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Designing for First Impressions

- *How do visually salient elements influence first impressions of web pages?*

Master's Thesis in Information Systems

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Abstract for Master's thesis

Subject: Information Systems	
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<p>Abstract: New online businesses emerge every day, contributing to an overflow of unknown vendors that rely solely on their online presence. As the number of unfamiliar online entities without any offline presence grows, there is a need to understand how visual web design decisions impact users' impressions and the sense of trust. When there is no prior interaction with a web page, the user's first impression has a significant impact. First impressions in the context of HCI are influenced by the visual design of a web page, which subsequently is influenced by viewing behavior and the saliency of design elements.</p> <p>An online survey was executed to explore how visually salient design elements influence the user's perception of appeal, trustworthiness, overall impression, and the prospect of further use. Participants viewed six different fictional web pages with an exposure time of four seconds. The results revealed that judgments of appeal do not affect perceptions of trustworthiness; however, an impact was seen on overall impression ratings and the prospect of further use. Repeated measures ANOVA's for appeal ratings revealed highly statistically significant pairings between stimuli, indicating that differences in design significantly influenced ratings of appeal.</p> <p>Conducted one-way ANOVA's demonstrated that age or gender differences did not significantly impact how the participants rated the web pages. Additionally, the study's results revealed that the lack of a visually significant element and a clear entry point does not generate indifferent results. In its entirety, the study confirms prior first impression research regarding the impact of visual appeal on first impressions and illustrates the importance of visual prototypicality and aesthetic treatment.</p>	
Keywords: first impressions, web page design, web page viewing behavior, web page viewing patterns, visual salience, visual hierarchy	
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1 INTRODUCTION

New businesses emerge every day, and progressively more companies decide to launch their business with only an online presence, contributing to an overflow of new and unknown actors. These unfamiliar actors have the same goal: to grasp the same users' and consumers' interests. As the number of online entities without any offline presence grows, the users become more critical and apprehensive towards new webpages and systems. What makes users choose to interact with one web page over another when an abundance of other options are at hand? The challenge for online entities may not necessarily be attracting visitors since most users are used to aimlessly browsing the Internet. The challenge is to convince the user to stay and to interact with the web page.

Even for businesses with distinctive offline presences, a web page is notably relevant in order for companies to attain new and maintain existing consumers. For new entities without an offline presence, a successful web page is all the more essential. When there is no prior interaction with a vendor or a web page, the user's first impression has a significant impact on whether or not the user chooses to interact or even stay on the webpage for more than a few minutes. Research has revealed that both positive and negative first impressions can have long-lasting effects on user perceptions and intentions, thus, suggesting that first impressions should attentively be considered when designing web pages (Lindgaard, Fernandes, Dudek, & Brown, 2006).

First impressions of web pages are formed rapidly. Research confirms that long-lasting first impressions are formed as quickly as within the first 50 milliseconds of the user's exposure to a web page's visual design and content (Lindgaard et al., 2006). The fact that first impressions arise within milliseconds of exposure indicates that first impressions are developed already before users have had the time to consciously reflect on what they have seen or had any time to process the content in front of them. The actuality that first impressions are formed mostly without conscious reflection makes visual design and visual communication critical. Suggesting that in order to create compelling, attention-grabbing, and succeeding web pages, it is imperative to understand the factors that weigh in and attract the subconscious attention of the user, as well as obtaining insight into what

makes the user subconsciously feel like the web page is reliable enough for further investigation and continued use.

1.1 Objective and purpose

This study aims to gain insight into first impressions of web pages and how they are formed, specifically how visual design elements impact the formation and outcome of these first impressions. First impressions in Human-Computer Interaction (HCI) are highly relevant since users continuously form influencing impressions while browsing, searching, and performing tasks on the Internet. First impressions are formed of new systems, web pages, applications, and even new visual content that a familiar entity might present. Being aware of the impact and the possibilities that first impressions have can help designers and developers create designs that are as good as possible and generate the best possible first impression. Additionally, understanding what the user first fixates on and possibly overlooks, provides insight into how web page designers and developers can influence the user's impressions as well as create better user experiences.

With an extensive user population online, it is imperative to understand viewing patterns and their impact on forming impressions. Furthermore, understanding how web pages are viewed and perceived will also demonstrate the significance of first impressions, how they are formed, and how they impact web page users. As the online environment consists mainly of visual elements, it is also essential to recognize the effect that specific design decisions can have on user perceptions as well as user attention (Kahn, 2017). User attention subsequently influences how web pages are viewed and how the visual information is processed. Faraday (2000) argued that visually salient elements guide visual attention and that these visually salient elements are hierarchical, proposing that certain design elements are consistently processed before others and capture the user's attention before anything else.

1.2 Research questions

The thesis's main objective is to obtain an understanding of pre-use first impressions within the HCI context. As well as explore the impact that visual design elements have on first impressions and how these obtained impressions influence the perception of core principals within web page use. The following research questions have been defined to support the research objective:

1. What influences pre-use first impressions in an HCI context?
2. According to Faraday's visual hierarchy, how do visually salient elements influence pre-use first impression perceptions of visual appeal, trust, overall impressions, and further use?

1.3 Structure of thesis

The thesis is structured as follows; the introduction will be followed by a literature review of relevant research within the thesis's scope in chapter two. Previous research regarding web pages, how they are constructed, viewed, and used will be presented (section 2.1 and 2.2), as well as the use of visual elements and visual salience within the context of web pages (section 2.3). Relevant literature and research of first impressions will be introduced, including practical implications of first impressions (section 2.4 and 2.5). In its entirety, the literature review will provide an extensive answer to the first research question; what influences pre-use first impressions within an HCI context.

Following the literature review, in chapter three, the research methodology will present the chosen method and provide a motivation for the selected approach by presenting alternative methods and comparing both quantitative and qualitative methods (section 3.1 and 3.2). Followed by the application of the chosen method and data collection, with the main focus on the survey design and the included stimuli design (section 3.3).

The results and an analysis of the obtained data will be presented in chapter four, including a descriptive analysis and a quantitative analysis, conducted with one-way ANOVA's and repeated measures ANOVA's (sections 4.1, 4.2, and 4.3). The results will be discussed in chapter five, providing main findings, possible practical implications as well as limitations, and possible further research. A Swedish summary is included at the end of the thesis in chapter six.

2 LITERATURE REVIEW

The following chapter introduces and defines key concepts of the thesis, providing an insight into previous research made within web page viewing behavior and first impressions through a literature review. Additionally, as relevant information associated with web page viewing behavior and first impressions, the chapter will review the construct of web pages, visual design, and web page use.

2.1 Web page construct

Web pages have, throughout the past three decades, developed in their usability and visual design. With new technology and increasing knowledge, the options are endless. Still, there remain some key features to consider. According to Thielsch, Blotenberg, and Jaron (2014), successful web pages are combinations of relevant content, highly perceived usability, and aesthetic design; hence, constructed of three main pillars: content, usability, and aesthetics, each construct being able to treat separately. These three pillars influence how users perceive and rate the web page, thus making them essential factors in the construct of first impressions as well as influencing elements of viewing behavior (Thielsch et al., 2014). Since content is the primary reason a user visits a web page, it has been considered to be of great importance. Content is defined by ISO 9241-151 (2006) as content objects placed in a user interface, a content object defined as an “interactive or non-interactive object containing information represented by text, image, video, sound or other types of media” (p. 3). Usability is defined as the degree of efficiency and satisfaction through which the user utilizes a product or system to achieve its goals (ISO, 1998). Usability can further be divided into inherent and apparent usability, distinguishing usability as either objective or subjective. Apparent usability is regarded as subjective, thus highlighting the importance of the user’s perception and usability evaluation (Thielsch et al., 2014).

