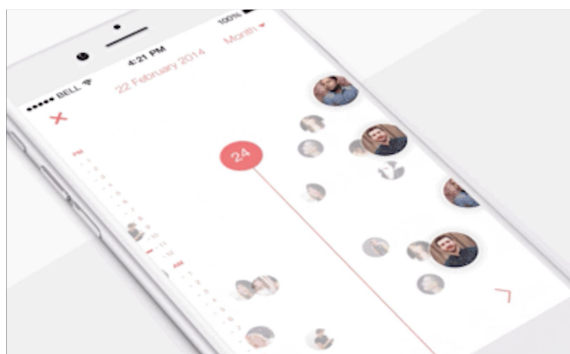*Figure 2.9: An example of Staging animation. Example retrieved from Medium.com article created by Kit Oliynyk. Video example is shown here: https://youtu.be/Gf88iqZhPMU*

---

[7] *"Jedi Principles of UI Animation" by Kit Oliynyk:*
https://medium.com/@adaptivepath/jedi-principles-of-ui-animation-2b88423b1dac

2.1.2 The possible benefits of animation to User Experience

In recent years, animations have become an important art of graphical user interface. The main reason for using animation or motion in a user interface is to make transitions feel more smooth and natural. Furthermore, animation helps designers to guide user's attention and focus their attention on important objects and changes in the interface. Using animation in a right way and with positive motives gives the designer an ability to "reinforce the hierarchy of content and to highlight what's most important at a specific point in time" (Head, 2016).

Functional animation helps people orient themselves within the interface, directs their eyes to see where a new element comes from and where a hidden element goes. For example, a shake animation occurring after a made mistake quickly indicates about the error. Meanwhile, for example, user noticing an error notification badge in the interface, would probably take longer to understand (Oliynyk, 2016).

A number of studies have explored the possible benefits of animated transitions. Shanmugasundaram and Irani (2008) examined the effect of animated transitions in zooming interfaces like metro maps. Their analyses suggest that the participants of their study solved given tasks in interfaces with animation approximately twice as fast as without animation. Besides, participants felt less necessity for processing time when animations were included to the interface design.

A study by Merz et al. (2016) investigated the influence of different animation styles on the perception of UX in animated transitions. They derived three animation principles (slow in and slow out, anticipations and follow-through) and applied them to common animated transitions in mobile applications. Their results from the pilot study showed that animation style in animated transitions could affect the perception of UX.

According to Head (2016), there is a list of benefits of using animation in interface design. Animation reduces cognitive load, helps to reduce change blindness, helps to communicate, attracts attention and directs focus. Even a small amount of motion in

an interface can make it easy to understand the interface at a glance and therefore save user's time and nerves (Head, 2016).

The capability of motion to attract and direct attention

Motion has an ability to capture people's attention (Pratt et al, 2010). During their experiments, Pratt et al. found that participants reacted more quickly to the objects that were animated than to the objects with no movement.

Head (2016) states that animation in the web is mostly known for its usage in the banners. The aim of animated banners is to attract the viewer's attention by *"preying on our visual reflexes"* (Head, 2016). Therefore, people get annoyed by the banners that are irrelevant to them and try to look elsewhere or even block ads from websites. The reason why moving ads and banners are so widely used in the web today, comes from the idea that movement catches viewer's eyes and is so hard to exclude. This is a smart and beneficial trick for the business, but annoying and disruptive for the users.

Animation acting as a reminder

Motion can also be used to focus user's attention on something that needs to be periodically dealt with and paid attention on (Head, 2016). This is not the most common practice, but there are some functionalities that need such usage, for example when filling in a form there might be a "save" button that viewers need to be reminded to click on. Using animation can be considered extremely commendable in such situations.

Reducing change blindness with animation

Dessart et al. (2012) suggest that animation can give notifications about changes occurring in display and can improve giving feedback on users' actions. Addition to that, animated transitions can be used in diverse occasions such as navigating from one view to another or when transformations are applied in the interface (Dessart et al, 2012).

Animation helps to strengthen the brand's personality and values

For a brand or a company, adding animation to the website's interface design can communicate the brand as being modern, updated and knowledgeable. Moreover, animation can create connection between the website and the customer while being lifelike and arising pleasant feelings (Harley, 2014).

Using animation to provide amusement

As the essence of animation dates back to the times when it was used in cartoons, animation can still be used for creating funny moments. Attracting user's attention can also be achieved by adding some moving and surprising elements.

Elements that fade in, change color, or otherwise move are considered to be amusing and can make the interface design look "pop" (Harley, 2014).

Using animation to Aid Comprehension and Understanding

Animating an element in the interface can help express how that element relates to other elements on the page and to any actions that the user has just taken (Harley, 2014). According to Nielsen (2010), the animation effect must begin within 0.1 seconds of the initial user action to effectively give response to user action.

Directing users' attention with animation can be considered especially when there is an object in the interface that the user must notice and thereupon act immediately (Harley, 2014).

2.2 Attention managing in e-commerce websites

A growing number of customers and providers have started using e-commerce services to conduct shopping and selling operations on the web. (Geng et al, 2012). According to Geng et. al. (2012), some behavioural patterns have evolved for users to browse the online shopping sites and to have effective ways to find the wished products.

Although e-commerce has been investigated for many years, the problem with percentage of fulfilled purchases has stayed similarly low for years (Baymard Institute, 2017). The most popularly pointed out reason for that is that customers tend to just browse different sites to compare the products and the prices. This is an indication to the fact that competition between different providers is tough.

When a user has entered a web shop and looks around, it means that he has given his current full attention and as the attention is gained, it needs to be cleverly used and turned into business profit. This means that some help to guide user to interact with the site in a right way is needed.

2.2.1 Attention Economy's impact on e-commerce

Directing attention in a proper way in e-commerce websites is extremely important from the perspective of Attention Economy. As it has been simply said by Matthew Crawford, "Attention is a resource – a person has only so much of it." (Crawford, 2015).

According to Thomas H. Davenport and J. C. Beck (2001), attention is focused mental engagement on a particular item of information. Items come into our awareness, we attend to a particular item, and then we decide whether to act (Davenport & Beck 2001, p. 20). Attention economy is a phenomenon that affects consumers and providers in many ways. Everyone is now eager to consume the

massive amount of online information meanwhile there are loads of brands, products and websites available, all of them aiming to attract people's attention and time.

While visiting the online shopping site, people may not notice when the website is undergoing remarkable changes, when important notes occur or notifications appear. Not noticing such relevant changes might lead to user making mistakes and feeling frustrated. For the business, it may end up losing a client and money. Therefore, considering using the animation might be a profitable solution.

Also, while there are thousands of online shops available, users are browsing between different providers and products before making a final buying act. Their idea of a perfect purchasing process seems to be very demanding, even small details of the web shop's layout design can annoy, frustrate or disturb them. The end goal for providers is to sell more, but it is far more difficult. To use the phrase of Thomas H. Davenport and John C. Beck, all the new products or offerings are a form of information that requires attention to be consumed (Davenport & Beck, 2001).

According to Davenport & Beck (2001), as previous generations didn't have the Internet, they didn't have problems with information consumption and attention distribution like people have now. Now it's almost impossible to give enough attention to all the information in the society. Focusing gets harder day by day.

2.2.2 Attention directing and sales

In e-commerce, managing the attention of customers and learning about their habits is important during both, the online sales and after sales process, because when the input is considered and implemented, it might help the provider to reach wider audiences and to increase the amount of returning customers.

According to Smith et. al. (1982), it is reasonable for the provider, that user will focus on a higher-priority tasks, when there are also lower-priority tasks presented. Therefore, the more relevant objects for the business on the graphical interface should gain the main focus, and other, more irrelevant objects, can be used as icons (Vertegaal, 2002). Keeping the interface as clean as possible and highlighting (also

with animation) the parts with most importance, can provide the positive result both for the customer and for the provider.

2.3 Relevance of the research topic to Human-Computer Interaction field

There are many studies done in Cognitive Psychology and Human-Computer Interaction field on the ability of animation to gain attention, but there is a lack of research on animation's ability to direct attention.

Web based animations used for advertising (like banners and other moving ads) have been investigated before. Hong et al. (2004) studied the effect of the frequency of animation on information processing of both relevant and irrelevant tasks. The results of their study suggested that processing of information didn't depend only on the attention an object attracts, but is affected by other items on the same screen. Yoo & Kim (2005) found a relation between attention and the animation on websites as they found an effect of attention on the performance of cognitive responses.

Animations and motion has become increasingly natural in modern websites with the rise of HTML5 and CSS3 transforms and transitions. Though web and mobile conferences have issued design and development considerations for adding interactivity to User Interface elements, the usability around this topic has been barely discussed. Furthermore, the knowledge on which types of motion to use for different design goals, should be studied and shared (Harley, 2014).

To sum it up, it revealed from the academic literature and studies done previously, that animation is already gaining bigger importance of graphical user interface. Animation has different functional abilities like attracting and directing attention, acting as a reminder and being helpful for reducing change blindness. From the academic literature, it also revealed that attention managing is extremely important in online shopping sites as it may reflect directly in the sales.

To complement the previously gained knowledge and inputs on animation's ability to attract and direct attention, the next chapter will investigate more deeply the examples of functional attention-directing interface animations that are described and illustrated in literature and in the industry. Furthermore, a review to outline the animation usage examples found in current online shopping websites will be done subsequently.

3 Animations used in web shops

There are many examples online which show the useful and pleasant use of animation that also helps to attract and direct user's attention. The following chapter will review and outline the functional animation usage examples and use-cases found in current e-commerce websites.

The aim of this chapter is to seek answers for the 4th research objective of the thesis:

- RO4: To observe the current functional animation patterns used in online shopping sites.

The input for finding attention attracting examples came from the knowledge and ideas shared by Val Head in her book "Designing Interface Animation" (2016). The list of example websites used is retrieved from Awwwards[8] – the community meeting point for digital design professionals from across the world. This site is known as a place to find inspiration, pass on knowledge and experience and to connect and share constructive critiques. Awwwards uses a transparent and strict evaluation system implemented by experienced professionals.

The selection of sites was chosen by the following filters:
- Category: E-commerce
- Tag: Animation
- Award: Honorable mentions

---

[8] *Awwwards: www.awwwards.com*

3.1 Navigation in the web shop

The visitor's goal is usually to find a product to buy or to just look around, therefore, product's findability, whether from the home page or from the menu, is a key to a successful business.

Using animation to help focus on important context

Animation can be used in a context that might actually help users to notice the information that is relevant for them. When users enter website there are things users are mostly interested in and using animations can help to make sure that the most important things are noticed (Head, 2016).

A good use of animation can be seen in websites where truly only the main information is animated and everything else is static and clean, there aren't even any navigation transitions or background animations. So all the animation is focused on making the most important information easier to take in at a glance (Head, 2016).

An example of how to put products into the highlight can be seen on Ode Goods[9] web shop. After loading the page, the product collection images slide in from the bottom to attract the viewer's attention directly to themselves. This is the only animation applied to the page, therefore it stands out clearly (see Figure 3.1 for an example).
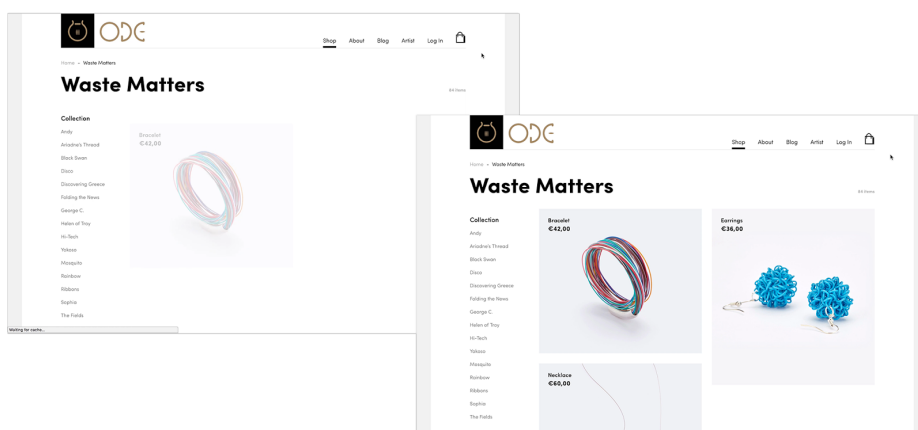
Figure 3.1: An example of Ode Goods web shop's home page, where product images slide in from bottom after loading the page. Video example is shown here: https://youtu.be/x4mCveKst2s

---

[9] *Ode Goods: https://www.odegoods.com/shop/collection/waste-matters/*

3.2 Choosing the product

When choosing a certain product from the products' list, after clicking on the product image or on a button "View more", a new page loads and therefore there usually isn't any animation added for leaving the page.

Sometimes, animations are added to the product's image to reveal the firstly hidden information or when a cursor hovers the image, system indicates it somehow (with colour, little motion like zooming in or out, etc.)

Animation used to reveal firstly hidden information
It is trending that web shops use big product image and add less information in the first view. So, some indications for further information or buttons reveal after hovering the image. Little animation can be added to smoothly reveal new information and to attract user's eyes on the texts and elements used. A good example of such usage can be seen on Ode Goods web shop (see Figure 3.2 for an example).
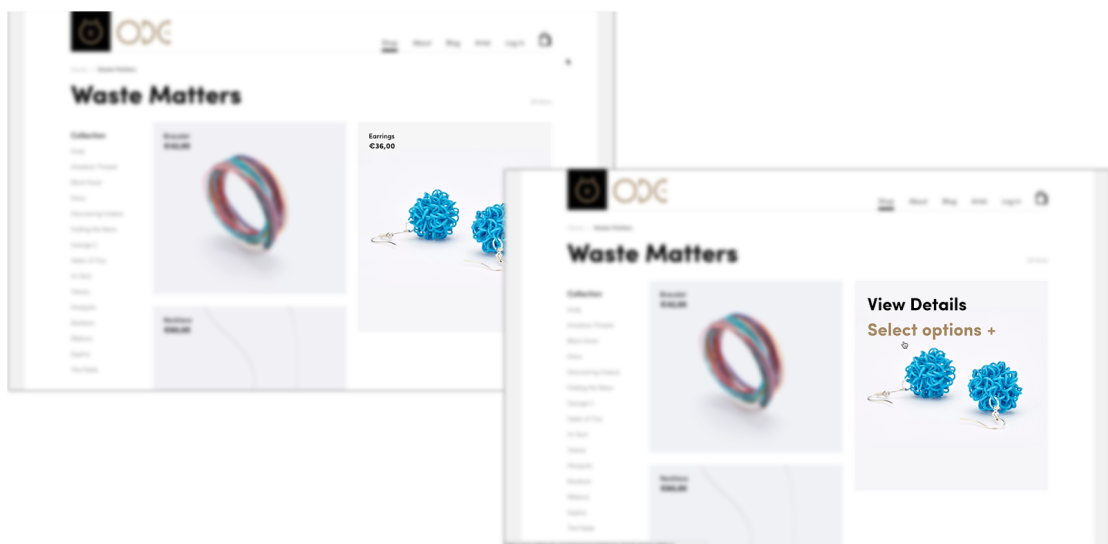
Figure 3.2: An example of Ode Goods[10] web shop's home page, where a little animation is used to smoothly drag attention to the information revealing after hovering the product image. Video example is shown here: https://youtu.be/HMG41-FWzaY

---

[10] *Ode Goods: https://www.odegoods.com/shop/collection/waste-matters/*

3.3 Product detailed view

The detailed view page of the product usually gives an overview of the characteristics, properties and images of the product.

Drawing attention to the context change
The content of the web page changes while being switched to a detailed view, being zoomed in, reordered etc. The content may shift to give a more detailed view or a less detailed view of the same information or to reveal new information. Using animation to show where elements have moved to, which objects have appeared, and which elements were there before, make shifts in context easier to follow and can help reduce potential confusion of the user (Head, 2016).

Woobag[11] has an example of how to easily draw attention to the information about the product after switching to a product's detailed view page. The information box slides slightly up from the bottom (see Figure 3.3 for an example).
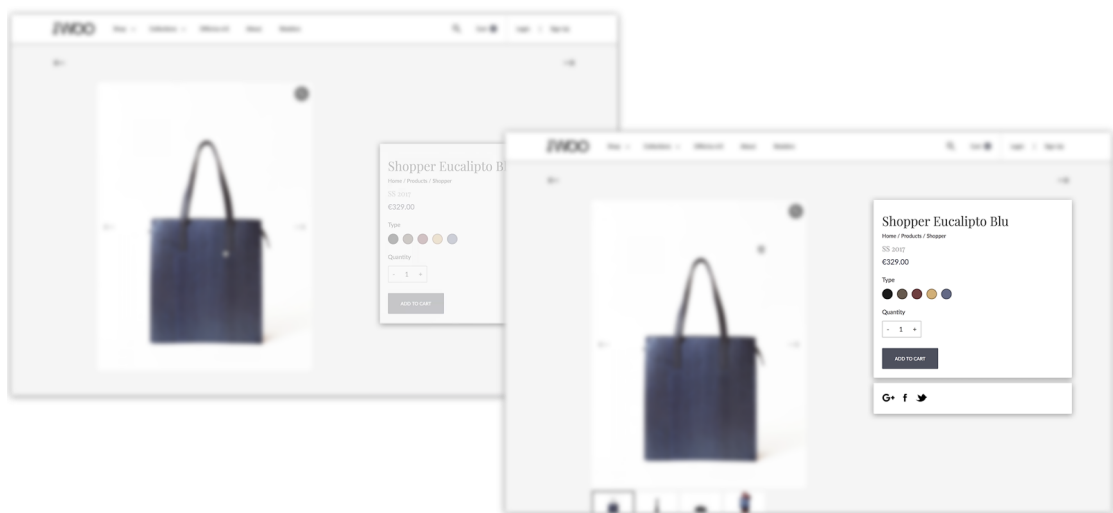
Figure 3.3: An example retrieved from Woobag's web shop, of how to attract attention to product's info after switching to a product's detailed view. Video example is shown here: https://youtu.be/gWOoUfqM1VU

Using animation to show user where to look next

Eye movement through the content can be directed with the motion (Head, 2016). The direction of the animation helps users visually keep track of which object in the layout they have been interacting with and what's happening next.