Aesthetics is a term that researchers have been struggling to define since it can mean various things depending on the context. Aesthetics is repeatedly used synonymously with visual appeal and beauty (Tuch, Presslauer, Stöcklin, Opwis, & Bargas-Avila, 2012).

Nonetheless, the perception of beauty is subjective, and no general definition of what is considered to be beautiful has been established. However, Moshagen and Thielsch (2010) define aesthetics within the construct of web pages as follows:

“an immediate pleasurable subjective experience that is directed toward an object and not mediated by intervening reasoning” (p. 3).

Tuch et al. (2012) suggested that aesthetics is evaluated through aesthetic appraisal and aesthetic judgment. Subjective experiences, valued as positive, are considered aesthetic appraisals. Normative criteria and thoughts of attributes that should be regarded as aesthetic are aesthetic judgments. Aesthetic appraisal and judgment influence how we perceive and assess the level of appeal of the visual stimulus. The assessed level of appeal influences our first impression and judgment of the system or webpage as a whole (Tuch et al., 2012).

2.1.1 User experience and visual design

User experience is a widely used concept, constituting different aspects. Albert and Tullis (2013) define user experience as a measure or observation of a user’s experience. Their definition includes three defining characteristics: “(1) a user is involved, (2) that same user is interacting with a system, product or interface, (3) the user’s experience is measurable, or observable” (Albert & Tullis, 2013). It is essential to distinguish between usability and user experience since it is commonly mistaken to indicate the same thing. However, usability is a part, and an important one, contributing to the entire user experience. Usability measures how easily a user can carry out possible tasks. User experience observes the user’s entire interaction, considering feelings, thoughts, and perceptions (Albert & Tullis, 2013).

In the context of HCI, the visual design of a system or a web page user interface has the ability to impact the user's experience altogether. The purpose of visual design is to strategically implement design elements to enhance user engagement, interest, desired perception, and aesthetic appeal (Michailidou, Harper, & Bechhofer, 2008). A successful

visual design increases the interaction value and is carefully calculated to serve the need, knowledge, and purpose of the visit for existing and desired users. The main visual design elements are agreed upon to be: lines, shapes, colors, textures, typography, and form. Features like motion, images, symmetry, and position are also considered elements of visual design. In a technological graphic user interface (GUI), buttons, icons, text fields, windows, and pull-down or pop-up screens are categorized as design elements (Lynch, 1994). Design elements are generally placed according to design principles, which are informal guidelines for designers developed throughout the years. The most common design principles are unity, gestalt, space, hierarchy, balance, contrast, scale, dominance, similarity, and complexity (White, 2011). Design principles' primary function is to guide the viewers to comprehend the visually encoded information easily (Agrawala, Li, & Berthouzoz, 2011). An effective visual presentation aims to help the users navigate, interact, and understand the content effortlessly. Form, content, and cognition influence the perception of visual stimulus. Furthermore, cognition influences how the user retrieves and adopts the information it has retrieved (Michailidou et al., 2008).

2.2 Web page viewing behavior

Web pages are often a “combination of textual, pictorial and multimedia content” (Pan et al., 2004), differing from other traditional visual stimuli. Thus, meaning that web pages are viewed differently from images, even though web pages could be defined as complex images. As design patterns and general design guidelines for web pages have emerged, it has simultaneously contributed to users' expectations of how to view web pages and where specific elements are typically placed (Buscher, Cutrell, & Morris, 2009). How web pages are viewed can be explained by studying the eye movement behavior of the user. Eye movements are categorized as either fixations or saccades. Fixations are motionless gazes, lasting about 200 - 300 milliseconds, whereas saccades are eye gazes moving continuously and rapidly between fixations (Pan et al., 2004). Generally, visual information is processed and perceived only during fixations, when the eye movements stay still for a brief moment (Buscher et al., 2009).

Eye-movements are guided by how the image is processed, either through a bottom-up or top-down process. The bottom-up process is determined by saliency; in other words, the viewing process is influenced by the saliency of the content as well as the visual complexity of the stimulus (Sutcliffe & Namoune, 2008). The bottom-up process is rapid and naturally a subconscious process; the gaze is guided by low-level aspects of images such as contrast, color, and luminance. The top-down process has been challenging to define. It is considered to be governed by the user's goals, tasks, and knowledge of similar types of visual stimuli. Since the user's interests heavily influence the top-down process, the eye-movements are primarily directed towards areas that the user finds cognitively compelling (Nyström & Holmqvist, 2008).

2.2.1 Web page viewing patterns

Web page viewing patterns provide insight into how users read and scan web pages; even though users are different and have different intentions, eye-movements exhibit general patterns governed by the web page's construction and the processing of visual content. Nielsen (2006) argued that the most common viewing pattern is the F-shaped pattern. As seen in figure 1, the F-shaped viewing pattern starts at the top left corner of a web page, the user's gaze continuing with a horizontal movement across the top of the page, thus creating the top bar of the letter F. The scanning continues downward, followed by a shorter horizontal movement creating the lower bar of the letter F. Finally, with a motion along the left side of the page, the stem of the letter is created.

The user's tendency to exhibit the F-shaped viewing pattern comes with a few implications that predominantly affects the positioning of content on the web page. Since users rarely read through a text in a word-by-word manner, the most important information needs to be located in the first two paragraphs. According to Nielsen (2006), the user is even less inclined to skim through the content found further down the page, concluding that most fixations fall at the first lines of a text. The following lines receive significantly fewer fixations. The same applies to sentences; most fixations fall at the first few words, located on the left-hand side, whereas the following words in the same line receive fewer fixations (Pernice, 2017). However, it is essential to keep in mind that the

Nielsen's (2006) research focused on scanning patterns mostly related to text scanning and reading, meaning that the tendency to exhibit the F-shaped patterns might differ regarding image dominated web pages.

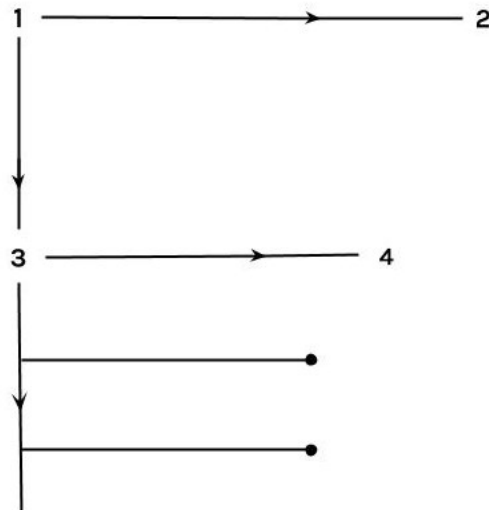


Figure 1: The F-shaped viewing pattern

Most users exhibit similar browsing behavior on the Internet, expecting to find what they seek with the least amount of effort. The user's desire to be as efficient as possible is considered the reason for the F-shaped viewing pattern's frequent appearance. Research implies that the F-shaped viewing pattern arises due to text formatting, efficiency, and commitment. If the text on the web page lacks clear and coherent formatting, there is no direction for the users to find critical information, leading the user to create a path of its own. This path is most likely to be the path that takes the user the least effort (Pernice, 2017). Even though the F-shaped pattern has been proven to be a reasonably dominant viewing pattern for web pages, Pernice (2017) suggests a number of other viewing patterns. For instance, in the spotted pattern, the user ignores large chunks of text and is most likely scanning for something specific. In the layer-cake pattern, the user limits its scanning to headings and subheadings, the pattern containing mostly horizontal lines. A viewing pattern that is not so typical is the commitment pattern. The user fixates on nearly everything in the commitment pattern, thoroughly reviewing the web page and its content (Pernice, 2017).