In the detailed view page, the characteristics of the product are usually pointed out. For example, most web shops provide the opportunity to choose the color or size of the product. Boom Botix[12] has a minimalistic animated example of how to indicate that clicking on the chosen color will change the color of the product (see Figure 3.4 for an example).

Figure 3.4: An example retrieved from Boom Botix web shop, of minimalistic animation that indicates how chosen color button changes product's color. View video example: https://youtu.be/-9Qp6nr4lj8

---

[12] *Boom Botix: http://pro.boombotix.com/*

Woobag[13] uses the small sliding motion after choosing a product's color (see Figure 3.5 for an example).
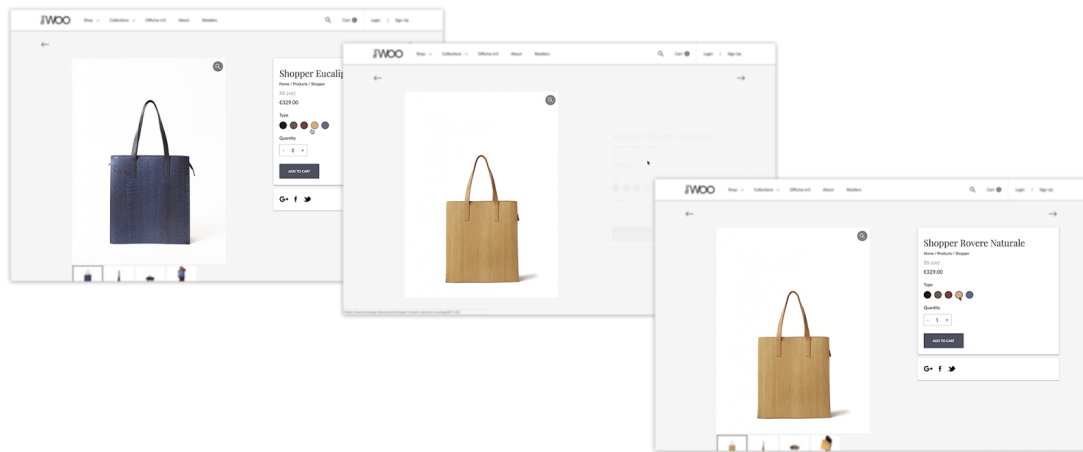
Figure 3.5: An example retrieved from Woobag's[14] web shop, of a minimalistic animation that indicates how chosen color button changes product's color. View video example:
https://youtu.be/UpM-amJ2X74

3.4 Adding product to cart or wish list

After the user has selected a product and has chosen specific characteristics of the product, he usually has an option whether to add the product to the wish list or to the shopping cart. It has been suggested that when a web shop doesn't have wish list, people use shopping list to collect the goods they are interested in. Whether a web shop has a wish list or not, in case of adding a product to either of those lists, some animation should be added to illustrate the product's movement.

Supporting interaction with a clear visual response
When a user has added a product to the cart, the interface usually indicates it somehow. There are many examples found in the internet of how animation is used for that. For example, Net-a-porter[15] uses animation to illustrate the product's movement to the shopping bag after clicking the button "Add to shopping bag". The shopping bag icon expands to a box where the details of a product and also a text

---

[13] *Woobag:* https://www.woobag.it/cart
[14] *Woobag: https://www.woobag.it/cart*
[15] *Net-a-porter: www.net-a-porter.com*

"Just added to your bag" are presented. The box elements disappear in a few seconds (see Figure 3.6 for an example).

Figure 3.6: An example of product's movement to the shopping bag in the web shop Net-a-porter[16].
View video example: https://youtu.be/YmGmBWiuBww

An example by Fantasy[17] illustrates even more precisely how the chosen product moves to the shopping cart (see Figure 3.7 for an example).
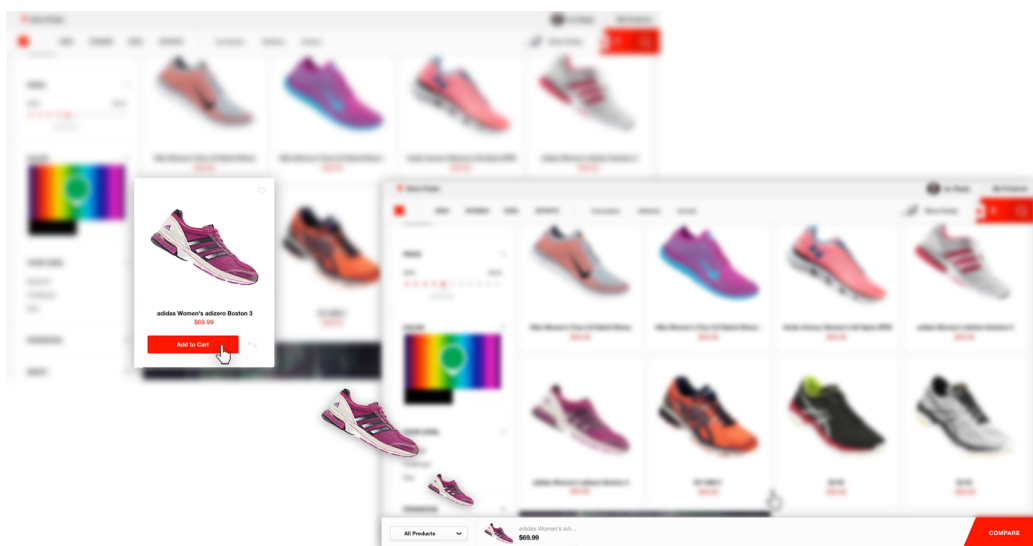
Figure 3.7: An example created by Fantasy of product's movement to the shopping bag in the video prototype by Fantasy. View video example: https://youtu.be/MZdHf-BDo1g

---

[16] *Net-a-porter: www.net-a-porter.com*
[17] *Fantasy: http://www.fantasy.co/*

3.5 Shopping cart view

Inside the shopping cart, there is a collection of the products a user has picked. In this view, there are different interactions like viewing the cart, deleting product, changing the amount of products, returning to shopping, taking a further step and starting fulfilling the purchasing process. All of those steps are important and need to be addressed clearly. Yet again, animation can be helpful in this process.

Animations of disappearing and reappearing elements

When user wants to delete a product from the cart, there should be some indication that presents the function that product has been deleted. Web shop Woobag[18] has a great example of such interaction using motion. After the product has been deleted from the cart, a notification slides in from the top right corner to notify user that the product has been deleted (see Figure 3.8 for an example).
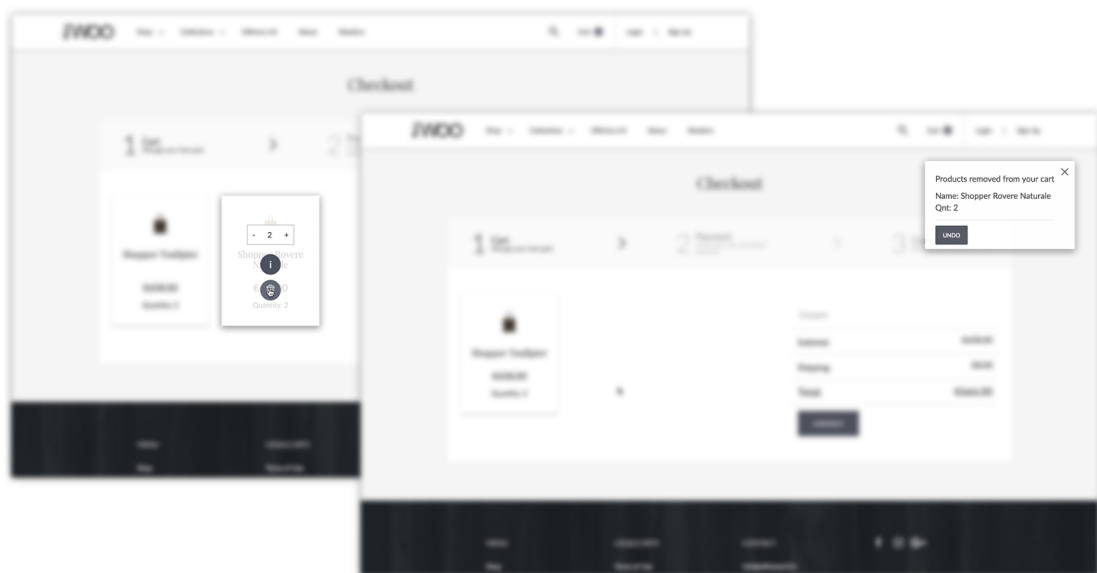
Figure 3.8: An example retrieved from web shop, of the motions used while elements disappear in the shopping bag. Video example is shown here: https://youtu.be/z5JET_FHWxI

---

[18] *Woobag: https://www.woobag.it/cart*

Another example of the animation used for showing that a product has been removed from the cart can be seen in web shop by AIAIAI (https://aiaiai.dk/). They use a very simple solution to indicate that something is happening by viewing small loading dots (see Figure 3.9 for an example).
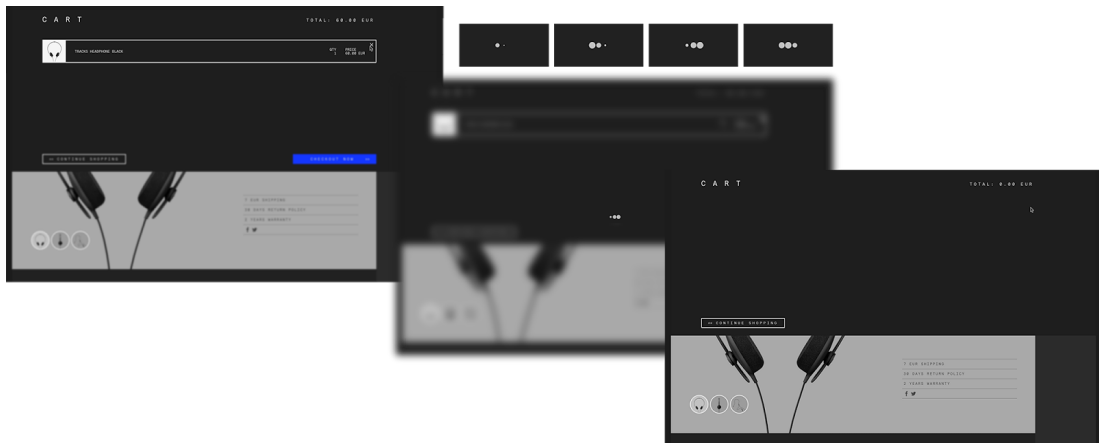
Figure 3.9: An example of the animation used for showing that a product has been removed from the cart in AIAIAI[19] web shop. Video example is shown here: https://youtu.be/jnPDV1RaEjA

There is also a function to restore the previous state. So the website asks user whether he wants to undo the deleting and put the product back to the cart list. After clicking the undo button, the product slides back to its previous place and a notion saying "Undo completed! Product restored" appears (see Figure 3.10 for an example).
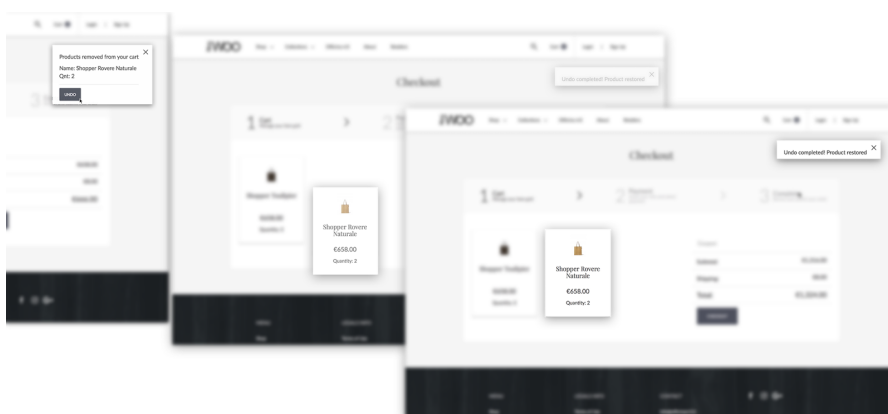
Figure 3.10: An example retrieved from Woobag's[20] web shop of the motions used while deleted product is being restored in the shopping cart. Video example is shown here: https://youtu.be/z5JET_FHWxI

---

[19] *AIAIAI: https://aiaiai.dk/*
[20] *Woobag's: https://www.woobag.it/cart*

3.6 Filling in a payment form

The final step of purchasing process is usually filling in a payment form. For the business, this is an important part of the web shop because in this step the user is actually eager to handle out money. But payment flows have very high dropout rate (Baymard Institute, 2017), therefore it is necessary to put some effort on its design and also to consider adding animation to attract user's attention on the relevant elements and to avoid user frustration.

Checkout form's input animations

Classical forms are usually those that have text input, input label and a placeholder example text. For example, when input label is "E-mail" then input placeholder is usually "For example: yourname@mail.com". Sometimes designers use input label inside the input instead of placeholder text to save space or to make input fields look more aesthetic. The problem with such solution is that when the user starts filling in the placeholder, the input label disappear and user might forgot of which input is he/she currently filling.

For that reason, form fields are now usually designed in a way that input label is firstly written inside the input field and when the user starts filling in the field, the label decreases and slides slightly up while still staying inside the field (see Figure 3.11 for an example). It helps to save space and make form design look better but at the same time user experience doesn't worsen.

Figure 3.11: An example of a web shop checkout form's input animation where the input label decreases and slides slightly up. Example retrieved from Market-Me[21]. View video example: https://youtu.be/Y3z4DL55P78

---

[21] *Market-Me: https://www.market-me.fr/barni-eshop/*

Animations to Aid Comprehension and Understanding

In online shopping site, where the user's attention is already attracted, the design focus should be aimed at designing an animation that will increase the user's ability to understand the User Interface (Harley, 2014).

In many e-commerce checkout forms, *"if a user indicates different billing and shipping addresses, the fields for the second address are animated and appear underneath as a result of the user's action"* (Harley, 2014) (see Figure 3.12 for an example).
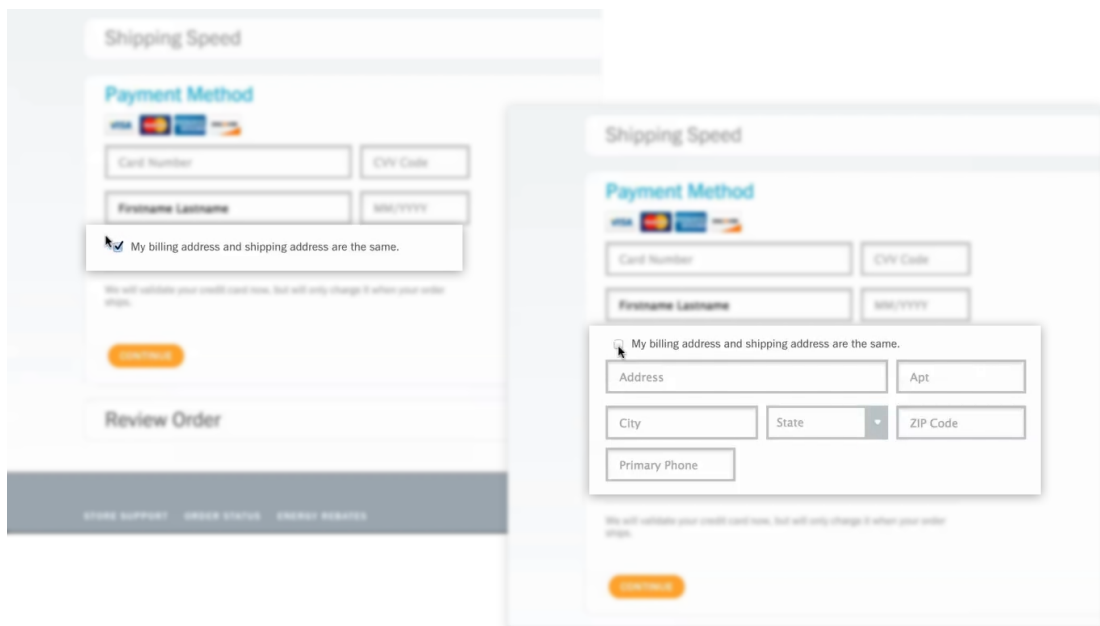
Figure 3.12: An example of activating different shipping address and of animated result to user's action. Retrieved from https://goo.gl/FcDLZ6. View video example: https://youtu.be/kXvs_CPCMdY

Using animation to give effective error notifications in a form

While filling in the payment form, mistakes and errors are eager to happen. This might lead to user frustration (Baymard Institute, 2017). When users get the notice that there is a problem with the provided information, they are most frustrated and it leads to high dropout rates (Villar, 2014).