Shen and Zhao (2014) emphasize in their research that web page viewing differs from natural viewing patterns since web page viewing patterns focus on the top-left corner. According to their study, most of the first, second, and even third fixations fall in the top-left region. Specifically, first fixations tend to fall in the center “position that is slightly toward top-left corner” (Shen & Zhao, 2014). The second and third fixations fall in the direction of the top-left corner, however, still more towards the center of the page. A positional bias of the top-left region is achieved by the preference of placing objects or texts in the area. Logos, large texts, and objects in the center’s trajectory or the top-left region attract first fixations’ attention. Shen and Zhao (2014) suggest that fixations tend to cluster at the top-left corner and center of the page; subsequently, the cluster starts to diversify after a few seconds.

2.2.2 Drivers of viewing behavior and patterns

Viewing patterns are guided by searching and scanning; searching refers to the user’s attempt to find an entry point into the web page, whereas scanning refers to the user’s behavior after locating an entry point (Djamasbi, Siegel, & Tullis, 2011). In the scanning process, the user is susceptible to the information located in the entry point’s periphery. The searching and scanning processes are mainly influenced by visual design elements and the manipulation of them, *i.e.*, the point of entry can be manipulated by: “size, color, location, text style and visual information (images) of components” (Djamasbi et al., 2011). Furthermore, the scanning process is influenced by proximity and the general placement of web page components. Components close together are usually perceived as being related to each other, thus, being processed together. When related information is placed in close proximity, the user’s scanning becomes more effective, and the experience more pleasurable (Djamasbi et al., 2011).

According to Buscher et al.’s (2009) research, the salience of elements direct first fixations and subsequent fixations are directed by expectations and general knowledge of where to find specific content — indicating that the salience of elements influences the searching process and that the user’s expectations influence the scanning process. Thus, suggesting that three different aspects govern viewing behavior: 1) the features of

the web page itself, 2) the user's expectations of where to find relevant information, 3) the user's underlying task or need of information (Buscher et al., 2009). In order to influence viewing patterns, web designers need to consider how visual elements are applied, the placement of these visual elements, the primary reason for the user's visit, and the user's expectations.

2.2.3 Visual salience

The saliency of objects has a significant impact on which objects are perceived and how. The user's first fixations are influenced by the most visually salient elements displayed, meaning that the object or region that stands out the most will be processed and noted first. Since the human brain is constantly scanning its surroundings, it cannot apprehend or process every received input. Therefore, the brain processes regions and objects separately, focusing on the most salient feature to process first (Peters & Itti, 2007). Treisman & Gelade (1980) formed a framework for how visual salience is computed. To determine which of the objects or regions are the most salient, a saliency map is constructed of the incoming visual information. Visual neurons, sensitive to visual stimuli, analyze the visual information, and compute a saliency map. The most salient features are highlighted in the saliency map, thereby subconsciously influencing the user's gaze. The objects or regions that are determined as most salient are processed and perceived first.

The impact of visual salience is based on visual salience bias. When the user processes images and displays, the first fixation consistently focuses on the most visually salient object in the image or display (Kahn, 2017). Because of the visual salience bias and how visual information is processed, visually salient objects are more likely to be given attention. According to prior research, the effect of visual salience bias can be long-lasting and generally influences the user's choices more than the user's personal preferences (Kahn, 2017). The visual salience bias has an even more prominent effect when the user has a heavy cognitive load.

According to Peters and Itti (2007), visual salience is based on stimulus-driven signals; the signals communicate to the user that particular objects or regions are significantly different from the surrounding and worthy of attention. Visually salient objects or areas are reasonably similar independent from the observer. However, changes in surrounding stimuli and context can generate different saliency maps. Since the saliency of elements depends on the context and surrounding stimuli, it is difficult to determine specific salient objects. In natural environments where highly salient items are present, a perceptual salience occurs, which is effortlessly and automatically computed (Itti & Koch, 2000). Treisman and Gelade (1980) introduced different instances on how visual salience is processed differently according to the context and surrounding stimuli, simple display being one of them, where the user's attention immediately is drawn to the most salient item in the visual display. In the simple display, very little to none scanning of the display occurs, suggesting that the visual information is processed all at once. Treisman and Gelade (1980) named visual displays without significantly salient objects as conjunction targets. The absence of significantly salient objects causes the user aimlessly to scan the display in search of something captivating. Displays containing numerous items that contribute little to visual salience do not influence attention to be drawn in any particular location. However, in displays with only one or a few significant visually salient items, the items will be highly attention-drawing since they are substantially different from the rest.

2.2.4 Visual hierarchy

Visual salience in the context of HCI is affiliated with visual search and decision-making. Web designers use images, headlines, icons, call-to-action-buttons, among others, to direct attention. By making the objects colorful and stand out from the rest of the website, the objects become salient (Kahn, 2017). However, web pages can be filled with salient objects making distinct predictions difficult. However, web pages can be full of salient elements making distinct predictions difficult. Faraday (2000) developed a visual scanning model identifying a hierarchy between six different, visually salient features: motion, size, image, color, text-style, and position. The visual hierarchy is formed by the user's perception and interpretation of the objects' importance visually presented in the

user interface. The function of a visual hierarchy is ultimately to guide the user's viewing pattern. The elements that are the most visually salient are categorized as the most important, thus, viewed first. Faraday (2000) proposed the following hierarchy among visual design features:

1. Motion
2. Size
3. Image
4. Color
5. Text-style
6. Position

The visual user interface can easily be an overwhelming environment for the user. In order for the user to process information efficiently and not overlook vital information, there is a need for guidance. The visual hierarchy assists the user in “what to do, how to do it, and what to expect” (Schlatter & Levinson, 2013). According to Faraday (2000), a flat visual display lacking salient items and a hierarchy can lead to poor user experiences. The user does not know what is essential nor where to focus. Furthermore, a web design where too many objects are highlighted contributes to a cluttered design where nothing is emphasized.

Faraday's (2000) model consists of two stages, the search phase, and the scanning phase. The search phase is the phase where the user finds its entry point. Per Faraday's (2000) model, the searching phase is guided by motion, size, images, color, text-style, and position. The scanning phase is where the user extracts information from the elements in the entry point's proximity. The hierarchy of the objects determines the entry point. If an element of motion is excluded, the size feature will determine the entry point. If both motion and size are not a factor, an image is the next plausible entry point. The entry point's determination continues hierarchically for color, text-style, and position, given that none of the features mentioned above being visually more salient (Faraday, 2000).

A web design with an impactful viewing pattern is designed so that crucial information has more prominence or visual weight than elements that are considered less critical. Visually prominent elements tend to draw more attention and are thus perceived as more critical (Schlatter & Levinson, 2013). Using visually prominent elements, web page designers can create desired entry points; since the entry point is the first element or region that the user processes, it heavily influences the rest of the user experience and how web pages are perceived. A viewing pattern guided by visual hierarchy can be altered by the positioning and manipulation of elements in the interface, with changes such as a variation in sizes, different use of color, use of interface types (*i.e.*, buttons and links), and general treatments of elements (Schlatter & Levinson, 2013). In order for the visual design to guide the user, designers can use elements that carry different visual weight. The features are categorized as dominant, sub-dominant, or subordinate, distinct from most to least important (Still, 2018). Dominant elements are attention-drawing and carry a lot of visual weight, whereas subordinate elements rarely attract attention. Sub-dominant elements have lesser visual weight and are created through different use of color and contrast. Since the scanning phase follows the initial searching phase, it is essential to consider what kind of elements are placed around the entry point and their classification (*i.e.*, dominant, sub-dominant, or subordinate).

Faraday's model of visual hierarchy and entry points has, later on, received criticism. The model was developed to examine the distribution of attention on a web page interface and predict the user's entry points. According to Still's (2018) study, Faraday's (2000) model is inadequate in predicting entry points. Still (2018) used web page stimulus with clear entry points to examine the model; the overall results were dissatisfactory. From the proposed visually salient elements, position was the only element that reached a satisfactory result. Color and text-style did a fair job, whereas size and image failed as entry points. Grier (2004; see Shen & Zhao, 2014) also questioned Faraday's model, concluding that the model is not sufficient for more complex web page viewing patterns presented today. Faraday formulated the visual hierarchy model almost two decades ago, and during that time, web design has developed immensely. Still's results demonstrate the need for an updated model for predicting entry points, adjusted to today's design practice. However, the elements proposed in Faraday's (2000) original research are still significant in investigating users' viewing behaviors and viewing patterns.

2.3 Phases of web page use

When using a web page, the user goes through a series of phases. Research has suggested that web page use entails “an exposure and impression formation phase, an evaluation and use phase,” (Thielsch et al., 2014) and finally, the user’s intentional outcomes. Thielsch et al. (2014) suggested a differentiation of three phases:

1. Pre-use first impression phase
2. Post-use overall impression phase
3. Intention formation phase

The pre-use impression phase is the phase where the initial first impression is formed. In this phase, the user is only exposed to the web page’s visual stimulus and has not yet had the time to cognitively process the content (Tuch et al., 2012) In the post-use overall impression phase, the user matches the first impression of the visual content to the impression formed by using the user interface. In this phase, content and usability are influencing elements, as opposed to the pre-use first impression phase, where the visual stimulus is generally the only influencing element. In the last phase, where intentions towards the web page are built, the user forms its intentions for further use, intent to buy, and intent to recommend or visit again (Thielsch et al., 2014).

As these three presented phases of web page use are all interlinked, it highlights the importance of creating a positive impression throughout the user’s web page use in order to impress the user, regardless of the desired outcome. However, further into this thesis, prior conducted research will be introduced, demonstrating that creating a positive pre-use impression carries a lot of weight since it heavily influences the following phases.

2.4 First impressions

First impressions are crucial when developing an opinion of something, as well as when determining subsequent actions. Fundamental research made by Lindgaard et al. (2006) has demonstrated that reliable first impressions are formed as fast as within 50

milliseconds of exposure. First impressions influence human behavior in various situations and to a different extent, with both mid-and long-term effects (Tuch et al., 2012). The subject of first impressions has been a compelling topic for researchers, and research has been conducted within; psychology, marketing, usability, and so on. First impressions is variously defined, and the apparent effects are different, considering the context. Within marketing, the first impression is considered to be a quick evaluation that habitually influences the overall impression of a product or consultant (Sheng, Lockwood, & Dahal, 2013). In the context of HCI, first impressions could be similarly explained. A first impression could be seen as an initial rapid evaluation of a web page, system, or application, contributing to the formed impression.

Sheng et al. (2013) suggested that attention and interpretation of information are the main activities that influence the impression formation process. The formation of a first impression is seen as an active process, where the user gathers information, organizes it, and forms a representation of what is seen. Users initially categorize what they see based on salient features, such as “color, images, use of font, font size, the position of items” (Sheng et al., 2013). Research conducted by Lindgaard et al. (2006) and Tuch et al. (2012) exhibit that impression formation and information processing start within milliseconds of exposure. Thielsch et al. (2014) argue that since impression formation is so rapid, differentiating immediate and deliberate first impressions is important. Immediate first impressions are mostly based on visual perceptions from bottom-up processes, while deliberate first impressions are based on top-down processes. In comparison, top-down visual stimuli processing is influenced by conscious reasoning and reflective cognitive processes (Thielsch et al., 2014).

2.4.1 Impact of first impressions

The impact of first impressions within HCI has been researched, for instance, regarding visual appeal and perception of usability (Tractinsky, Cokhavi, Kirschenbaum, & Sharfi, 2006), trust (Karvonen, Cardholm, & Karlsson, 2000), and credibility (Robins & Holmes, 2008). Regarding judgment and decision-making, first impressions can cause cognitive confirmation bias. In a situation of cognitive confirmation bias, the user's positive first

impression can influence the perception of negative issues, suggesting that the user may overlook issues and errors later on encountered. The confirmation bias also affects perceptions in situations of negative first impressions. Users with negative first impressions often have a more challenging time accepting positive aspects later on, diminishing positive perceptions of appeal, usability, and content (Sheng et al., 2013). The impact of confirmation bias and first impressions can, especially in the setting of web page viewing, be imperative to understand to attain the user's attention and willingness to revisit a web page. The cognitive confirmation bias has also been determined to have a sustained effect on the user, further demonstrating that first impressions can have long-lasting effects.

Since first impressions can have long-lasting effects, it is therefore vital to consider what kind of first impressions web pages generate. Research has proven that participants ranked perceived usability higher when the first impression based on visual appeal was positive. Conversely, participants ranked perceived usability lower when the first impression of visual appeal was negative, even though the usability was higher (Lindgaard et al., 2006). The exhibited phenomenon is a form of a cognitive bias called the halo effect, proving that first impressions have long-lasting effects and influence the user's perception of usability, credibility, and trust (Djamasbi et al., 2011). Because of the halo-effect, a first impression affects everything the user sees and processes afterward, meaning that great content and usability might not have an impact if the user has already formed a negative or positive first impression (Lindgaard et al., 2006).

2.5 Prior research in the field of first impressions

Majority of first impressions research within the field of HCI focus on the impact of visual appeal and aesthetics on the formation of first impressions. Research observing the effect on trust, credibility, informativeness, task performance, mental workload, and perceived usability have been conducted, as well as research on cultural effects, gender differences, and the behavior of different generation (Tuch et al., 2012). However, a common goal has been to understand better what kind of elements and factors generate specific user judgments. Fundamental research has, for instance, been made by Lindgaard et al. (2006),

their research confirming that first impressions of web pages are constructed rapidly within milliseconds of exposure. Researchers have been inspired by Lindgaard et al.'s studies and have provided further proof of the initial study's findings.

2.5.1 Exposure time

Lindgaard et al. (2006) conducted three studies to determine the time frame of forming an impression based on a web page's visual appeal. Participants viewed and rated the visual appeal of web pages that were generally rated as the "best and worst examples of visually appealing web pages by members of the Human Oriented Technology Lab" (Lindgaard et al., 2006). Exposure times were limited to 500 milliseconds and 50 milliseconds. Results were highly correlated, concluding that 50 milliseconds is enough time for a user to form a reliable first impression based on its visual appeal.

Tractinsky et al.'s (2006) research concluded that users can form immediate impressions based on aesthetics and that these impressions are substantial. The study's objective was to provide further proof for the rapid pace of formation and the effect that aesthetics has on first impressions. As opposed to Lindgaard et al.'s (2006) research, Tractinsky et al. (2006) conducted two experiments with an exposure time of 500 milliseconds and a longer exposure time to ensure the consistency of the formed opinion. Evaluations were consistent between the shorter 500 millisecond exposure time and the longer exposure time of 10 seconds, further supporting the evidence that reliable opinions are formed already within milliseconds.

2.5.2 Judgments based on aesthetics

In research conducted after the initial study, the aim for Lindgaard, Litwinka, and Dudek's (2008) research, was to identify visual attributes that affect judgments as well as review how relationships between judgments of visual appeal, trust, and usability, differ in terms of different cognitive demands. To further confirm findings from previous work, the exposure time was limited to 50 milliseconds. The results revealed that judgments on

appeal formed significantly faster than judgments on trust and usability. All three judgments were driven by visual appeal, even though perceptions of usability and trustworthiness are differently processed since they are cognitively more demanding than perceptions of appeal. The same study also aimed to determine if specific attributes or combinations of attributes could potentially influence perceptions of appeal, trust, and usability judgments. Six attributes were tested individually for each of the three judgments. The chosen attributes were: balance, contrast, density, graphics, symmetry, and text. The results revealed that density, contrast, and graphics had the best impact on appeal ratings. Whereas balance, text, and contrast were prominent when it came to trustworthiness. Lastly, graphics, balance, and contrast were determined to considerably impact usability ratings (Lindgaard et al., 2008).