A team behind Stripe Checkout[22] has designed a solution for providing error notification by adding a shaking animation to the form (see Figure 3.13 for an example). "The form is basically shaking its head at you" (Villar, 2014)
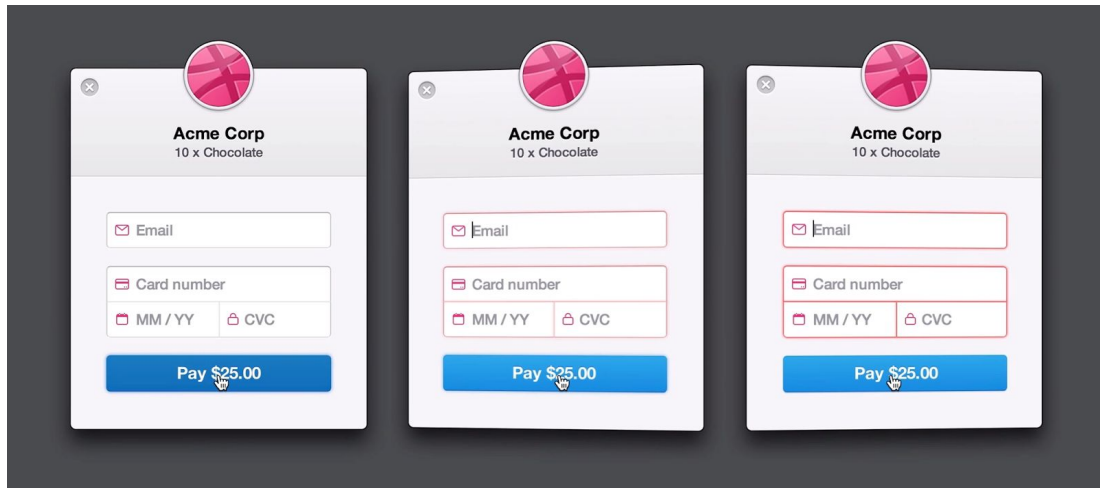
Figure 3.13: An example of required field notification animation in form. Form is designed by a team behind Stripe Checkout[23]. View video example: https://youtu.be/-9zR3bkdOxI

In line with the examples and input gained during the review on different modern shopping sites and the animation techniques used there, some ideas and knowledge will used for designing the study and the website prototype.

---

[22] *Stripe Checkout: https://stripe.com/checkout*
[23] *Stripe Checkout: https://stripe.com/checkout, https://goo.gl/eFUkVE*

4 The Study

The purpose of this research study was to investigate the effects of functional animation on the user experience and on how efficiently users solve different types of shopping tasks in web shops. Also, more general focus of the study was also to assess whether using animations help direct user's attention quicker to the important elements of the interface than using static objects.

The aim of this chapter is to seek answers for the research question of the thesis:

- RQ: How functional interface animation affects the efficiency of users and the user experience across different types of shopping tasks in web shops?

By the term "efficiency" it is meant how much effort (measured in time) users required to solve the task.

4.1 Method

To answer the research question, two studies were done. Firstly, a quantitative experimental study was carried out focusing on the quantitative results collected through comparison of two similar but slightly different prototypes. The A/B Test chosen for the empirical-analytical study focused on objective knowledge through measuring variables. The data collected from both experimental groups was important for measuring the possible differences.

Secondly, a study of user preference was conducted for participants' feedback. The questionnaire collected participants background information and asked 5 questions about the visual aspects, navigation, getting information and overall appreciation. While the A/B Test was performed online, there was no good option to ask participants to do a Thinking Aloud method for hearing their thoughts, although it would have given some instant feedback on the prototype. Also, because none of the participants were native English speakers and had different command levels of

English, it would have probably not being easy for everyone to verbalize their thoughts.

4.1.1 Subjects

40 participants were recruited for the A/B Test and for a study of user preference, involving both people working full time (the majority) and university students. The number of participants was chosen based on the input of pilot study. This amount seemed adequate enough for providing the results but at the same time the capability of researcher's analysis was considered. Participants were randomly assigned into two groups. 20 participants in the group A saw a website prototype without animated elements and 20 participants in the group B saw a prototype with animations (see Table 4.1 for an example).

In group A, there were 14 male and 6 female participants. The average age of the participants was 24,7 years and varied between 18 and 38. In group A, there were 10 Estonian participants, 9 Portuguese participants and 1 Syrian participant. In group B, there were also 14 male and 6 female participants. The average age of the participants was 24,8 years and varied between 18 and 50. In group B, there were 11 Estonian participants, 8 Portuguese participants and 1 Ukrainian participant. In group A, 10 out of 20 participants did online shopping regularly, 8 persons had done it at least once and 2 persons had never done online shopping. Interestingly, group B had the same experience with online shopping.

Table 4.1: Background information about the participant of the study

	Number of participants	Female	Male	Average age	Estonian nationality	Portugese nationality	Syrian nationality	Ukrainian nationality	Does online shopping regularly	Has done online shopping	Had never done online shopping
Group A (without animation)	20	6	14	24,7	10	9	1	–	10	8	2
Group B (with animation)	20	6	14	24,8	11	8	–	1	10	8	2

4.1.2 Designing a prototype

The experimental setup for preparing the online A/B test was developed using an prototyping program Proto.io[24], which allows to create animated interface designs (see Figure 4.2 for an example). The researcher chose to use this tool because this program allows to create fully functional prototype without using any coding.
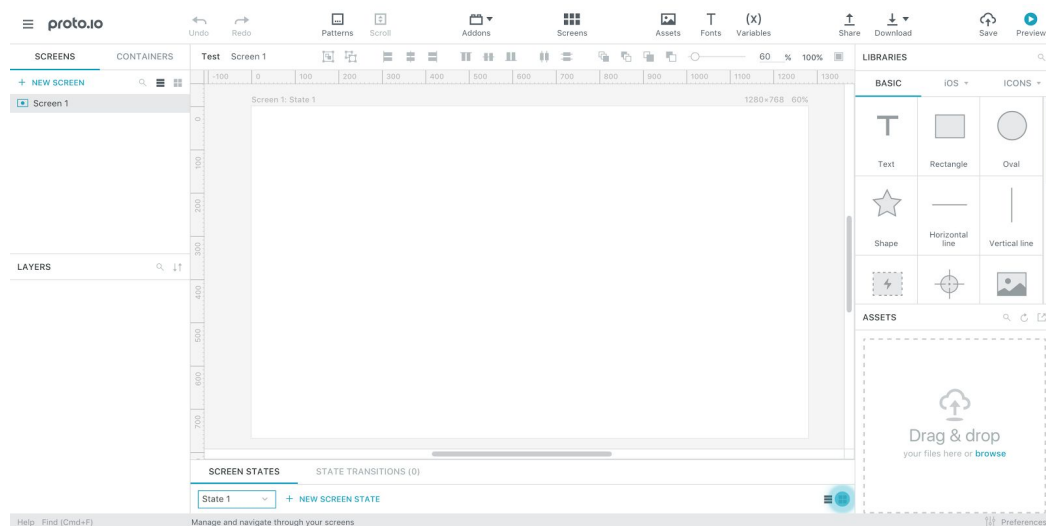
Figure 4.2: Proto.io prototyping program interface

Two prototypes that had exactly the same layout design and functions were created. The difference was that prototype A[25] had no animations and prototype B[26] had different functional animations implemented. The selection of animations chosen for prototype B were based on the review done previously on current animation patterns used in web shops nowadays.

In both prototypes, the interaction activities that were chosen are included in the usual purchasing process. These interactions was chosen because it represented one of the major activities that users need to perform when buying online. The purchasing process was divided into six (6) different steps and for every step a task description view was created for the user (see Figure 4.3 for an example).

---

[24] *Proto.io: https://proto.io/*
[25] *Video example of prototype version A (without animations): https://youtu.be/TNXebFxKF_w*
[26] *Video example of prototype version B (with animations): https://youtu.be/SLb5g2kk0xs*
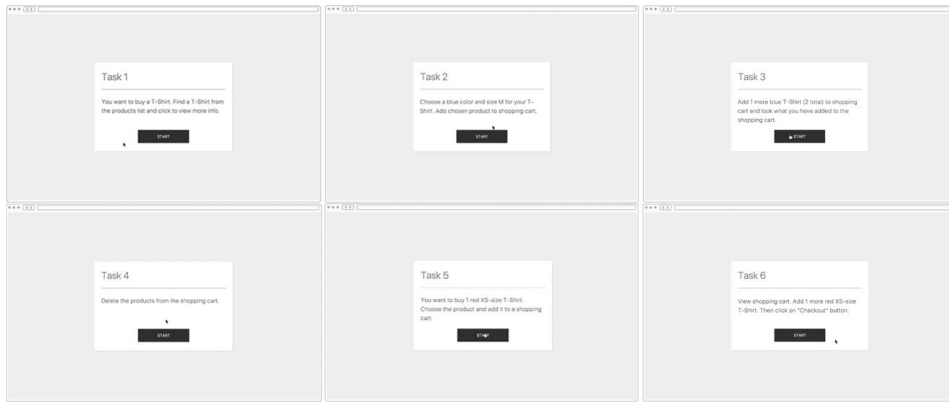
Figure 4.3: A/B Test's task views with scenario description

The task scenarios were also added to the lower left corner to act as a reminder. Although participants were precisely informed to memorize the tasks, they tended to forget what was asked (see Figure 4.4 for an example).
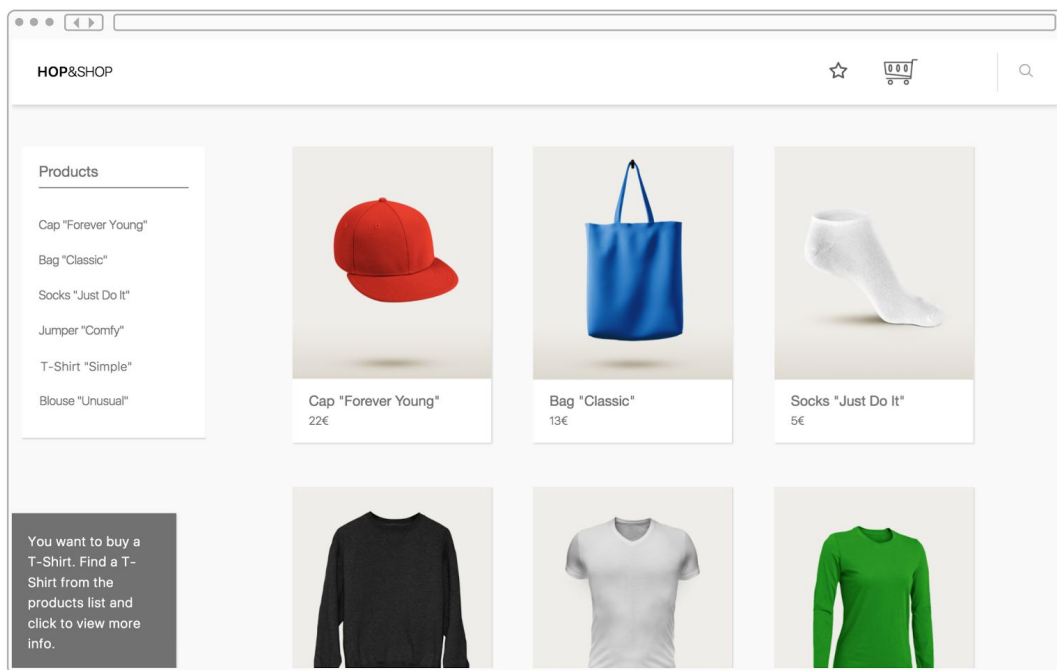
Figure 4.4: Task scenario description reminder at lower left corner of the interface

4.2 Procedure

Participants were randomly assigned to two groups. Prior to starting the experiment, participants were instructed about the structure of the study and the possible limitations that may occur during the study. They then received a link generated in Lookback[27] environment. This program helps to send a self-test link and instructions to participants, makes a screen recording video of the participant's desktop and after participant has allowed to upload the video, Lookback collects all the results to one folder.

The subjects were asked to perform 6 different scenarios using a web shop prototype. To get adequate information about the user behaviour, participant performance was screen recorded with lookback.io and later all of the tasks were separately analysed and compared with other prototype's results. The aim was to measure how much time and how many clicks it took to perform the tasks. Both groups got the same scenarios to follow.

After a participant had performed all of the tasks asked in the prototype, he/she was directed to a study of user preference. In this survey, some background information about the participant were asked and questions about different criterias were asked. Later, users stopped the screen recording and uploaded the video. The whole process is illustrated in the Figure 4.5.
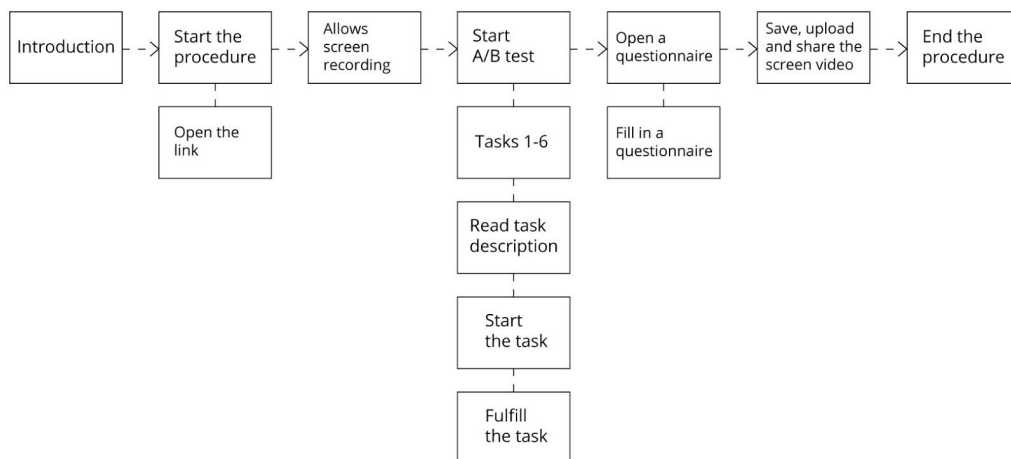
Figure 4.5: The schema above illustrates the whole study procedure.

4.2.1 Given task scenarios

Here is a list of scenarios participants got before starting to perform the tasks. Before every new task, they were shown a scenario to follow. Every task started with a click on "Start" button and ended with a new task description view. The time and clicks spent between were measured.

The intend to buy wasn't considered in this study. Therefore, users didn't get a chance to choose the product they would have bought in normal situation. As mentioned before, the goal was only to track how users act in buying process and whether animation had any effect on their performance. The scenarios were following:

Task 1: "You want to buy a T-Shirt. Find a T-Shirt from the products list and click to view more info."

Users started the experiment after reading the first instruction and by clicking the "Start" button. Users searched where to find the products list and how to choose a T-Shirt category from the list. After clicking on the product image, on the button "View detailed info" or on the T-Shirt category in the left side menu, the counter stopped and a scenario for another task appeared on user's screen.

In the task 1, the difference between animated and non-animated interface was:

a) Non-animated interface - after refreshing/loading the page, everything is static (see Figure 4.6 for an example)

Figure 4.6: An example of non-animated interface version A task 1. Video example is shown here: https://youtu.be/TNXebFxKF_w

b) Animated interface - after refreshing/loading the page, products slid in from the bottom with a little easing animation (see Figure 4.7 for an example). Also, a zooming animation appeared when hovering the product's image (see Figure 4.8)
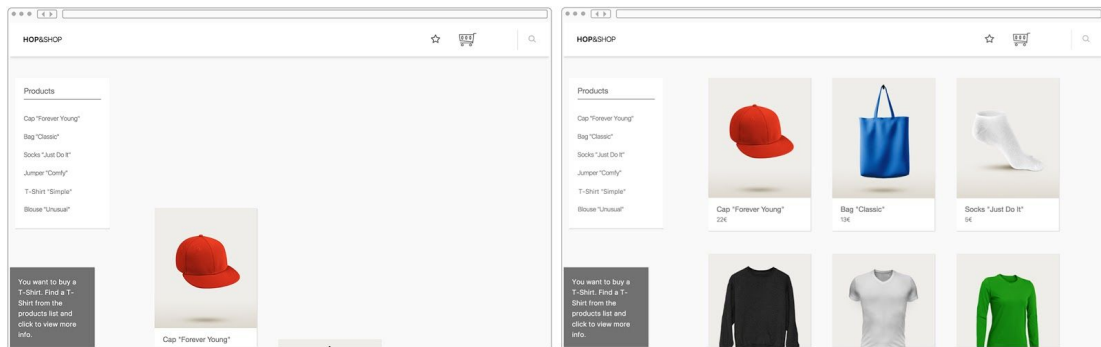
Figure 4.7: An example of animated prototype version B task 1, where products slide in from the bottom after loading the page. Video example is shown here: https://youtu.be/SLb5g2kk0xs
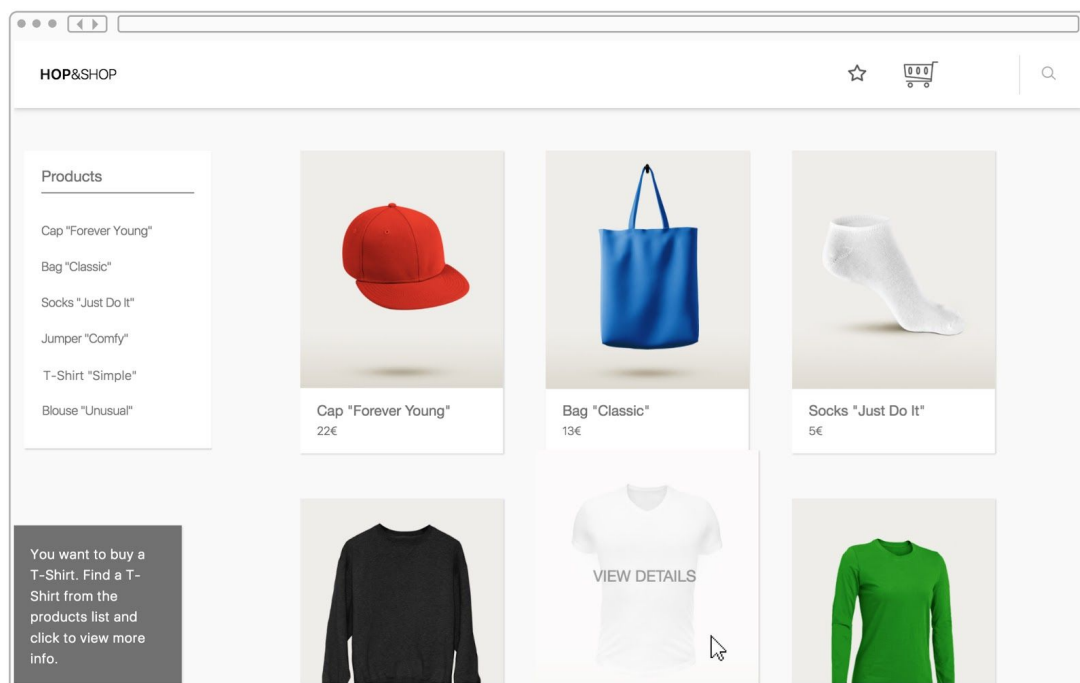
Figure 4.8: An example of animated prototype version B, where a zooming animation appeared when participant hovered over the product's image. Video example: https://youtu.be/SLb5g2kk0xs

Task 2: "Choose a blue color and size M for your T-Shirt. Add chosen product to shopping cart."