In research conducted by Tractinsky et al. (2006), the results exhibited that extreme ratings on attractiveness, both positive and negative, were provided faster than average ratings. Users evaluated web pages based on classical and expressive aesthetics design dimensions. Classical aesthetics describes the design's clarity and orderliness, and expressive aesthetics represents the creativity, originality, and richness of the web page's design. Results revealed that positive impressions were, in general, combined with high levels of both classical and expressive aesthetic dimensions. Furthermore, web pages that were categorized as unattractive by users mainly had lower levels of expressive aesthetics (Tractinsky et al., 2006).

2.5.3 Credibility and trust

In Albert, Gribbons, and Almada's (2009) study, the aim was to research trust and the impact that pre-conscious assessment has on it, as well as if these pre-conscious trust assessments are reliable. Two trials studied the reliability of the user's trust judgments. In the trials, screenshots of web pages were viewed for 50 milliseconds, further supporting Lindgaard et al.'s (2006) suggestions that judgments are made rapidly within milliseconds. Throughout the two trials, half of the participants were consistent with their expressed judgments on trust. The results suggested that users are able to process the

feeling of trust already pre-attentively, thus concluding that the visual appeal of a web page is also pre-attentively processed (Albert et al., 2009).

Kim and Fesenmaier (2008) researched the impact that first impressions have on destination web pages' persuasiveness. Results concluded usability and inspiration as primary drivers for positive first-impression formation; the results also indicated that participants make rapid judgments in the context of tourism web pages. The study's chosen determining factors were informativeness, usability, credibility, inspiration, involvement, and reciprocity. Kim and Fesenmaier (2008) determined these factors as considerable elements regarding the formation of first impressions regarding tourism destination web pages. However, credibility, inspiration, involvement, and reciprocity were confirmed not to be perceived as favorable by the users. In the formation of first impressions, inspiration-related elements had the most impact, whereas usability and credibility were determined as the following drivers. The results obtained from the research further supporting the general findings regarding first impressions; visual appeal and aesthetics have a significant impact on the formation of first impressions (Kim & Fesenmaier, 2008).

Robins and Holmes (2008) studied the relationship between visual design and credibility. In the study, web pages were designed with high and low aesthetic treatments to determine visual aesthetics' effect on credibility. Web pages with high aesthetic treatments were consciously designed, employing design principles for effective communication, mindful use of colors and graphics to enhance the brand and overall concept. For web pages with low aesthetic treatment, content and design elements were placed without any considerations of making it visually appealing. Web pages with high aesthetic treatment produced more positive judgments of credibility, further supporting the hypothesis that a web page's visual design has a significant impact on the user's perception.

The study focused on the visceral level of experience. A noteworthy aspect of the visceral level is that there has not been any cognitive reflection. In other words, the visceral experience is the immediate reaction. Robins and Holmes' (2008) findings demonstrated that shorter exposure times resulted in more negative credibility judgments. The longer

the exposure time, the more positive the judgment of credibility tended to be. The results imply that judgments are based on cognitive criteria. Robins and Holmes (2008) concluded that establishing credibility through content is more challenging if a positive judgment of credibility has not already been made at the visceral level.

2.5.4 Visual complexity and prototypicality

Michailidou et al.'s (2008) research presented results regarding first impressions, visual complexity, and the perceived aesthetics of web pages. Visual complexity is defined as the extent to which detail is contained in an image or an interface (Tuch et al., 2012). The level of complexity is determined by structural elements and the characteristics of these structural elements. Texts, links, images, and tables are categorized as structural elements. The color and size of these elements are regarded as possible characteristics. Visual complexity is dependent on "the density and the diversity of the elements" (Tractinsky et al., 2006). Density is the number of structural elements on the web page, whereas diversity is the variety of different structural elements placed in the interface (Michailidou et al., 2008). In other words, visual complexity is constructed by the arrangement of objects, symmetry, variety of colors, and the openness in the interface.

The study conducted by Michailidou et al. (2008) takes into consideration that impressions of web pages are formed rapidly and that these impressions are the first impressions of the user. However, contrary to other already mentioned research, in Michailidou et al.'s (2008) study, the exposure time was not fixed. The results determined a strong and high correlation between perceived visual complexity, aesthetic appearance, and structural elements. In its entirety, the study demonstrates that it is possible to manipulate user perception with structural changes in the layout of the web page. The results exhibit that the overall structural layout is an essential possibility in predicting the user's impression (Michailidou et al., 2008).

Tuch et al. (2012) also researched the contribution of visual complexity and prototypicality of web pages regarding first impressions. Prototypicality is created from the user's mental models that arise through experience. Prototypicality is, in a way, the

expectation the user has of the placement of objects on the web page. The main findings in Tuch et al.'s (2012) research were that visual complexity and prototypicality of web pages are essential elements regarding first impressions of aesthetic perceptions. The study's results revealed that web pages with high visual complexity resulted in more negative first impressions. However, web pages with higher prototypicality levels created more positive first impressions than web pages that had lower levels of prototypicality. Negative first impressions were the highest with web pages with a high level of visual complexity and low prototypicality level. Web pages with low visual complexity and high prototypicality were considered visually appealing, concluding that the level of visual complexity has a more substantial impact on web pages with high prototypicality (Tuch et al., 2012). Beyond the effects of prototypicality and visual complexity, the researchers also found that users were quick to respond in cases of web pages that were considered attractive than with web pages that were deemed to be unattractive. The results from Tuch et al.'s (2012) research highlight the importance of considering visual complexity and the level of prototypicality, as well as how these two factors play together when designing web pages.

2.5.5 Mode of use

Van Schaik and Ling (2009) expanded Lindgaard et al.'s (2006) research studying the mode of use. The user's prevailing situation defines the mode of use. The mode of use can be either action or goal-oriented. In the goal-oriented mode of use, the user focuses on accomplishing a goal, and the system functions as an aid to complete that goal. Whereas in action mode, the user focuses on specific actions. Different modes of use are subconsciously combined with distinct preferences. Users with goal mode generally prefer web pages with classical aesthetics since the arousal is low, and the design is clear and familiar. Web pages with classical aesthetics favor sensemaking, and the understanding of the content is, in general, more comfortable. Users in action mode prefer expressive aesthetics since it generates higher arousal levels with its complexity (Van Schaik & Ling, 2009).

The mode of use is considered to be a pivotal factor when it comes to the stability of created impressions. Van Schaik and Ling's (2009) study demonstrated that the perception of aesthetics was more stable when a context was provided, entailing that including a mode of use form more reliable perceptions. The reason for this is that when the user is provided with a context, the user is more likely to have a focus for its judgment of the potential use, thus "producing less volatile judgements" (Van Schaik & Ling, 2009). In conclusion, Van Schaik and Ling (2009) demonstrated that the mode of use, type of aesthetic design, and the knowledge the user possesses are essential factors to consider in perception formation.

2.5.6 Influencing elements

Thielsch et al. 's (2014) research aimed to understand the user's process of evaluating a web page and the influencing elements. The study examined content, usability, and aesthetics as influencing elements. Since content, usability, and aesthetics are expressed by the objects placed in the user interface, they play a notable role in cognitive processing and the visual perception of a web page. In the process of evaluating web pages Thielsch et al. (2014) distinguished three phases of web page use: the phase for exposure and impression formation, the evaluation and use phase, and an intentional outcomes phase. The study further differentiated first impressions as immediate or deliberate. Deliberate impressions are constructed from reflective cognitive processes and reasoning, whereas immediate impressions are predominantly based on aesthetics alone.

The study's general results were that all three, content, usability, and aesthetics, contributed to the formation of first- and overall impression of a web page (Thielsch et al., 2014). In the deliberate first impression formation phase, aesthetics had a significant impact, whereas content had a moderate impact. In the intentional outcome phase, the extent to which the user had the intention to revisit or recommend the web page, content had a very high impact, "while aesthetics had a small but significant impact" (Thielsch et al., 2014). Usability had no relevancy when it came to the intention to revisit or recommend a webpage and only a "small to mediocre influence on first and overall impressions" (Thielsch et al., 2014). The findings in Thielsch et al. 's (2014) research

suggest that also for deliberate first impressions, aesthetics is a decisive factor. However, for the whole duration of use, content is a significant factor. In higher cognitive processes, in cases such as deciding if the web page is worth revisiting, the influence of content increases while the impact of aesthetics decreases; however, it is not eliminated.

Douneva et al. (2016) research studied how different web page designs influence first impressions. For the study, company web pages were separated into different categories identified through their salient characteristics. The study's objective was to investigate differences in first impressions, visual aesthetics evaluations, and the web pages' memorability. Through that determining which web page designs, users were most inclined to favor. The chosen web pages were categorized as follows (Douneva et al., 2016):

1. Strong colors of one color family (SCOFA)
2. Large pictures (LAPIC)
3. The same amount of pictures and text (SAPAT)

The main findings regarding aesthetic preferences were that pages with an equal amount of pictures and text (SAPAT) were assessed as professional and conventional. In contrast, strong colored pages (SCOFA) were found to be less professional. Strong colored pages were also determined as unimaginative and uninviting. Pages with large pictures (LAPIC) were evaluated between SAPAT and SCOFA pages, being perceived as conventional but not to the same extent as SAPAT pages. Regarding memory performance, pages with the same amount of pictures and text generated the best results; however, both pages with large pictures and pages with strong colors generated results close to the average.

The results can be explained by the prototypicality of the presented web pages. Most of the pages in all categories had a high prototypicality, meaning that objects such as menus and search bars are placed in places that the user expects to find them. Even with shorter exposure times, web page designs that meet users' expectations are more likely to be remembered (Douneva et al., 2016). Based on the research results, web pages with an equal amount of text and pictures are perceived as aesthetically more appealing, resulting in high memory performances.

2.6 Impact of visual stimulus, appeal, and aesthetics on first impressions

Lindgaard et al. (2006) argued that first impressions, especially in an HCI environment, build and depend on aesthetics and visual complexity. The preference for visually appealing objects is evident when it comes to product choices; the same preference exists for system interfaces and web pages. According to Lindgaard et al.'s (2008) study, perceived visual attractiveness accounted for 72% of the overall user experience and usability. Users were found to perceive visually appealing systems as more usable than less appealing versions.

Most of the prior studies have primarily stated their definition of visual appeal and aesthetics. Definitions vary, still, all come down to the same principle that the perception of visual appeal and aesthetics is subjective. Visual appeal, aesthetics, and beauty are often used synonymously. Thielsch et al. (2014) defined aesthetics as a pleasurable personal experience of an object. Lindgaard et al. (2006) approached aesthetics as a part of visual appeal, concluding that aesthetics is an undefined subjective term about beauty, agreeing with earlier research that aesthetics can be divided into two dimensions, classical and expressive. Classical aesthetics refers to design concepts such as symmetry, orderliness, cleanness, and pleasantness, whereas expressive aesthetics refer to perceptions of originality, creativity, and fascination. The evaluation of classical and expressive aesthetics is considered to be subjective; however, according to Tractinsky et al. (2006) they still describe a general notion of aesthetics that is consensual.

2.6.1 Assessment of visual appeal and aesthetics

Tuch et al. (2012) argued that aesthetic judgments are formed by the perceived stimuli, such as color, shape, and complexity of the objects and the interface. Previous experience and knowledge influence how the stimulus is perceived. The perceived aesthetics is processed in five different stages (Tuch et al., 2012). First, a perceptual analysis is made, followed by an implicit memory integration; these first stages are processed subconsciously and are thus intuitive. The following stages, three and four, are influenced

by knowledge and previous experiences, implementing higher cognitive processes. At the final stage, all of the processed information is evaluated. From the final process, two outputs have been suggested, "aesthetic appraisal and aesthetic judgment" (Tuch et al., 2012). Aesthetic appraisals are what most web page designers hope to achieve since appraisals are positively valued perceptions, while aesthetic judgments are negatively connotated judgments (Tuch et al., 2012).

Lindgaard et al. (2008) studied the attributes balance, contrast, density, graphics, symmetry, and text, to determine if specific attributes would generate higher ratings of appeal, trustworthiness, or perceived usability. Thielsch et al. (2014) attempted to measure aesthetics with a series of questions presented in a questionnaire. Four aspects were examined; simplicity, diversity, color, and craftsmanship. Of these four aspects, 18 items were measured to find a general aesthetic factor. Tractinsky et al. (2006) had participants evaluating web pages on a 10-point rating scale; the intention was to figure out the user's level of agreement with the web page's design. Statements on expressive aesthetics, such as sophistication, creativeness, and fascination, as well as classical aesthetics statements such as cleanliness, pleasantness, and aesthetics, were studied.

Michailidou et al. (2008) highlighted that visual design could alter users' perceptions of web pages with color modifications, used fonts and size, and images and animations. Their research examined evaluations from a classical and an expressive point of view. Five terms and their antonyms were used to evaluate web pages: (1) cluttered – clean, (2) boring – intense, (3) disorganized – organized, (4) confusing – clear, and (5) ugly – beautiful (Michailidou et al., 2008).

2.6.2 Practical implications of visual stimulus on first impressions

First impressions are defined differently depending on how much time the user spends on forming it. In terms of pre-use first impressions, the user has not had any time to process what it has seen cognitively, meaning that the impression is based solely on a subconscious impression derived from the visual stimulus. Visual information is

predominantly responsible for pre-use first impressions since visual stimulus is evaluated immediately (Thielsch et al., 2014). In HCI, the visual stimulus is constructed of design elements, graphical objects, and images placed in the GUI. Since pre-use first impressions are formed within milliseconds, based on visual stimulus, the user's viewing behavior is an essential part of the impression formation. The user's viewing behavior determines the gaze pattern, most importantly determining where the gaze falls during these first impactful milliseconds. The user's viewing pattern can be altered by visual design elements, meaning that visual design elements also influence first impressions. According to Buscher et al. (2009), an element's saliency directs the user's first fixations. Following fixations are guided by the user's expectation and the knowledge of where to find specific content. In conclusion, the user's viewing behavior is governed by three different aspects:

1. The features of the web page itself.
2. The users' expectations of where to find relevant information.
3. The users' underlying task or need for information.

Especially in an authorless environment like the world wide web, visual design's impact serves a function beyond decoration (Robins & Holmes, 2008). Lindgaard et al. (2006) demonstrated that first impression judgments are considerably stable; new information is often processed in a biased way influenced by the initial impression. The opposing evidence from additional attributes such as usability, functionality, and reliability has to be significant in order for the impression to change (Tractinsky et al., 2006). Implying that positive judgments of credibility already need to be made at a visceral level since it is more challenging to establish credibility through authority or content, let alone convincing the user if a negative impression already has been formed.

Research has proven that prototypicality significantly impacts how users judge appeal and aesthetics (Tuch et al., 2012). As mentioned earlier, prototypicality represents the user's expectations of how objects are placed on a web page or system. Elements such as navigation bars and logos are usually found in similar places regardless of the web page. Michailidou et al. (2008) concluded that a high level of familiarity impacts the user's perception of appeal and impression. Correspondingly, Tuch et al.'s (2012) study demonstrated that a high prototypicality creates positive first impressions. Contradicting

web page designs that differ significantly from users' expectations can lead to suboptimal first impressions. Familiar environments and designs are generally perceived as more attractive and user-friendly than unfamiliar ones (Tuch et al., 2012). While new and creative solutions could seem like great possibilities to make positive impressions, users still perceive familiar and recognizable web pages as more appealing than unfamiliar modern solutions.