Subjects started the next task after reading the second instruction and by clicking the "Start" button. The participant had to find the product's info in the right side of the interface. There was a possibility to change the color and the size of the product. After doing so, user had to add the product to shopping cart by clicking on a button "Add to shopping cart".

The difference with animated and non-animated interface here was:

a) Non-animated interface - none of the elements moved after loading the page (see Figure 4.9 for an example)

Figure 4.9: An example of non-animated interface version A task 2. Video example is shown here: https://youtu.be/TNXebFxKF_w

b) Animated interface - the interface gave animated indications that color and size had been changed. Also, when clicking on the "Add to shopping cart" icon, a small box quickly animated from the top corner with easing animation to notify that the product had been added (see Figure 4.10 for an example)
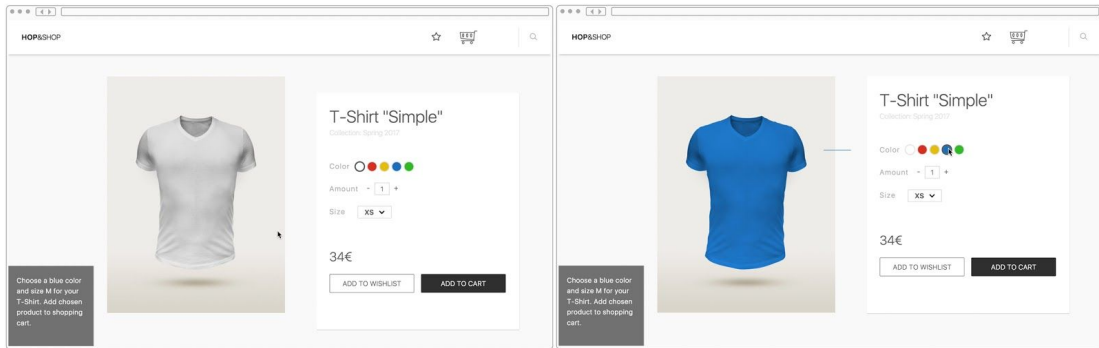
Figure 4.10: An example of animated interface version B task 2. Video example is shown here: https://youtu.be/SLb5g2kk0xs

Task 3: "Add 1 more blue T-Shirt (2 total) to shopping cart and look what you have added to the shopping cart"

The participant had to click on a shopping cart icon or on a button "View shopping cart". The aim of this task was to measure, how quickly subject found the shopping cart icon or a button and how fast he/she could perform the task.

The difference with animated and non-animated interface here was:

a) Non-animated interface - everything was static (see Figure 4.11 for an example)
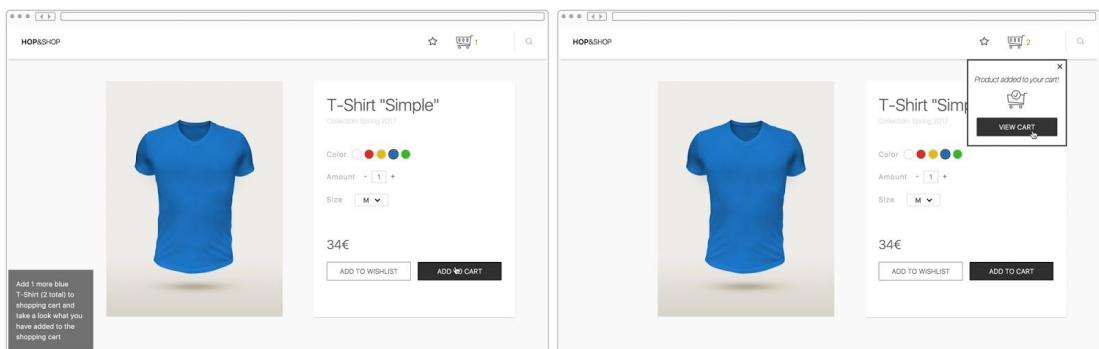
Figure 4.11: An example of non-animated interface version A task 3. Video example is shown here: https://youtu.be/TNXebFxKF_w

b) Animated interface - a notification box slid in from the upper right corner to indicate that the product has been recently added to the cart
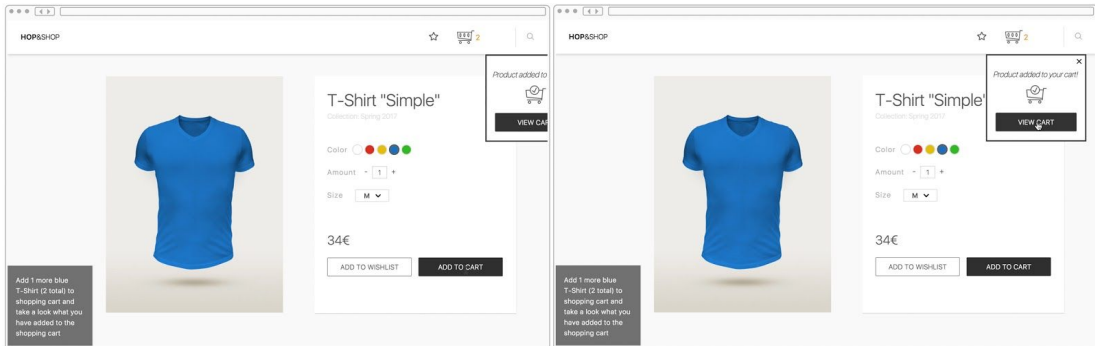
Figure 4.12: An example of animated interface version B task 3. Video example is shown here: https://youtu.be/SLb5g2kk0xs

Task 4: "Delete the products from the shopping cart".

The difference with animated and non-animated interface here:

a) Non-animated interface - only the vanished product and some text indicated that product had been deleted, but nothing moved in the interface (see Figure 4.13 for an example)
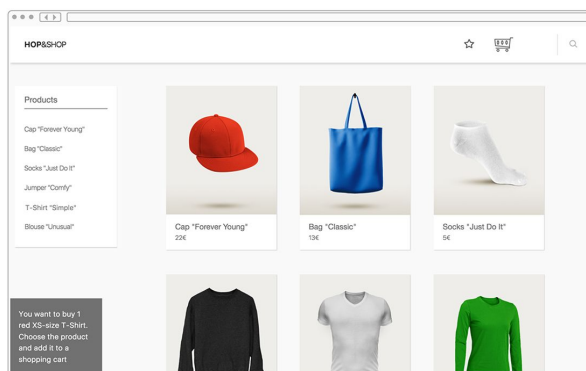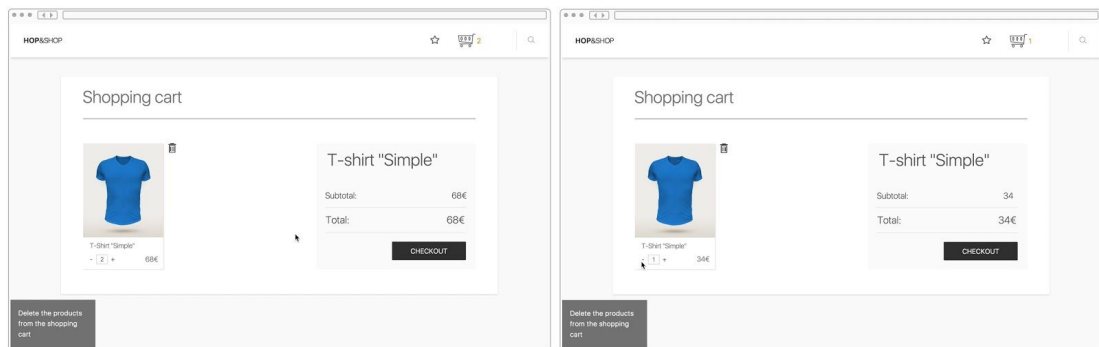

Figure 4.13: An example of non-animated interface version A task 4. Video example is shown here: https://youtu.be/TNXebFxKF_w

b) Animated interface - when the user deleted the object from the shopping cart, the result of this act was indicated with animation. The product image and info slid in from the bottom and the trash bin icon appeared soon later (see Figure 4.14 for an example)
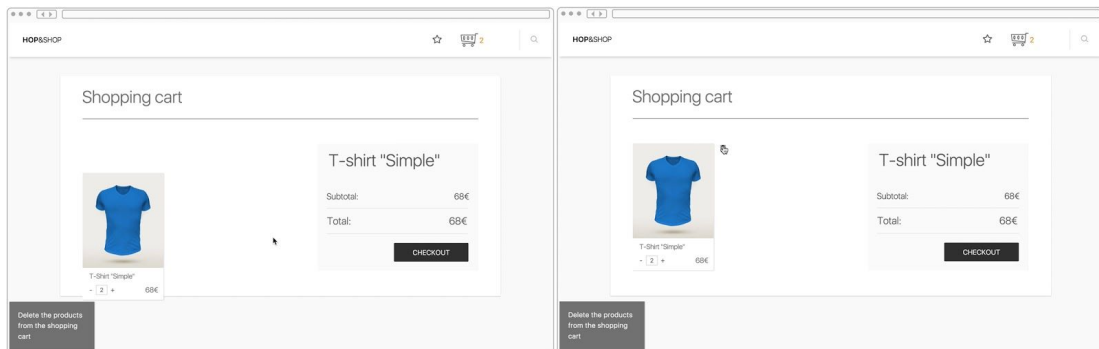
Figure 4.14: An example of animated interface version B task 4. Video example is shown here: https://youtu.be/SLb5g2kk0xs

Task 5: "You want to buy 1 red XS-size T-Shirt. Choose the product and add it to a shopping cart "

The difference with animated and non-animated interface here:

a) Non-animated interface - the first screen the participant saw was the empty shopping cart view that had no movement. Next, he/she was forwarded to the products list/home page view and everything looked the same as in the task 1 (see Figure 4.15 for an example)
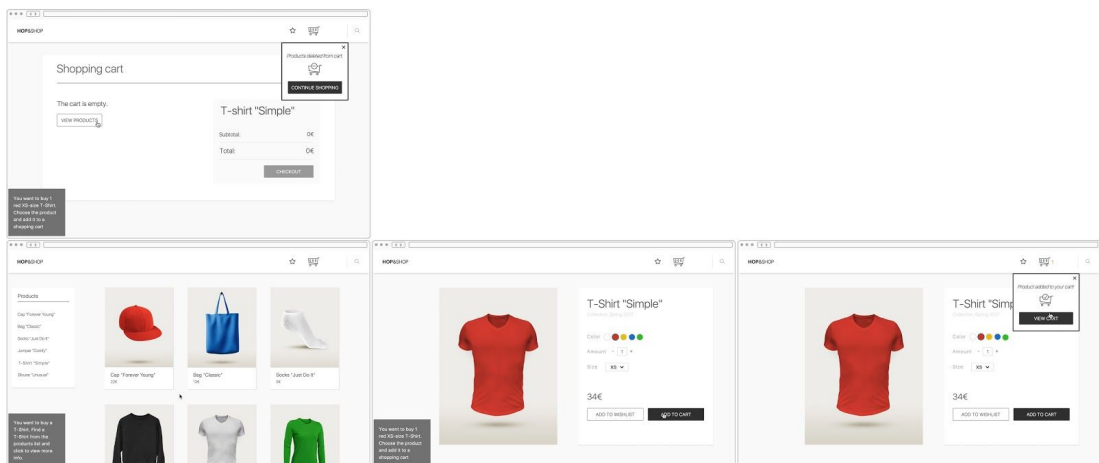
Figure 4.15: An example of non-animated interface version A task 5. Video example is shown here: https://youtu.be/SLb5g2kk0xs

b) Animated interface - the empty shopping cart view here had 2 different animations. A notification box slid in from the upper right corner and the "View products" button appeared with a little easing transition. After, the same animations were shown as in tasks 1, 2 and 3 (see Figure 4.16).
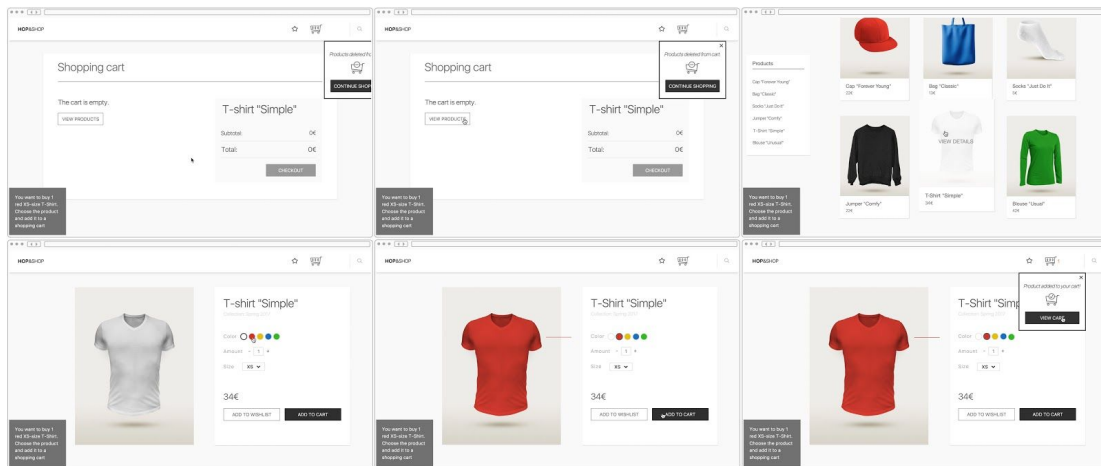
Figure 4.16: An example of animated interface version B task 5. Video example is shown here: https://youtu.be/SLb5g2kk0xs

Task 6: View shopping cart. Add 1 more red XS-size T-Shirt. Then click on "Checkout" button

Firstly, it was measured, whether there was a difference when performing the same task on first and on second time. User is in the shopping cart view and has an option to add one extra t-shirt clicking on "+" icon or to go back to the product's view page and add one product from there.

The difference with animated and non-animated interface here:

a) Non-animated interface - only the amount numbers changed without any movement (see Figure 4.17 for an example)
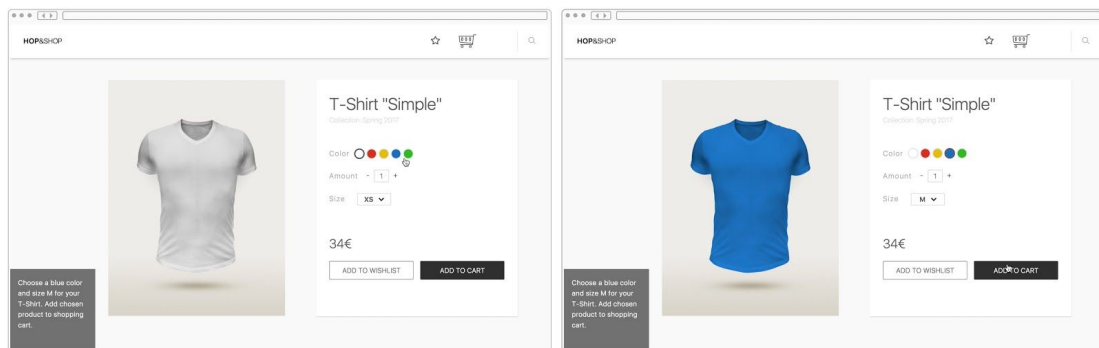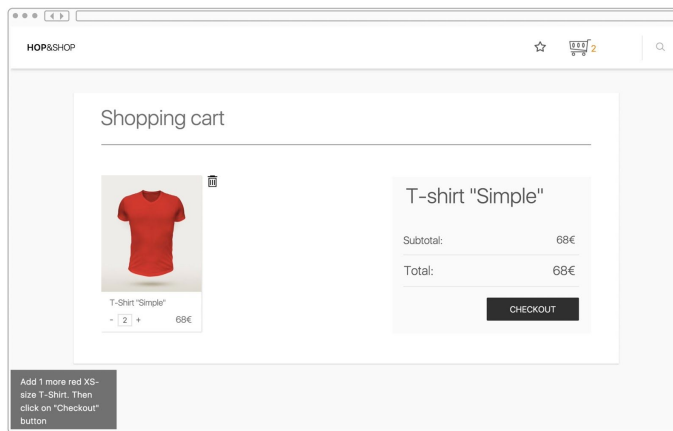
Figure 4.17: An example of non-animated interface version A task 6. Video example is shown here:
https://youtu.be/TNXebFxKF_w

b) Animated interface - when user clicked on "+" icon, the result of this action
   was indicated with animation (see Figure 4.18 for an example)
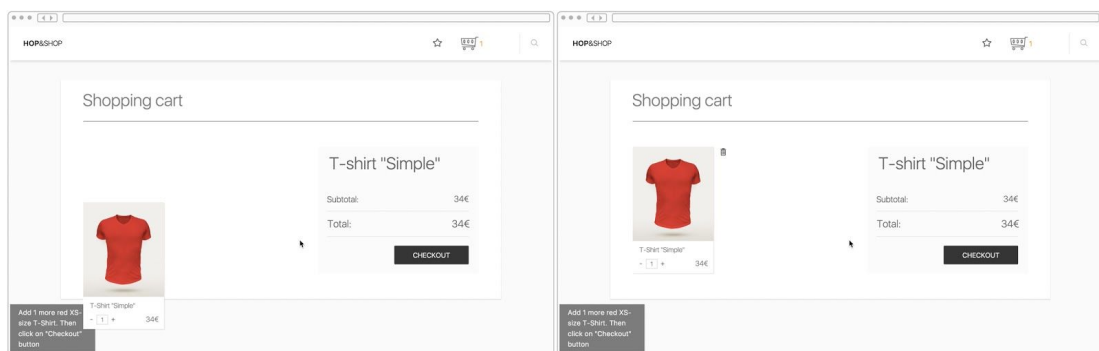
Figure 4.18: An example of animated interface version B task 6. Video example is shown here:
https://youtu.be/SLb5g2kk0xs

4.2.2 A Pilot study

A pilot study was carried out on a small group of students from University Fernando Pessoa (see Figure 4.19). The aim of the pilot study was to evaluate the time and statistical effect to predict the appropriate sample size and to understand what needs to be improved in the prototype. The experiment protocol (see Appendix 2 "Experimental Test Script") was also tested in order to understand if it is clear enough for the participants.