3 RESEARCH METHODOLOGY

The following chapter will present the research methodology as well as the design and the procedure of the conducted study. The chapter will include a justification for the chosen method alongside a description of qualitative and quantitative methods in general and suggestions of alternative approaches. The research methodology serves as a guide for the conducted study and for the decisions that have been made.

3.1 Methodology selection

According to Nyberg and Tidström (2012), the selection of research method should be based on the research questions and what kind of a problem the researchers aim to solve. Qualitative methods are considered well-fitted when the objective of the research is to understand attitudes, experiences, and behavior in-depth. In contrast, quantitative methods generate statistics from larger groups of participants through more time-efficient methods, such as questionnaires or structured interviews (Dawson, 2011). Qualitative and quantitative approaches are differentiated through the type of questions that are asked, through expected answers, and used variables (Nyberg & Tidström, 2012).

Quantitative approaches typically aim to answer questions regarding frequency, quantity, relationships, or connections. Answers are mainly provided in manners that can be measured or placed on a scale for statistical processing or calculation purposes (Nyberg & Tidström, 2012). Thus, providing opportunities for obtaining large scale insights and statistical data on relationships, connections, and general perceptions. In quantitative research, the method must be reliable in order for the results to be valid. The method used should be tested and verified for the minimal occurrence of invalid data and confusion from the participant (Nyberg & Tidström, 2012).

Qualitative research methods aspire to interpret and understand phenomena, who, why, what, and how are typical question. In contrary to quantitative approaches, questions in qualitative studies are seldomly answered with numbers. In qualitative studies, free formulating answers are often included, and responses are divided into categories or

classes rather than frequencies or quantities (Nyberg & Tidström, 2012). Qualitative approaches are traditionally more time-consuming, often having participants formulating their own answers and going more in-depth with the obtained responses. Since qualitative methods require more time and more resources, the samples are usually smaller. However, with smaller samples, it is challenging to make sweeping statements (Nyberg & Tidström, 2012).

3.2 Chosen method

The study aims to investigate how visually salient elements influence pre-use first impression perceptions of visual appeal, trustworthiness, overall impressions, and further use. Previous research within first impressions has mostly used quantitative approaches or combinations of qualitative and quantitative methods. Based on previous studies and the presented research question, a quantitative approach was chosen. A qualitative approach could contribute in-depth insight into how users perceive web pages with different salient elements, thus, offering explicit improvements to web page design. However, according to Tractinsky et al. (2006), web page designers do not design for individuals. Designers design for populations, thus highlighting the importance of obtaining judgments from larger samples rather than individuals.

Since the study aims to explore the user's pre-use first impression perceptions, the exposure time is a contributing factor in choosing the approach. Pre-use first impressions are formed within milliseconds of exposure, based solely on visual stimulus (Thielsch et al., 2014). Because of the short exposure time, it might be challenging for the participants to express their opinions and emotions, suggesting to include simple answer options. In a setting where the participant freely formulates its answer, the answer's reliability becomes a factor since the perception might change during the process.

A user forms its perception based on visual stimulus and prior knowledge. In order to avoid a situation that the participant would have previous experience or obtained perception of an existing web page, new web pages without any connection to existing web pages or brands have to be used. Prior knowledge or an already formed perception

even of a company name could lead to differences in results. A first impression is only formed once, meaning that the perceived first impression influences any judgments made after the initial exposure. Additionally, pre-use first impressions occur before the user has had any time to interact with the web page, suggesting that participants should not be able to explore the web page at all before providing their opinions. Previous studies have used screenshots of web pages instead of active web pages to ensure the the answers' reliability.

3.2.1 Alternative methods

Eye-tracking methods have been widely used in first impression studies, especially regarding influencing visual elements and general viewing behavior. Eye-tracking methods generate accurate evidence on eye movements and longer fixations, making it easier to determine where attention subconsciously is drawn and what kind of elements attract the most attention in which settings. However, even though eye-tracking studies provide visible evidence, it does not necessarily always present the whole truth in how the user perceives what has been seen. Sutcliffe and Namouné (2008) demonstrated that eye-tracking devices provide data on areas and elements that can be considered salient. However, these areas might ultimately be utterly uninteresting to the user itself, thus not being as impactful as deemed. Since eye-tracking tests point out areas that are by default salient but not necessarily interesting for the users, Sutcliffe and Namouné (2008) suggest that a post-test memory recall of the web page content is a sufficient way to test the saliency of areas.

An eye-tracking method would provide the study confirmation of salient elements and regions and provide insight into how these elements influence general eye-movements and fixations. However, results obtained from eye-tracking studies do not convey how the user perceives the visual appeal, the web page's trustworthiness, or the user's overall impression. Combining an eye-tracking study and a questionnaire could be a possible approach that would generate both evidence on saliency as well as convey the user's perceptions and judgments. Nevertheless, the option would be more time-consuming for the participants and those conducting the study, resulting in a smaller sample. Therefore

the author opted for a simple and more approachable option that would generate a larger sample.

3.3 Application of method

An online survey was chosen to be the best procedure to obtain valid results and reach out to as many participants as possible. An online survey offers several advantages, *i.e.*, participants can be reached quickly, effortlessly, and respond to the survey more time-efficiently. A survey answered online also allows the participant to complete the survey wherever and whenever. It does not contribute to the same kind of pressure and possibly objective answers as an observed experiment. For researchers, an online survey increases the capacity for a larger sample, and the obtained responses can be transmitted straight to databases, facilitating the researcher's work.

In order to conduct an online survey successfully, the chosen tool needs to be accessible and trustworthy enough for the participant to feel comfortable to complete the survey. The survey should be short and straightforward and preferably offer some incentive for the participant. Even though online surveys provide plenty of advantages, as to everything, some weaknesses are essential to keep in mind when analyzing the data. There is no guarantee that the participant has answered the survey truthfully or correctly, hence why it is imperative to formulate the entire survey, including questions and instructions, clearly and understandably.

3.3.1 Question design

In order to acquire users' judgments and perceptions, four different questions, following the research questions, were formulated for the survey. Each question, focusing on one of the four aspects of perception the study aims to answer; appeal, trustworthiness, overall impression, and further use.

The following questions were formulated:

1. How appealing did you find the web page? (unappealing – appealing)
2. How trustworthy did you find the web page? (untrustworthy – trustworthy)
3. What kind of impression do you have of the web page? (negative – positive)
4. Would you continue to explore the web page further? (yes, no, or I don't know)

The presented questions were answered on a 5-point scale (see figure 2). Determined that the use of a 7-point or 10-point scale would lead to extended periods of consideration for the participant, furthermore leading to unreliable answers as the participant takes a longer time to process the response. On the 5-point scale, in every question, option one represented the negative antonym of option five. For the fourth question, options “yes”, “no”, or “I don't know” were provided. Questions were kept similar and short to obtain quick and genuine answers from the participants.

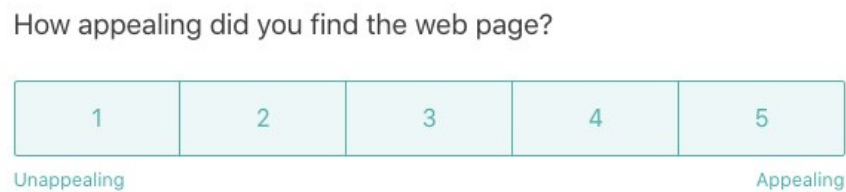


Figure 2: Survey question design

3.3.2 Stimuli design

For the purpose of the study, fictional web pages were created based on the stimuli guidelines presented in Still's (2018) study. The study included five different fictional web pages, each web page designed to highlight one element from Faraday's (2000) proposed hierarchy. The feature motion from the proposed visual hierarchy was excluded from the survey due to the choice to use screenshots of web pages instead of actual active web pages. The designs were simple, attempting to include only one clear entry point. Still (2018) argued that contrast and neighborhood similarity are fundamental variables when it comes to determining saliency. In order for an object such as an image to become

salient, it “must be distinct from its neighbors” (Still, 2018). Even though saliency cannot be guaranteed, it is essential to avoid competition with other elements higher up in the hierarchy (Still, 2018).