It revealed from the pilot study that the prototype had some minor mistakes in the interface design that confused participants and needed to be fixed before the main study. During the pilot study, the subjects could recall the task descriptions from the paper that was placed in the table and where all the tasks were written down. But it also occurred that participants spent too much time on looking at the paper and some of them even took the paper to their left hand and read the task instructions straight from there, not from the prototype instruction pages. Therefore, to still give the participant the opportunity to recall the tasks, they were later added to lower left corner of the prototype.

Figure 4.19: A student from University Fernando Pessoa performing a pilot study.

5 Findings

The study subjects' performance was measured with task completion time and with the number of clicks done while fulfilling the tasks. In the following chapter, the results from the study will be compared and analysed.

The study had 2 test groups: Group A and Group B. Group A fulfilled the tasks using web shop prototype with no animations and Group B fulfilled the tasks using the prototype with added animations. Participants in both groups performed the study online. Participants had overall 6 tasks to complete, therefore every task will be compared and analysed separately.

5.1 Task completion time and number of clicks done

Task completion time is the amount of time (in seconds) a participant took from the moment he/she clicked on a "Start" button after reading the instructions of a task, until arriving at the instruction page of the next task. The task completion time of each participant and each task was measured and marked manually by the researcher while watching the screen recorded videos. After that, the measured info was formed into a table and the average time of a group's performance was calculated.

The number of clicks done for fulfilling the task was also measured manually by the researcher while watching the screen recorded video. As the Proto.io[28] program highlights all the clicks participant does in the interface, not only the clicks done while navigating between different pages, the clicks done in the same page were counted, too.

5.1.1 Task 1

Task 1 description was: "You want to buy a T-Shirt. Find a T-Shirt from the products list and click to view more info." There were two options to solve this task.

---

[28] *Proto.io: https://proto.io/*

Participant had a choice to click on the T-Shirt image or to click on "T-Shirt Simple" option found in the side menu located in the left side of the interface (see Figure 5.1).
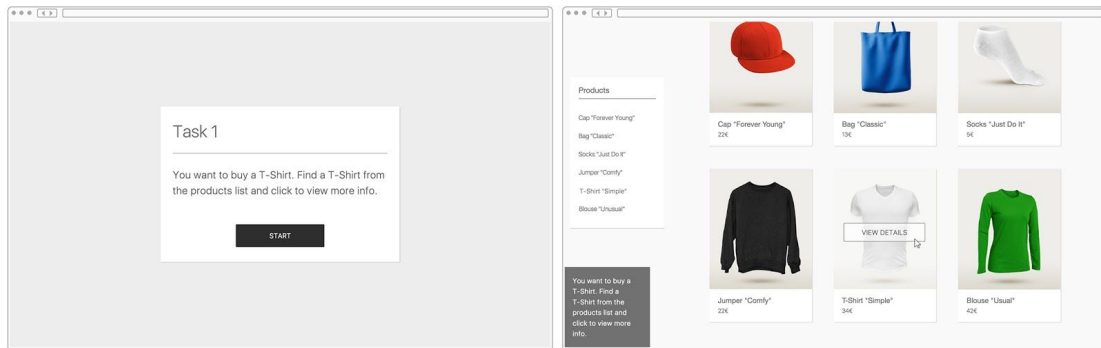
Figure 5.1 Left image is the Task 1 instruction page and right image is the Task 1 products list view where user had to click on right button to fulfill the task.

The average performance of task 1 performed by **Group A (without animation)** is summarized in Table 5.2. The average completion time of task 1 performed by Group A was 10 seconds and the average number of clicks done by Group A while performing the task 1, was 1,25.

Table 5.2: The average performance of task 1 by Group A and group B

Group	Task 1 completion time	Task 1 number of clicks done
A (without animation)	00:00:10	1,25
B (with animation)	00:00:09	1,15

The average completion time of task 1 performed by **Group B (with animation)** was 9 seconds and the average number of clicks done by Group B while performing the task 1, was 1,15. The average performance of task 1 performed by Group B is summarized in Table 5.2.

The average completion time performed by Group B (with animations) was 1 second quicker than Group A (without animations). Group B fulfilled the task 1 with 0,10 clicks sooner than Group A.

5.1.2 Task 2

Task 2 description was: "Choose a blue color and size M for your T-Shirt. Add chosen product to shopping cart." To solve this task, participant had to perform the steps in a correct order (see Figure 5.3).
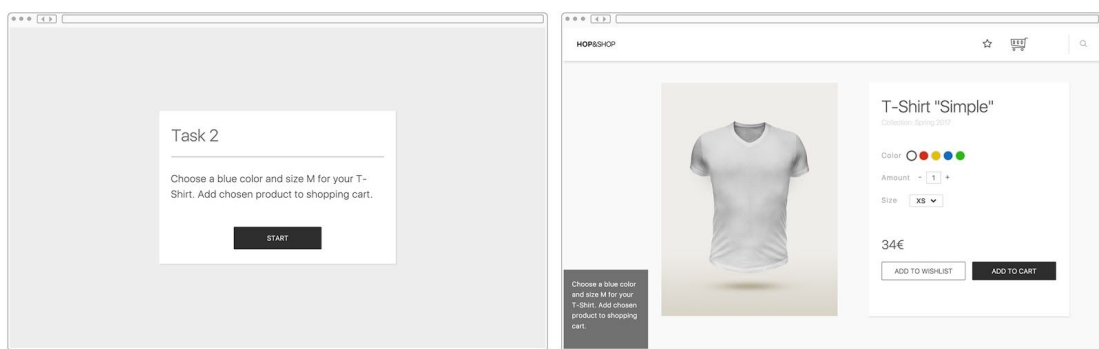
Figure 5.3: Left image is the Task 2 instruction page and right image is the Task 2 T-Shirt detailed view, where user has to choose blue color and size M and then click on a button "Add to cart" to fulfill the task.

The average performance of task 2 performed by **Group A (without animation)** is summarized in Table 5.4. The average completion time of task 2 performed by Group A was 10 seconds and the average number of clicks done by Group A while performing the task 2, was 3,85.

Table 5.4: The average performance of task 2 by Group A and group B

Group	Task 2 completion time	Task 2 number of clicks done
A (without animation)	00:00:10	3,85
B (with animation)	00:00:13	4,0

The average completion time of task 2 performed by **Group B (with animation)** was 13 seconds and the average number of clicks done by Group B while performing the task 2, was 4,0. The average performance of task 2 performed by Group B is summarized in Table 5.4.

Group A performed this task 3 seconds quicker and with 0,15 clicks fewer than Group B.

5.1.3 Task 3

Task 3 description was: "Add 1 more blue T-Shirt (2 total) to shopping cart and look what you have added to the shopping cart" To solve this task, participant had to just click once again on "Add to cart" button and then click on a notification box appearing from upper right corner saying that "Product has been added to the shopping cart" or on a button "View cart" or on the shopping cart icon placed in header menu (see Figure 5.5).
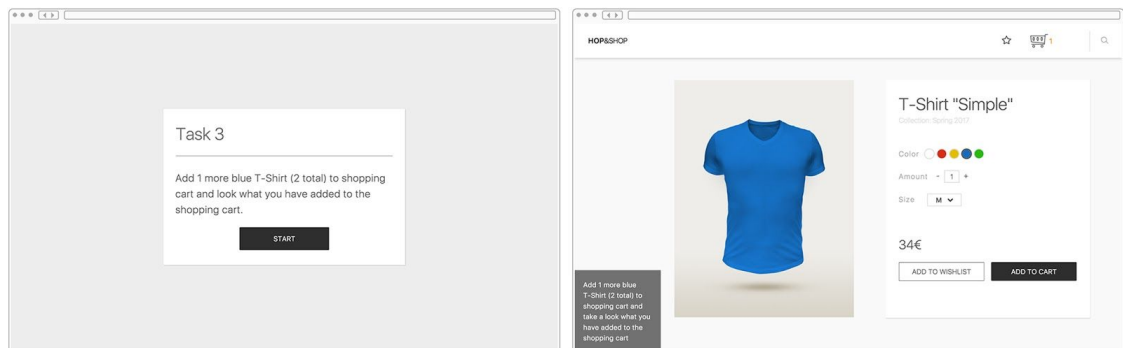
Figure 5.5: Left image is the Task 3 instruction page and right image is the Task 3 T-Shirt detailed view, where user has to choose click once again on "Add to cart" button to fulfill the task.

The average performance of task 3 performed by **Group A (without animation)** is summarized in Table 5.6. The average completion time of task 3 performed by Group A was 12 seconds and the average number of clicks done by Group A while performing the task 3, was 2,65.

Group	Task 3 completion time	Task 3 number of clicks done
A (without animation)	00:00:12	2,65
B (with animation)	00:00:11	2,4

The average completion time of task 3 performed by **Group B (with animation)** was 11 seconds and the average number of clicks done by Group B while performing the task 3, was 2,4. The average performance of task 3 performed by Group B is summarized in Table 5.6.

Group B performed the task 3 1 second quicker and did 0,25 clicks less during the task than Group A.

5.1.4 Task 4

Task 4 description was: "Delete the products from the shopping cart" To solve this task, participant had to click on a trash bin icon next to product image or click twice on minus icon below the image (see Figure 5.7).

Figure 5.7: Left image is the Task 4 instruction page and right image is the Shopping Cart view, where participant had to click on a trash bin icon next to product image or click twice on minus icon below the image

The average performance of task 4 performed by **Group A (without animation)** is summarized in Table 5.8. The average completion time of task 4 performed by Group A was 7 seconds and the average number of clicks done by Group A while performing the task 4, was 1,3.

Table 5.8: The average performance of task 4 by Group A and group B

Group	Task 4 completion time	Task 4 number of clicks done
A (without animation)	00:00:07	1,3
B (with animation)	00:00:06	1,1

 The average completion time of task 4 performed by **Group B (with animation)** was 6 seconds and the average number of clicks done by Group B while performing the task 4, was 1,1. The average performance of task 4 performed by Group B is summarized in Table 5.8.

Group B performed the task 4 1 second faster than group A and did 0,2 click fewer than group A.

5.1.5 Task 5

Task 5 description was: "You want to buy 1 red XS-size T-Shirt. Choose the product and add it to a shopping cart." For more detailed analysis results, the task was divided into 2 steps in the analysis part.

The task steps were divided as follows:

5a) Go to home page and choose topic "T-Shirts"

To solve this task, participant had to click either on web shop "logo" or on button "View products" or "Continue shopping" (see Figure 5.9).
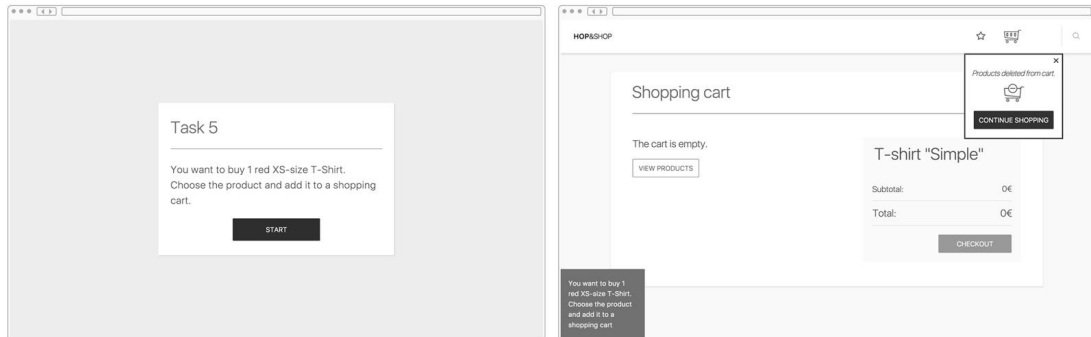
Figure 5.9: Left image is the Task 5a instruction page and right image is the Shopping Cart view, where participant had to click either on web shop "logo" or on button "View products" or "Continue shopping".

5b) Choose 1 red XS-size T-Shirt and add to shopping cart"

When the participant had reached the home page, he/she had once again an option to click on a T-Shirt image or to click on "T-Shirt Simple" option found in the side menu located in the left side of the interface, to get to the T-Shirt detailed view page. Then, the participant had to choose correct characteristics for the T-Shirt and click on a button "Add to shopping cart" (see Figure 5.10).
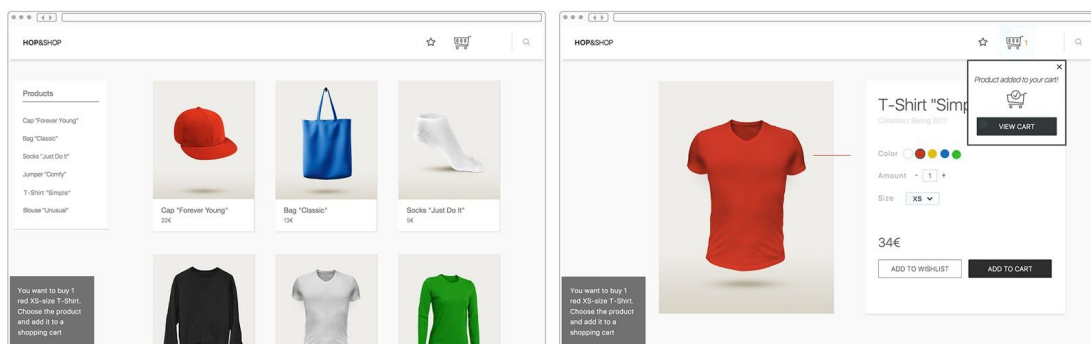
Figure 5.10: Left image is the start page of Task 5b which is prototype's home page. Right image is a detailed view, where participant has chosen a red color and has added red T-Shirt to cart.

The average performance of **task 5a** performed by **Group A (without animation)** is summarized in Table 5.11. The average completion time of task 5a performed by Group A was 6 seconds and the average number of clicks done by Group A while performing the task 5a, was 1,1.

Table 5.11: The average performance of task 5a by Group A and group B

Group	Task 5a completion time	Task 5a number of clicks done
A (without animation)	00:00:06	1,1
B (with animation)	00:00:08	1,25

The average completion time of task 5a performed by **Group B (with animation)** was 8 seconds and the average number of clicks done by Group B while performing the task 5a, was 1,25. The average performance of task 5a performed by Group B is summarized in Table 5.11.

Group A performed task 5a 2 seconds faster than Group B. The average click rate of Group A was also 0,15 times smaller than Group B's.

The average performance of **task 5b** performed by **Group A (without animation)** is summarized in Table 5.12. The average completion time of task 5b performed by Group A was 20 seconds and the average number of clicks done by Group A while performing the task 5b, was 4,75.

Table 5.12: The average performance of task 5b by Group A and group B

Group	Task 5b completion time	Task 5b number of clicks done
A	00:00:20	4,75
B	00:00:18	4,1

The average completion time of **task 5b** performed by **Group B (with animation)** was 18 seconds and the average number of clicks done by Group B while performing the task 5b, was 4,1. The average performance of task 5b performed by Group B is summarized in Table 5.12.

Group B performed task 5b 2 seconds faster than Group A and did 0,65 clicks less, too.

5.1.6 Task 6

Task 6 description was: "View shopping cart. Add 1 more red XS-size T-Shirt. Then click on "Checkout" button". To solve this task, participant had to click on a plus icon below the product image and then had to find the location of "Checkout" button and click on it (see Figure 5.13).
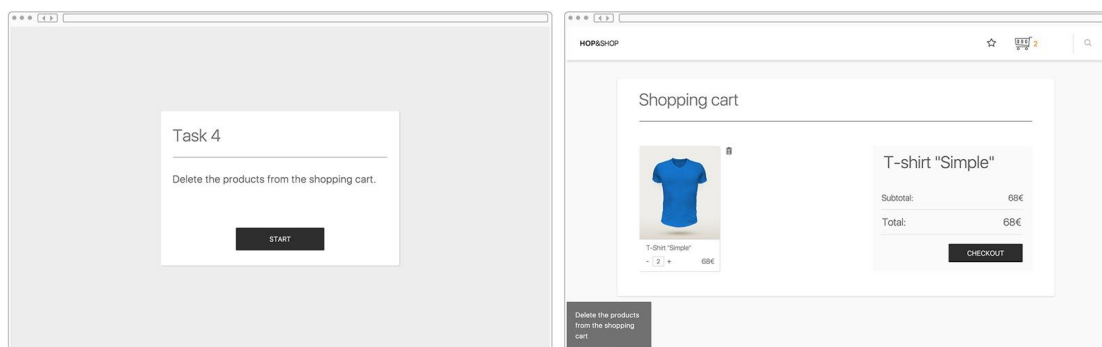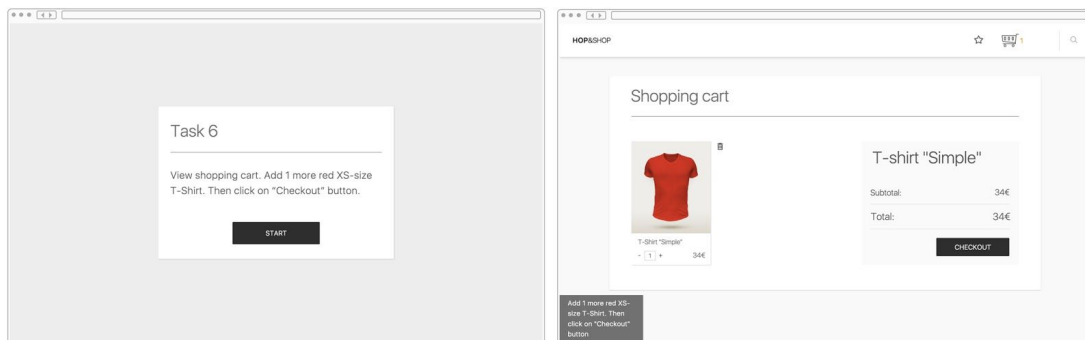

Figure 5.13: Left image is the Task 6 instruction page and right image is the Shopping Cart view, where participant had to click a plus icon below the product image and then had to find the location of "Checkout" button and click on it.

The average performance of task 6 performed by **Group A (without animation)** is summarized in Table 5.14. The average completion time of task 6 performed by Group A was 11 seconds and the average number of clicks done by Group A while performing the task 6, was 2,35.

Group	Task 6 completion time	Task 6 number of clicks done
A (without animation)	00:00:11	2,35
B (with animation)	00:00:11	2,1

The average completion time of task 6 performed by **Group B (with animation)** was 11 seconds and the average number of clicks done by Group B while performing the task 6, was 2,35. The average performance of task 6 performed by Group B is summarized in Table 5.14.

Group B and Group A performed the task 6 with the same duration, 11 seconds. Group A made 0,25 more than Group B.

5.2 User preference

Participants answered five questions (Q1, Q2, Q3, Q4 and Q5) at the end of the experiment. The results of the study are summarized in a table below (see Figure 5.15).
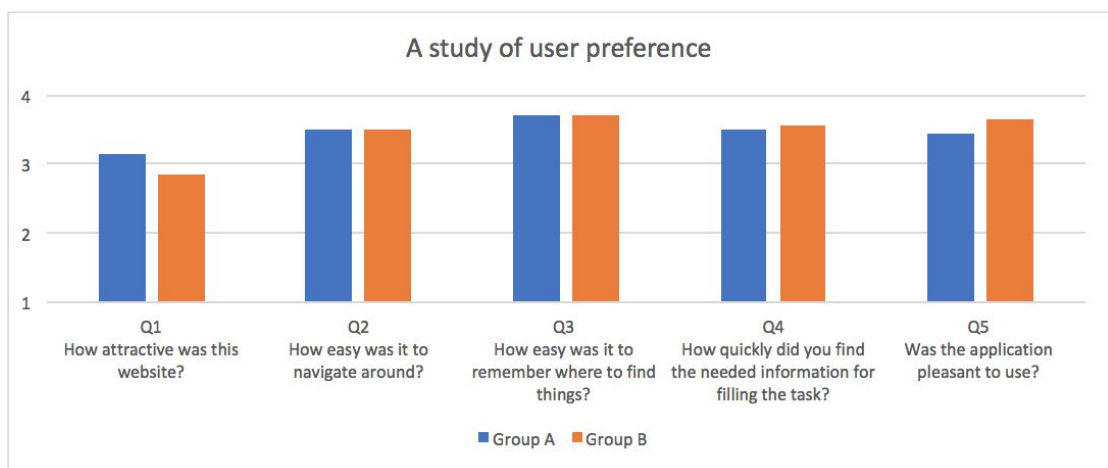
Figure 5.15: Participants answers on questions Q1, Q2, Q3, Q4 and Q5

Q1 asked participants, how attractive was the prototype. Participants could choose their option for answering Q1 in a scale of 1 to 4, where 4 was "Very attractive" and 1 was "Unattractive". The results show that Group A considered the prototype to be more attractive than Group B. Group A rated the prototype with 3,15 points of total of 4 and Group B with 2,85 points of total of 4.

Q2 asked them, how easy was it to navigate around. Answers for Q2 were in a scale of 1 to 4, where 4 was "Easy" and 1 was "Difficult to understand". Q3 asked them, how easy was it to remember where to find things. Answers for Q3 were in a scale of 1 to 4, where 4 was "Easy to remember" and 1 was "Hard to remember".

Group A and Group B had similar thoughts on how easy was it to navigate around in the prototype and how easy was it to remember where to find things. Both groups rated the navigation usability of the prototype with 3,5 points of total of 4 and rated the memorization with 3,7 point of total of 4.

Q4 asked them, how quickly did they find the needed information for filling the task. Answers for Q4 were in a scale of 1 to 4, where 4 was "Quickly" and 1 was "Took a long time". Group B considered the information delivery to be 0,05 point better than Group A. Group B rated finding information with average 3,55 points of total of 4, while Group A rated it with average 3,5 points of total of 4.

Q5 asked them, how pleasant was this application to use. Answers for Q5 were in a scale of 1 to 4, where 4 was "Pleasant" and 1 was "Unpleasant". Group B rated the pleasant usage of application with 3,65 points of total of 4 and Group A rated it with 3,45 points of total of 4. Group B found the application to be 0,20 points more pleasant to use.

In line with above data collected and presented, the following chapter will discuss the possible reasons for such results, will criticize the study methods and will provide possible ideas for further studies.

6 Discussion

This chapter analyses the major findings and results of the study, reviews the chosen methods used in the thesis, explains the limitations of the study and gives input for the possible further research.

6.1 Major Findings

The findings of this work present some evidence that animation helps to direct focus and improve users' performance. The data revealed that adding animation to certain purchasing processes could have some attention directing properties, but each interaction step needs to be separately approached because not all added motion had positive effect on how efficiently users solved the tasks. Also, there is some evidence, that animated elements in the interface attract more attention and influence user's choices.

The results of the study gave evidence that it is reasonable to use only one animation at a time, because several animated objects might have confusing effect on the user. Furthermore, it also revealed that at some interaction steps, animation can have also a negative effect on participant's performance.

It was unexpected that based on the results of the empirical study of user preferences, the website prototype seemed more attractive to the Group A who saw the version without animations. Meanwhile, the application seemed more pleasant to use to the Group B, who saw the prototype with added animations. It is interesting, as the visual looks of the prototypes were identical.

From the informal feedback of some participants, it can be concluded that the animations drew attention to necessary tasks and elements on the web page, so that there was no time to evaluate the prototype's appearance. Users were busy with their tasks and did not have the time or interest to assess the design. Apparently, the people from Group A, who were supposed to watch over the whole page, also put more note on design.

It seems that usability-wise, participants of group B found the application to be more useful for quickly finding the needed information as they rated this feature with a higher score, although the results about prototype's navigability and memorization were the same.

In addition, some participants mentioned after the study that the design of the prototype was very minimalistic, simple and clear, therefore answering the questionnaire was complicated. The design seemed to them quite basic and not very attractive but simple enough to fulfill the tasks successfully. So, it may be concluded, that for the participants, the design or a pleasant feel is not as important as usability.

6.2 Results

As it was already mentioned before, participants had overall six (6) tasks to complete and every task was compared and analysed separately to get more precise data and input for drawing conclusions. The results needed to be separately approached because adding animation to interface design can have positive and negative impact on customer performance. Different motions used in different situations and on different elements may affect purchasing processes.

As the base of both prototypes was very similar design-wise, it needs to be mentioned that measuring significant differences is difficult and the reason for such results can be only concluded based on the knowledge and ideas previously gained through literature review and the participants' behaviour noticed in the screen-recorded videos.

Task 1
Although the statistical difference of the performance of task 1 was very similar, some conclusions may be drawn. Firstly, the average completion time performed by Group B (with animations)[29] was 1 second quicker than Group A (without animations)[30]. In the B version of the prototype, the products quickly slid in from the bottom of the page after the page was loaded. This small motion drew the participant's attention and

---

[29] *Video example of prototype version B (with animations): https://youtu.be/SLb5g2kk0xs*
[30] *Video example of prototype version A (without animations): https://youtu.be/TNXebFxKF_w*

therefore it may be said that it indicated where the products are located. Participants may have discovered the location of the T-Shirt more easily.

Secondly, based on the screen recorded videos, it can be said that participants in the group B noticed the T-Shirt image quite instantly and clicked on the image. At the same time, some of the participants from Group A fulfilled the task by clicking on the "T-Shirt Simple" option found in the side menu located in the left side of the interface. The reason for this might have been that as Group A had no animations and they did the F-shaped reading of the web content, they found the left side menu before seeing the T-Shirt image in the centre of the page. According to the results of the eye tracking study conducted by Nielsen Norman Group (Nielsen, 2006), customers often read the content of the websites in a reading pattern that looks somewhat like letter "F". Users usually start reading the upper part of the content area in a horizontal movement. Then, they move down the page a bit and read across in a bit shorter second horizontal movement. Finally, users scan the content's left side in a vertical movement. "F" also stands for *fast* reading (Nielsen, 2006).

Task 2

Interestingly, Group A performed task 2 3 seconds faster and with 0,15 clicks fewer than Group B. The difference may have occurred due to the reason that animated version B of the prototype indicated that product's color has been changed with line animation while version A quickly showed the information box. When user clicked on the blue color circle, a blue line was drawn from the circle to the T-Shirt. It may have attracted participant's attention for some seconds while Group A wasn't distracted by any motion.

Such sliding animations are now often used in web shops and other websites. They look pleasant and make the interface feel more lively. Web designers and developers like to add such little tricks to their work to present their skillset and to avoid a dull impression of the site. But according to the study results, adding such motion does not improve participant's performance in such minimalistic interface, where there are not many distractions.

Task 3

Group B performed the task 3 1 second more faster by 1 second and made 0,25 clicks less during the task than Group A. After clicking the "Add to cart" button, both prototypes had a small notification box appearing in the upper right corner informing the participant that the product has been added to the cart. Version B had sliding and easing motion added to the box while Group A saw an instantly appearing notifier.

Although the task was very simple, some difference between the performance of the two groups became apparent. As the layout of the prototypes was almost identical and the participants of both groups had similar experience with online shopping, as 10 out of 20 persons from each group do online shopping regularly, the evidence of the positive effect of animation to attention direction is there.

Task 4

Group B performed the task 4 1 second faster than group A and made 0,2 clicks fewer than group A. Although the difference is once again very slight, the reason for this can be due to the usage of animation to draw attention to some certain elements of interface.

In version B, product image and trash bin icon appeared with animation after the page was loaded (see Figure 6.1 for an example). From the screen recordings, it is seen that most of the participants noticed the trash bin icon almost instantly and clicked on it while some subjects from Group A decided to click on minus icon below the image. Overall, 6 participants of total of 20 from Group A clicked on a minus icon, while only 2 participants from Group B clicked on it. The decision of clicking on a trash icon may have been influenced by the animation.
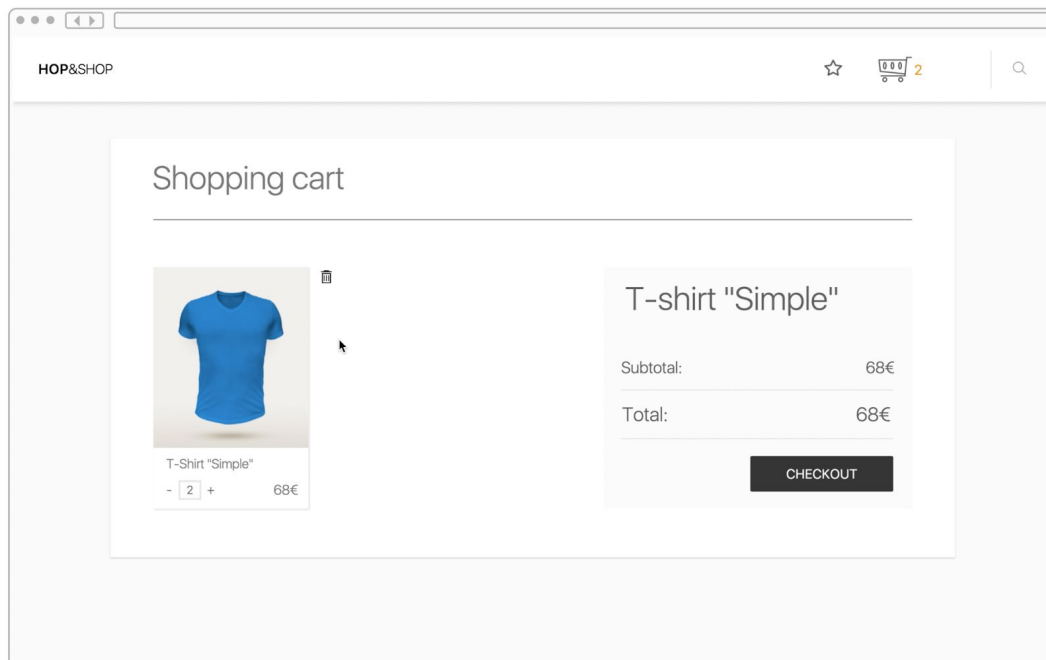
Figure 6.1: Task 4 layout

Task 5a

Group A (without animation) performed task 5a 2 seconds faster than Group B (with animation) which is interesting since some motion was added to the prototype B to draw attention on the buttons users had to click instantly. The average click rate of Group A was also 0,15 times smaller than Group B's.

Participants had several options to solve this task: to click on a "View products" button, on a "Continue shopping" button or on the logo in the upper left corner. Group A clicked mostly (15 participants of total of 20) on "Continue shopping" button in the upper right corner because the notification box that held the button was dominant design-wise and attracted their attention instantly.

Group B clicked mostly (17 participants of total of 20) on the "View products" button. The possible reason for this is that version B of the prototype had both buttons animated, and they chose to click on the "View products" button as it was closer in the left. Also, as Group B had two animated distractions, they had to put more time on choosing where to click and therefore their performance was worse.

Lesson learned here is that it is reasonable to use one animation at a time, because even when there are different animated elements aiming help user to fulfill the same task, several animated objects might have confusing effect on the user.

Task 5b

Group B performed task 5b 2 seconds faster than Group A as well as made 0,65 clicks less. According to the video analysis, participants solved this task similarly, with just some minor differences. The videos also revealed that as participants had already done similar tasks, their expertise was higher based on the experience.

The reasons for such different results can only be guessed. A reason why Group B performed better, can be that previously experienced animated tasks helped them to memorize where the interface elements were located and then later find the elements more easily.

Task 6

Group B and Group A performed the task 6 with the same duration, 11 seconds. Group A made 0,25 clicks more than Group B. The task was very simple and there was only one option for fulfilling the task. Furthermore, the only difference between both prototypes was that in version B, product image slid into it's place fast, but this animation was barely noticeable. Based on this evidence, it can be said that only striking animation can attract attention.

6.4 The Choice of Methods

The methods used for Theoretical Background, the Literature Review and the review on current online shopping sites, gave good input for understanding more deeply the essence of interface animation and the current state in the industry.

The A/B Test method used for carrying out the experiment was useful in collecting comparable data. As this study focused on comparing two different approaches, it was possibly the best solution for doing so. Also, screen recording videos helped to analyze and compare the data even more deeply.

Using Proto.io for creating the prototypes was easier and cheaper for the researcher, but was not so intuitive and didn't provide as real feeling of shopping experience as a real website would have.

6.5 The Limitations of the Study

The study had two types of limitations that were somewhat acknowledged and were also described to the participants even before carrying out the study. Firstly, as the study was conducted using a prototyping program Proto.io, the prototype didn't completely act in the way an actual web site would. Even though those limitations were introduced to participants right before the study, some of the participants still got confused by the fact that not all elements interacted the way people are used to seeing in the web. Secondly, as users were given 6 tasks, their main focus was on fulfilling the tasks and therefore they did not act entirely naturally as they perhaps would do in the real purchasing process.

Besides that, it revealed during the analysis of the recorded screen videos that some participants considered the right area of the Proto.io program to be part of the shopping site and therefore started interacting with it (see Figure 6.2 for an example). Some of them tried clicking the side arrows of the prototype, used the zooming option and clicked on the different screen images.
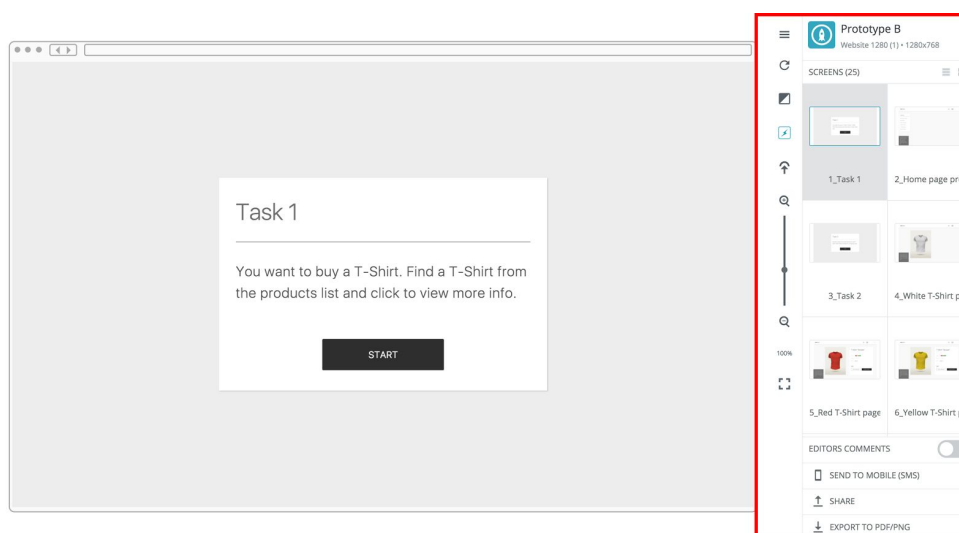
Figure 6.2: Example of how Proto.io[31] prototype's right side looks like.

---

[31] *Proto.io: https://proto.io/*

Another limitation was that one of the most important parts of a purchasing process, the checkout, was left out of the study scenarios. The reason was that it was impossible to create manageable checkout fields where participant could type their contact information. Also, a security risk for the participants would have occurred. In further research, all of those limitations can be avoided by using an actual online web shop.

6.6 Suggestions for Further Research

Although the collected data helped to draw conclusions, this work presents only one interpretation of the results. Different experimental procedures would be required to reveal the underlying information.

Due to the facts that the study was carried out using a prototype not a real online shopping site and that participants were given tasks to follow during the study, one subject that remains to be explored is how would interface animations affect the real purchasing process, performance and user experience. A study could be done with A/B testing, where two or more versions of a web shop designs, whether with animated elements or not, would be shown to users at random. Later, the statistical data could be compared and analysed.

This type of study would of course require good planning time-wise and in terms of analysis methods, because it is more complicated to compare results when no certain tasks are given. The A/B Test should be carried out during a longer period of time or at the same time with a bigger advertisement campaign that brings people to the web shop, because otherwise a situation where there are not enough visitors in the web site during the study, may occur. Firstly, some scenarios of most common behavioural patterns, that are later comparable, should be described. For example, when users have chosen a product and clicked the "Add to cart" button, they usually either head to shopping cart view or continue shopping. The amount of time spent between clicking the "Add to cart" and "View cart" buttons can later be measured and compared.

7 Conclusion

The goal of this work was to provide empirical evidence of positive influence of functional animation on user experience and on how efficiently users solve different types of shopping tasks in web shops. The thesis reached its set aims and provides a somewhat meaningful contribution to the research done previously in this field.

From the academic literature and from the studies done previously, it was revealed that animation is already gaining bigger importance in graphical user interface. Animation has different functional abilities, such as attracting and directing attention, acting as a reminder and being helpful in reducing change blindness. It can also be concluded from the literature review that attention management is extremely important in online shopping sites as it may reflect directly in the sales.

The experimental study was performed on 40 participants that were divided into 2 groups. The study results show that adding animation to certain purchasing processes could have some attention directing properties, but each interaction step needs to be separately approached because not all added motion has positive effect on user performance. Also, there is some evidence that animated elements in the interface attract more attention and influence the user's choices.

The results of the study confirmed that it is reasonable to use only one animation at a time, because several animated objects can have a confusing effect on the user, even when there are different animated elements aiming to help the user to fulfill the same task. For example, a group that saw no animations, performed the task 5a 2 seconds faster than group who saw animations. During this task, the group that saw animations, noticed different motions that were aiming to help attract participants attention to important parts for solving the task. But instead of the animations proving helpful, participants got distracted by several moving objects.

Furthermore, it was also revealed that at some interaction steps, animation can have a negative effect on the participant's performance. For example,the group that saw no animation, performed the task 2 3 seconds faster than the group that saw animations.

It was unexpected that based on the results of a study of user preference, the website prototype seemed more attractive to the group who saw the version without animations. Meanwhile, the application seemed more pleasant to use to the group who saw the prototype with added animations. It is interesting, as the visual looks of the prototypes were identical.

From the informal feedback of some participants, it can be concluded that the animations drew attention to necessary tasks and elements on the web page, so that there was no time to evaluate the prototype's appearance. Users were busy with their tasks and did not have the time or interest to assess the design. Apparently, the people from group who saw no animations and were supposed to watch over the whole page, also put more note on design.

It seems that usability-wise, the participants of the group who saw animations, found the application to be more useful for finding the needed information quickly as they rated this feature with a higher score. However, the results about prototype's navigability and memorization were the same in both groups.

Although the study gave some interesting data that helped the researcher draw conclusions, the study had several limitations that should to be considered in further research. In future work, more specific statistical data analysis approach could be done on the study data added to the appendix. The researcher learned from this study that for conducting such study, more time would be recommended and that using a generated prototype may have several limitations. Therefore, for creating a comparative experimental test, using actual online websites is recommended. Further research could also be done with A/B testing, where two or more versions of an actual web shop, whether with animated elements or not, would be shown to users at random. Later, the statistical data could be compared and analysed.

8 Kokkuvõte

Käesolev magistritöö "Kasutajaliidese animatsioonide mõju kasutajakogemusele: kliendi tähelepanu suunamine veebipoodides" keskendub kasutajaliidese (UI) animatsioonidele, eriti kliendi tähelepanu juhtimisele erinevates veebipoe ostuprotsessides.

Töö loob seoseid kasutajaliidese animatsiooni ja kasutaja käitumise efektiivsuse vahel veebipoes. Selle töö eesmärk on pakkuda empiirilist tõestust funktsionaalse animatsiooni mõju kohta kasutajakogemusele ning kasutaja võimekusele eri tüüpi ülesannete lahendamisel veebipoodides. Lõputöö jõudis püstitatud eesmärkideni ja lisab mõnevõrra olulise panuse varem selles valdkonnas tehtud teadusele.

Uuringu tulemused näitasid, et animatsiooni lisamine teatud ostuprotsessidele võib mõningal määral tähelepanu suunamist mõjutada, kuid igat interaktsioonisammu tuleb eraldi käsitleda, sest mitte kõikidel lisatud animatsioonidel pole positiivset mõju kasutaja võimekusele ülesannete lahendamisel. Samuti on tõendeid, et animeeritud elemendid kasutajaliideses püüavad rohkem tähelepanu ja mõjutavad kasutaja valikuid.

Edasistes uuringutes oleks võimalik võrrelda reaalsete veebipoodide erinevaid animeeritud ning animatsioonideta veebilehe variante pikema aja jooksul, et koguda informatsiooni kasutaja käitumise kohta reaalses veebipoes.

References

Animations and Transitions. (n.d.). Retrieved March 05, 2017, from https://msdn.microsoft.com/en-us/library/windows/desktop/dn742481(v=vs.85).aspx

Babich, N. (2017, March 13). How Functional Animation Helps Improve User Experience – Smashing Magazine. Retrieved April 23, 2017, from https://www.smashingmagazine.com/2017/01/how-functional-animation-helps-improve-user-experience/

Baecker, R. M. and Small, I.S. (1990) Animation at the Interface. Appears in The Art of Human-Computer Interface Design B. Laurel, (Ed.), Addison-Wesley, 251-267.

Barbosa, C. E., Cunha, L. M., Neto, B., Orleans, L. F., Silva, C. E. P., Oliveira, J., & de Souza, J. M. (2008). Attention Management: A Survey.

Chevalier, F., Riche, N. H., Plaisant, C., Chalbi, A., & Hurter, C. (2016). Animations 25 Years Later. Proceedings of the International Working Conference on Advanced Visual Interfaces - AVI '16. doi:10.1145/2909132.2909255

Crawford, Matthew B. (March 31, 2015). "Introduction, Attention as a Cultural Problem". The World Beyond Your Head: On Becoming an Individual in an Age of Distraction (hardcover) (1st ed.). Farrar, Straus and Giroux. p. 11. ISBN 978-0374292980.

CSS3 animation-timing-function Property. (n.d.). Retrieved March 20, 2017, from https://www.w3schools.com/cssref/css3_pr_animation-timing-function.asp

Daliot, A. (2015, May 14). Functional Animation In UX Design. Retrieved April 20, 2017, from https://www.smashingmagazine.com/2015/05/functional-ux-design-animations/

Davenport, T. H. (2001). *The attention economy: understanding the new currency of business*. Harvard Business School Press.

Dessart, C., Motti, V. G., & Vanderdonckt, J. (2012). *Animated transitions between user interface views*. Proceedings of the International Working Conference on Advanced Visual Interfaces - AVI '12. doi:10.1145/2254556.2254623

E-Commerce Checkout Usability. Retrieved March 20, 2017, from https://baymard.com/research/checkout-usability

England, E., & Finney, A. (2002). Managing multimedia: project management for Web and convergent media: Book 2 - technical issues. Harlow: Addison-Wesley.

Explore Topics in eMarketer PRO. (n.d.). Retrieved March 20, 2017, from https://www.emarketer.com/

Geng, X., Fan, X., Bian, J., Li, X., & Zheng, Z. (2012). Optimizing user exploring experience in emerging e-commerce products. *Proceedings of the 21st international conference companion on World Wide Web - WWW '12 Companion.* doi:10.1145/2187980.2187984

Harley, A. (2014, September 21). Animation for Attention and Comprehension. Retrieved March 20, 2017, from https://www.nngroup.com/articles/animation-usability/

Head, V. (with Marcotte, E.). (2016). *Designing interface animation: meaningful motion for user experience.* Brooklyn, NY: Rosenfeld Media.

Hong, W., Thong, J. Y., & Tam, K. Y. (2004). Does Animation Attract Online Users' Attention? The Effects of Flash on Information Search Performance and Perceptions. *Information Systems Research, 15*(1), 60-86. doi:10.1287/isre.1040.0017

Introduction - Material design. (n.d.). Retrieved March 05, 2017, from https://material.io/guidelines/#introduction-goals

Johnston, O., & Thomas, F. (1981). *The illusion of life: Disney animation.* New York: Disney Editions.

Lasseter, J. (1987). *Principles of traditional animation applied to 3D computer animation.* Proceedings of the 14th annual conference on Computer graphics and interactive techniques - SIGGRAPH '87. doi:10.1145/37401.37407

Lodigiani, C. (n.d.). THE ILLUSION OF LIFE. Retrieved March 17, 2017, from http://the12principles.tumblr.com/

Merz, B., Tuch, A. N., & Opwis, K. (2016). *Perceived User Experience of Animated Transitions in Mobile User Interfaces.* Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems - CHI EA '16. doi:10.1145/2851581.2892489

Nielsen, J. (2010, June 21). Website Response Times. Retrieved March 20, 2017, from https://www.nngroup.com/articles/website-response-times/

Nielsen, J. (2006, April 17). F-Shaped Pattern For Reading Web Content. Retrieved April 20, 2017, from https://www.nngroup.com/articles/f-shaped-pattern-reading-web-content/

Oliynyk, K. (2016, January 04). Jedi Principles of UI Animation – Adaptive Path – Medium. Retrieved April 20, 2017, from https://medium.com/@adaptivepath/jedi-principles-of-ui-animation-2b88423b1dac

Pratt, J., Radulescu, P. V., Guo, R. M., & Abrams, R. A. (2010). *It's Alive!: Animate Motion Captures Visual Attention*. Psychological Science, 21(11), 1724-1730. doi:10.1177/0956797610387440

Sciullo, M. D. (2017, January 09). How to Use Disney's Principles of Animation to Improve UX. Retrieved April 20, 2017, from http://www.tandemseven.com/experience-design/how-to-use-disneys-principles-of-animation-to-improve-ux/

Shanmugasundaram, M., & Irani, P. (2008). *The effect of animated transitions in zooming interfaces*. Proceedings of the Working Conference on Advanced Visual Interfaces - AVI '08, 396. https://doi.org/10.1145/1385569.1385642

Smith, D.; Irby, C.; Kimball, R.; Verplank, B.; Harslem, E. Designing the Star User Interface. Byte 7(4), 1982, pp. 242-282.

U.S. digital shopper reasons for abandoning carts 2016 | Statistic. Retrieved March 25, 2017, from https://www.statista.com/statistics/379508/primary-reason-for-digital-shoppers-to-abandon-carts/

Vertegaal, R. Designing attentive interfaces, in: Proc. of the Eye Tracking Research & Applications Symposium, New Orleans, LA, 2002, pp. 23–30

Villar, M. (2014, April 17). Improve the payment experience with animations – Design Insights from Bridge. Retrieved March 20, 2017, from https://goo.gl/eFUkVE

Yoo, C. Y., & Kim, K. (2005). Processing of animation in online banner advertising: The roles of cognitive and emotional responses. *Journal of Interactive Marketing, 19*(4), 18-34. doi:10.1002/dir.20047

Appendixes

Appendix A - Experimental Test Script

Before starting the test, participants got the following instructions via social media or via email to read through:

 Hi! My name is Piret. Thank you for participating in this experiment! Please, carefully read the following introductions first:

This is an experimental usability test of an online shop prototype. I will give you six tasks. Please read through the task, memorize, and then click the "Start" button and start completing the task. If you forget the task, you can find it from the prototype's lower left corner.

Remember, since this is a prototype not a real website, not all the buttons are working and you cannot interact with all the elements. Please try to follow the task script as precisely as possible. When all six tasks are completed, the program will ask you to complete a questionnaire, and if you've done this, be sure to press the "Submit" button.

The link will open the prototype, and your screen recording program. Please, set up the program, but you don't have to click on "Enable Camera" and "Enable MIC" buttons. This program records your computer screen and shares it later with me. If you're done with the test and questionnaire, you can stop the recording. To do this, click on the upper right of the flashing orange-green button. Please, click on 'End' and then "Yay! Upload it" buttons.

 If you are ready, then here is the link: …

The task scripts were the following:

Task 1: You want to buy a T-Shirt. Find a T-Shirt from the products list and click to view more info.

Task 2: Choose a blue color and size M for your T-Shirt. Add chosen product to shopping cart.

Task 3: Add 1 more blue T-Shirt (2 total) to shopping cart and take a look what you have added to the shopping cart.

Task 4: Delete the products from the shopping cart.

Task 5: You want to buy 1 red XS-size T-Shirt. Choose the product and add it to a shopping cart.

Task 6: View shopping cart. Add 1 more red XS-size T-Shirt. Then click on "Checkout" button

After fulfilling the 6 tasks, participants saw a screen with a notification box, saying:

Thank you! The experiment has ended. Now, please answer the following questions here: (button with link)

The questions of the empirical study of user preferences were following:

---

1. Your Gender
2. Your Age
3. Your Nationality
4. Have you done online shopping before?
5. How attractive was this website? (Very attractive – 4, unattractive – 1)
6. How easy was it to navigate around? (Easy – 4, difficult to understand – 1)

7. How easy was it to remember where to find things? (Easy to remember – 4, hard to remember – 1)
8. How quickly did you find the needed information for filling the task? (Quickly – 4, took a long time – 1)
9. Was the application pleasant to use? (Pleasant – 1, unpleasant – 4)

Appendix B - Collected data of the tasks

B1. Task 1

Participant nr	Task 1 performed by Group A (without animation)				Task 1 performed by Group B (with animation)			
	Task 1 start time	Task 1 end time	Task 1 duration	Task 1 clicks amount	Task 1 start time	Task 1 end time	Task 1 duration	Task 1 clicks amount
1	00:00:35	00:00:48	00:00:13	1	00:00:18	00:00:44	00:00:26	2
2	00:00:17	00:00:39	00:00:22	1	00:00:18	00:00:30	00:00:12	1
3	00:00:22	00:00:34	00:00:12	1	00:00:15	00:00:30	00:00:15	2
4	00:00:34	00:00:45	00:00:11	1	00:00:37	00:00:42	00:00:05	1
5	00:00:50	00:00:58	00:00:08	1	00:00:23	00:00:32	00:00:09	1
6	00:00:45	00:00:51	00:00:06	1	00:00:44	00:00:50	00:00:06	1
7	00:00:04	00:00:15	00:00:11	1	00:00:05	00:00:09	00:00:04	1
8	00:01:01	00:01:18	00:00:17	2	00:00:07	00:00:14	00:00:07	1
9	00:00:34	00:00:47	00:00:13	2	00:00:15	00:00:24	00:00:09	1
10	00:00:12	00:00:17	00:00:05	1	00:00:58	00:01:10	00:00:12	1
11	00:00:20	00:00:27	00:00:07	3	00:01:34	00:01:40	00:00:06	1
12	00:00:22	00:00:26	00:00:04	1	00:00:24	00:00:30	00:00:06	1
13	00:00:20	00:00:28	00:00:08	1	00:01:20	00:01:32	00:00:12	1
14	00:01:28	00:01:36	00:00:08	1	00:00:34	00:00:40	00:00:06	1
15	00:00:38	00:00:47	00:00:09	1	00:00:22	00:00:27	00:00:05	1
16	00:00:57	00:01:15	00:00:18	1	00:02:51	00:03:01	00:00:10	2
17	00:00:27	00:00:31	00:00:04	1	00:00:48	00:00:56	00:00:08	1
18	00:00:32	00:00:38	00:00:06	1	00:00:43	00:00:55	00:00:12	1
19	00:00:22	00:00:31	00:00:09	1	00:00:34	00:00:41	00:00:07	1
20	00:00:35	00:00:45	00:00:10	2	00:01:19	00:01:24	00:00:05	1
Average			00:00:10	1,25			00:00:09	1,15

B2. Task 2

Participant nr	Task 2 performed by Group A (without animation)				Task 2 performed by Group B (with animation)			
	Task 2 start time	Task 2 end time	Task 2 duration	Task 2 clicks amount	Task 2 start time	Task 2 end time	Task 2 duration	Task 2 clicks amount
1	00:00:58	00:01:07	00:00:09	4	00:00:51	00:00:58	00:00:07	4
2	00:00:46	00:00:54	00:00:08	4	00:00:51	00:01:01	00:00:10	4
3	00:00:40	00:00:53	00:00:13	4	00:00:31	00:00:52	00:00:21	5
4	00:00:55	00:01:03	00:00:08	4	00:00:49	00:00:58	00:00:09	4
5	00:01:07	00:01:21	00:00:14	4	00:02:15	00:02:44	00:00:29	4
6	00:00:56	00:01:09	00:00:13	4	00:00:59	00:01:28	00:00:29	4
7	00:00:21	00:00:38	00:00:17	4	00:00:16	00:00:27	00:00:11	4
8	00:01:30	00:01:40	00:00:10	4	00:00:23	00:00:30	00:00:07	4
9	00:00:54	00:01:06	00:00:12	4	00:00:32	00:00:41	00:00:09	4
10	00:00:29	00:00:40	00:00:11	4	00:01:22	00:01:30	00:00:08	3
11	00:00:34	00:00:42	00:00:08	4	00:01:57	00:02:07	00:00:10	4
12	00:00:31	00:00:39	00:00:08	4	00:00:40	00:00:46	00:00:06	4
13	00:00:41	00:00:51	00:00:10	3	00:01:47	00:02:00	00:00:13	4
14	00:01:54	00:02:04	00:00:10	3	00:00:52	00:01:03	00:00:11	4
15	00:01:03	00:01:16	00:00:13	4	00:00:48	00:00:59	00:00:11	4
16	00:01:26	00:01:39	00:00:13	4	00:03:21	00:03:35	00:00:14	4
17	00:00:59	00:01:05	00:00:06	3	00:01:06	00:01:15	00:00:09	4
18	00:01:07	00:01:17	00:00:10	4	00:01:11	00:01:20	00:00:09	4
19	00:00:39	00:00:46	00:00:07	4	00:00:53	00:01:03	00:00:10	4
20	00:00:49	00:00:58	00:00:09	4	00:01:37	00:01:54	00:00:17	4
Average			00:00:10	3,85			00:00:13	4

B3. Task 3

Participant nr	Task 3 performed by Group A (without animation)				Task 3 performed by Group B (with animation)			
	Task 3 start time	Task 3 end time	Task 3 duration	Task 3 clicks amount	Task 3 start time	Task 3 end time	Task 3 duration	Task 3 clicks amount
1	00:01:15	00:01:27	00:00:12	3	00:01:09	00:01:18	00:00:09	5
2	00:01:05	00:01:20	00:00:15	2	00:01:07	00:01:19	00:00:12	2
3	00:01:02	00:01:09	00:00:07	2	00:01:05	00:01:08	00:00:03	3
4	00:01:18	00:01:27	00:00:09	2	00:01:03	00:01:10	00:00:07	2
5	00:01:26	00:01:31	00:00:05	2	00:03:12	00:03:26	00:00:14	4
6	00:01:13	00:01:18	00:00:05	3	00:02:02	00:02:34	00:00:32	2
7	00:00:46	00:00:51	00:00:05	2	00:00:33	00:00:40	00:00:07	2
8	00:01:53	00:02:00	00:00:07	2	00:00:37	00:00:42	00:00:05	3
9	00:01:11	00:01:23	00:00:12	3	00:00:50	00:01:01	00:00:11	2
10	00:00:48	00:01:09	00:00:21	3	00:01:45	00:02:01	00:00:16	2
11	00:00:47	00:01:09	00:00:22	3	00:02:18	00:02:26	00:00:08	2
12	00:00:42	00:00:52	00:00:10	2	00:01:44	00:01:52	00:00:08	2
13	00:01:04	00:01:13	00:00:09	3	00:02:21	00:02:28	00:00:07	2
14	00:02:09	00:02:15	00:00:06	4	00:01:11	00:01:26	00:00:15	2
15	00:01:27	00:01:41	00:00:14	3	00:01:05	00:01:18	00:00:13	3
16	00:01:46	00:02:13	00:00:27	3	00:03:40	00:03:55	00:00:15	2
17	00:01:12	00:01:19	00:00:07	2	00:01:28	00:01:42	00:00:14	2
18	00:01:24	00:01:44	00:00:20	3	00:01:42	00:01:47	00:00:05	2
19	00:00:58	00:01:18	00:00:20	3	00:01:27	00:01:41	00:00:14	2
20	00:01:03	00:01:10	00:00:07	3	00:02:06	00:02:18	00:00:12	2
Average			00:00:12	2,65			00:00:11	2,4

B4. Task 4

Participant nr	Task 4 performed by Group A (without animation)					Task 4 performed by Group B (with animation)				
	Task 4 start time	Task 4 end time	Task 4 duration	Task 4 clicks amount	To solve this task, user clicked on	Task 4 start time	Task 4 end time	Task 4 duration	Task 4 clicks amount	To solve this task, user clicked on
1	00:01:29	00:01:33	00:00:04	1	trash bin icon	00:01:21	00:01:24	00:00:03	1	trash bin icon
2	00:01:23	00:01:28	00:00:05	1	trash bin icon	00:01:23	00:01:26	00:00:03	1	trash bin icon
3	00:01:12	00:01:15	00:00:03	1	trash bin icon	00:01:09	00:01:15	00:00:06	1	trash bin icon
4	00:01:29	00:01:32	00:00:03	1	trash bin icon	00:01:13	00:01:17	00:00:04	1	trash bin icon
5	00:01:34	00:01:40	00:00:06	2	minus iicon	00:03:28	00:03:32	00:00:04	1	trash bin icon
6	00:01:21	00:01:32	00:00:11	1	trash bin icon	00:02:38	00:02:41	00:00:03	1	trash bin icon
7	00:00:54	00:00:57	00:00:03	1	trash bin icon	00:00:47	00:00:49	00:00:02	1	trash bin icon
8	00:02:03	00:02:13	00:00:10	2	minus iicon	00:00:44	00:00:49	00:00:05	1	trash bin icon
9	00:01:25	00:01:28	00:00:03	1	trash bin icon	00:01:05	00:01:11	00:00:06	1	trash bin icon
10	00:01:14	00:01:29	00:00:15	2	minus iicon	00:02:06	00:02:09	00:00:03	1	trash bin icon
11	00:01:10	00:01:14	00:00:04	2	minus iicon	00:02:31	00:02:39	00:00:08	1	trash bin icon
12	00:00:54	00:00:58	00:00:04	1	trash bin icon	00:01:57	00:02:04	00:00:07	1	trash bin icon
13	00:01:16	00:01:23	00:00:07	1	trash bin icon	00:02:31	00:02:39	00:00:08	2	minus iicon
14	00:02:17	00:02:29	00:00:12	2	minus iicon	00:01:33	00:01:37	00:00:04	1	trash bin icon
15	00:01:46	00:01:54	00:00:08	1	trash bin icon	00:01:28	00:01:35	00:00:07	1	trash bin icon
16	00:02:16	00:02:21	00:00:05	1	trash bin icon	00:03:58	00:04:10	00:00:12	1	trash bin icon
17	00:01:24	00:01:37	00:00:13	1	trash bin icon	00:01:46	00:01:56	00:00:10	2	minus iicon
18	00:01:49	00:01:53	00:00:04	1	trash bin icon	00:01:54	00:01:58	00:00:04	1	trash bin icon
19	00:01:23	00:01:30	00:00:07	1	trash bin icon	00:01:46	00:01:56	00:00:10	1	trash bin icon
20	00:01:12	00:01:22	00:00:10	2	minus iicon	00:02:27	00:02:36	00:00:09	1	trash bin icon
Average			00:00:07	1,3				00:00:06	1,1	

B5. Task 5

	Task 5a performed by Group A (without animation)					Task 5a performed by Group B (with animation)				
Participant nr	Task 5a start time	Task 5a end time	Task 5a duration	Task 5a clicks amount	To solve this task, user clicked on	Task 5a start time	Task 5a end time	Task 5a duration	Task 5a clicks amount	To solve this task, user clicked on
1	00:01:45	00:01:49	00:00:04	1	"Continue shopping"	00:00:18	00:00:44	00:00:26	1	"View products"
2	00:01:33	00:01:37	00:00:04	1	"View products"	00:01:37	00:01:39	00:00:02	1	"View products"
3	00:01:23	00:01:25	00:00:02	1	"View products"	00:01:16	00:01:20	00:00:04	1	"View products"
4	00:01:41	00:01:45	00:00:04	1	"Continue shopping"	00:01:23	00:01:28	00:00:05	1	"View products"
5	00:01:45	00:01:50	00:00:05	1	"Continue shopping"	00:03:40	00:03:51	00:00:11	2	"View products"
6	00:01:40	00:01:44	00:00:04	1	"Continue shopping"	00:02:52	00:02:57	00:00:05	1	"View products"
7	00:01:01	00:01:06	00:00:05	1	"Continue shopping"	00:00:56	00:00:59	00:00:03	1	"Continue shopping"
8	00:02:26	00:02:32	00:00:06	1	"Continue shopping"	00:00:59	00:01:09	00:00:10	2	"View products"
9	00:01:33	00:01:36	00:00:03	1	"Continue shopping"	00:01:19	00:01:28	00:00:09	2	"View products"
10	00:01:42	00:01:51	00:00:09	1	"View products"	00:02:36	00:02:37	00:00:01	1	"Continue shopping"
11	00:01:15	00:01:26	00:00:11	2	"Continue shopping"	00:02:51	00:02:58	00:00:07	1	"View products"
12	00:01:03	00:01:06	00:00:03	1	"Continue shopping"	00:02:13	00:02:20	00:00:07	1	"View products"
13	00:01:30	00:01:36	00:00:06	1	"Continue shopping"	00:02:47	00:02:58	00:00:11	2	"View products"
14	00:02:44	00:02:49	00:00:05	1	"Continue shopping"	00:01:47	00:01:51	00:00:04	1	"View products"
15	00:02:02	00:02:06	00:00:04	1	"View products"	00:01:41	00:01:47	00:00:06	1	"View products"
16	00:02:24	00:02:32	00:00:08	1	"Continue shopping"	00:04:11	00:04:24	00:00:13	1	"View products"
17	00:01:44	00:01:49	00:00:05	1	"Continue shopping"	00:01:58	00:02:02	00:00:04	1	"Continue shopping"
18	00:02:01	00:02:09	00:00:08	1	"Continue shopping"	00:02:12	00:02:23	00:00:11	1	"View products"
19	00:01:37	00:01:42	00:00:05	1	"Continue shopping"	00:02:03	00:02:09	00:00:06	1	"View products"
20	00:01:25	00:01:36	00:00:11	2	"View products"	00:02:46	00:02:52	00:00:06	2	"View products"
Average			00:00:06	1,1				00:00:08	1,25	

	Task 5b performed by Group A (without animation)					Task 5b performed by Group B (with animation)				
Participant nr	Task 5b start time	Task 5b end time	Task 5b duration	Task 5b clicks amount	To solve this task, user clicked on	Task 5b start time	Task 5b end time	Task 5b duration	Task 5b clicks amount	To solve this task, user clicked on
1	00:01:49	00:02:14	00:00:25	5	click on T-Shirt image	00:01:43	00:02:00	00:00:17	4	click on T-Shirt image
2	00:01:37	00:01:50	00:00:13	4	click on T-Shirt image	00:01:40	00:01:57	00:00:17	4	click on T-Shirt image
3	00:01:25	00:01:50	00:00:25	5	click on T-Shirt image	00:01:21	00:01:29	00:00:08	3	click on T-Shirt image
4	00:01:45	00:01:54	00:00:09	4	click on T-Shirt image	00:01:29	00:01:49	00:00:20	4	click on T-Shirt image
5	00:01:50	00:02:16	00:00:26	4	click on T-Shirt image	00:03:51	00:04:04	00:00:13	4	click on T-Shirt image
6	00:01:55	00:02:22	00:00:27	5	click on T-Shirt image	00:02:58	00:03:40	00:00:42	5	click on T-Shirt image
7	00:01:06	00:01:35	00:00:29	5	click on T-Shirt image	00:00:59	00:01:27	00:00:28	4	click on T-Shirt image
8	00:03:00	00:03:31	00:00:31	5	click on T-Shirt image	00:01:09	00:01:29	00:00:20	4	click on T-Shirt image
9	00:01:36	00:01:52	00:00:16	5	click on T-Shirt image	00:01:29	00:01:47	00:00:18	4	click on T-Shirt image
10	00:01:51	00:02:17	00:00:26	5	click on T-Shirt image	00:02:38	00:02:51	00:00:13	4	click on T-Shirt image
11	00:01:30	00:01:52	00:00:22	6	click on T-Shirt image	00:02:58	00:03:08	00:00:10	4	click on T-Shirt image
12	00:01:06	00:01:20	00:00:14	5	click on T-Shirt image	00:02:34	00:02:48	00:00:14	5	click on T-Shirt image
13	00:01:36	00:01:49	00:00:13	6	click on menu T-Shirt option	00:03:03	00:03:23	00:00:20	4	click on T-Shirt image
14	00:02:49	00:03:13	00:00:24	5	click on T-Shirt image	00:01:51	00:02:00	00:00:09	4	click on T-Shirt image
15	00:02:06	00:02:17	00:00:11	4	click on T-Shirt image	00:01:47	00:02:01	00:00:14	4	click on T-Shirt image
16	00:02:32	00:02:51	00:00:19	4	click on T-Shirt image	00:04:24	00:04:52	00:00:28	4	click on T-Shirt image
17	00:02:53	00:03:02	00:00:09	4	click on T-Shirt image	00:02:02	00:02:11	00:00:09	4	click on T-Shirt image
18	00:02:09	00:02:25	00:00:16	5	click on T-Shirt image	00:02:23	00:02:48	00:00:25	5	click on T-Shirt image
19	00:02:02	00:02:26	00:00:24	4	click on T-Shirt image	00:02:09	00:02:39	00:00:30	3	click on T-Shirt image
20	00:01:40	00:01:58	00:00:18	5	click on T-Shirt image	00:02:56	00:03:07	00:00:11	5	click on T-Shirt image
Average			00:00:20	4,75				00:00:18	4,1	

B6. Task 6

	Task 6 performed by Group A (without animation)				Task 6 performed by Group B (with animation)			
Participant nr	Task 6 start time	Task 6 end time	Task 6 duration	Task 6 clicks amount	Task 6 start time	Task 6 end time	Task 6 duration	Task 6 clicks amount
1	00:02:18	00:02:26	00:00:08	2	00:02:30	00:02:39	00:00:09	2
2	00:02:01	00:02:14	00:00:13	3	00:02:08	00:02:20	00:00:12	3
3	00:01:54	00:02:06	00:00:12	2	00:02:35	00:02:41	00:00:06	2
4	00:01:59	00:02:08	00:00:09	2	00:01:59	00:02:25	00:00:26	2
5	00:02:24	00:02:41	00:00:17	3	00:04:11	00:04:18	00:00:07	2
6	00:02:24	00:02:42	00:00:18	2	00:03:47	00:04:10	00:00:23	2
7	00:01:39	00:01:48	00:00:09	2	00:01:33	00:01:48	00:00:15	2
8	00:03:56	00:04:15	00:00:19	3	00:02:08	00:02:14	00:00:06	2
9	00:01:55	00:02:08	00:00:13	3	00:02:24	00:02:27	00:00:03	2
10	00:02:33	00:02:46	00:00:13	2	00:04:06	00:04:10	00:00:04	2
11	00:01:56	00:02:13	00:00:17	3	00:03:46	00:04:07	00:00:21	2
12	00:01:24	00:01:30	00:00:06	2	00:03:02	00:03:11	00:00:09	2
13	00:01:57	00:02:02	00:00:05	2	00:03:32	00:03:41	00:00:09	2
14	00:03:29	00:03:38	00:00:09	2	00:02:08	00:02:13	00:00:05	2
15	00:02:32	00:02:38	00:00:06	3	00:02:07	00:02:12	00:00:05	2
16	00:02:57	00:03:01	00:00:04	2	00:04:55	00:05:04	00:00:09	2
17	00:03:12	00:03:17	00:00:05	2	00:02:15	00:02:20	00:00:05	2
18	00:02:33	00:02:38	00:00:05	2	00:02:59	00:03:19	00:00:20	3
19	00:02:32	00:02:42	00:00:10	2	00:02:54	00:03:12	00:00:18	2
20	00:02:02	00:02:14	00:00:12	3	00:03:12	00:03:16	00:00:04	2
Average			00:00:11	2,35			00:00:11	2,1