For the survey, six fictional web pages were created using templates from the website builder tool Wix.com. One web page for each visual hierarchy element; size, image, color, text-style, and position, and an additional from this point known as no hierarchy. In order to compare the effect of visually salient items, the no hierarchy web page was created without a clear hierarchy and any distinguishable salient items. The chosen web page templates were altered to fit the needs and the requirements of each stimulus set. Templates were chosen from existing categories such as business, store, creative, and blog, providing diversity between the stimuli. The templates were chosen based on the features that fitted the need the best without having to strip down the template of all included components. However, colors, fonts, images, background images, and texts were modified. The aim was to design the web pages to look as authentic as possible, including logos, fictional company names, social media tags, as well as relevant content that could be associated and presented in real-life situations. However, keeping in mind not to make the features purposely attention-drawing or more salient than the proposed highlighted element.

3.3.3 Size stimulus

According to Faraday (2000), larger elements are more prone to be noticed over smaller elements. More extensive features attract more attention as well as are perceived as visually more important than smaller ones. Attention is generally first drawn to the largest element, thus perceived as more important (Faraday, 2000). For the size stimulus, Still (2018) determined that the largest object on the web page should be either a block of text or an image, complying that the element is clearly distinguished from its neighbors.

For the size stimulus, the web page was constructed of an image that was significantly larger than the rest of the elements — clearly distinguished from the objects in proximity, appointing the image as the most visually salient item (see figure 3). Texts, links, log-in

functions, and call-to-action buttons were included for the web page to seem credible and perceived as a web page for an existing company. However, assuring that the elements included would not be perceived as visually more salient than the image.

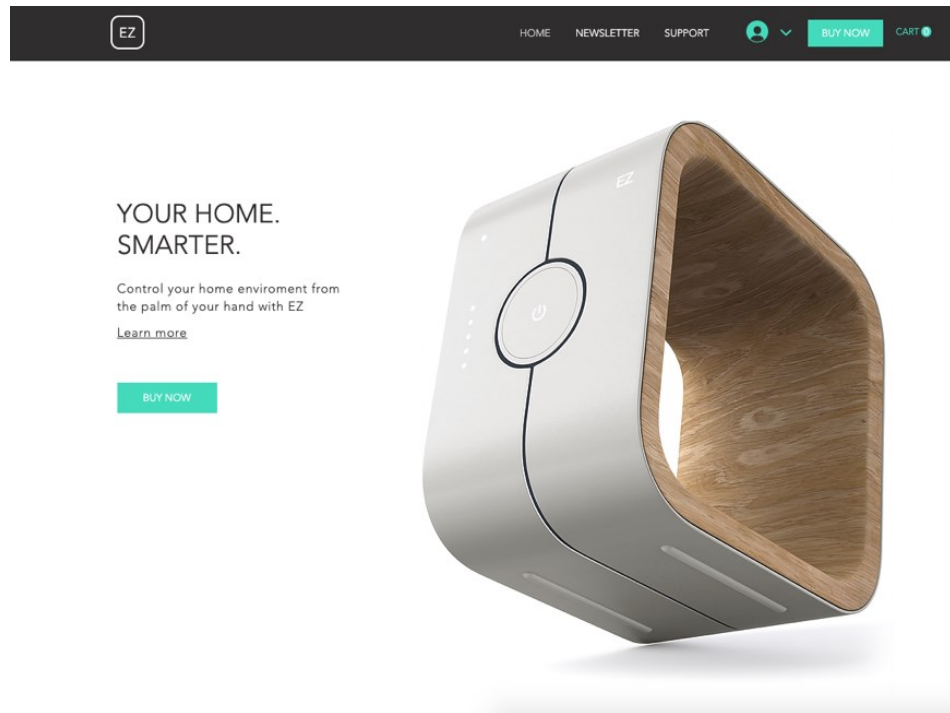


Figure 3: Size stimulus

3.3.4 Image stimulus

Faraday (2000) argued that images are preferred over text, placing images after size in the visual hierarchy. Graphics can be applied to attract attention to specific target areas since users will first pick out information from graphics and only after that from more demanding mediums, such as text (Faraday, 2000). Still (2018) created the image stimulus by including an image and surrounding it with text. For this study, the size stimulus was designed similarly, placing an image in the middle of the web page and surrounding the image with text blocks representing blog posts (see figure 4). Design elements commonly affiliated with blogs, such as viewing numbers, links to comments, and social media buttons, were included. The applied colors were subtle in order not to attract attention.

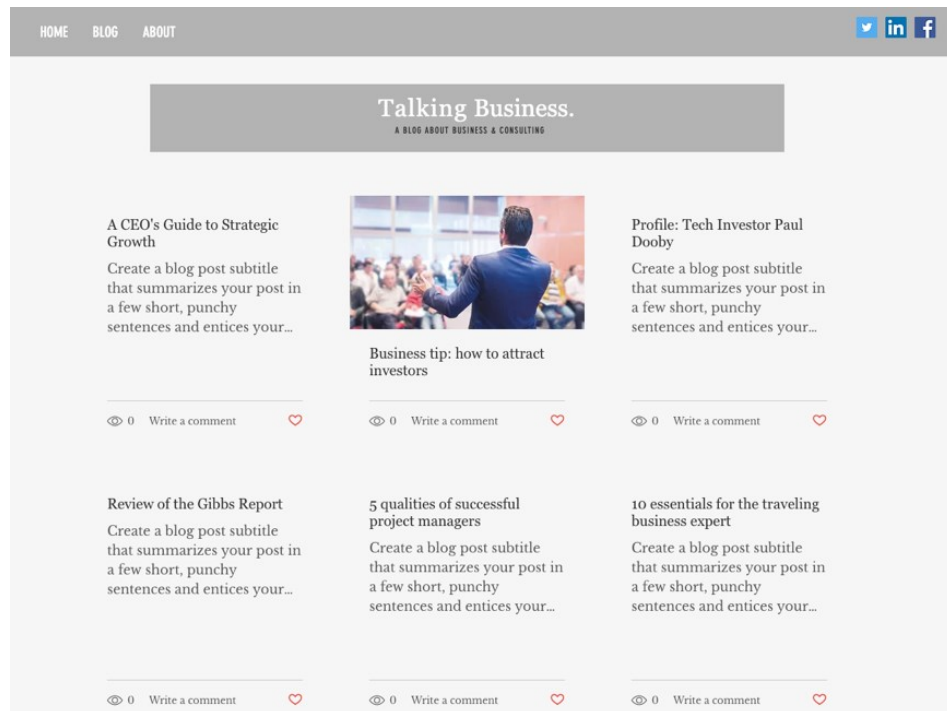


Figure 4: Image stimulus

3.3.5 Color stimulus

Color variations are often used to highlight important objects or areas. When objects are similar in size and appearance, bright colors will attract more attention than heavier ones, brighter colors dominating over darker (Faraday, 2000). Differences in color and contrast provide the user visual search cues, clear contrasts exhibiting relationships between objects, highlighting the important objects. To use color as a visually salient element, Still (2018) proposed using only one color and presenting it as a colored text. The created stimulus for color was kept simple, highlighting the headline with a colored text and using that same color cohesively in the logo and navigation bar. Furthermore, to make the web page appear authentic, social media icons were included, as well as a logo and a navigation bar (see figure 5).

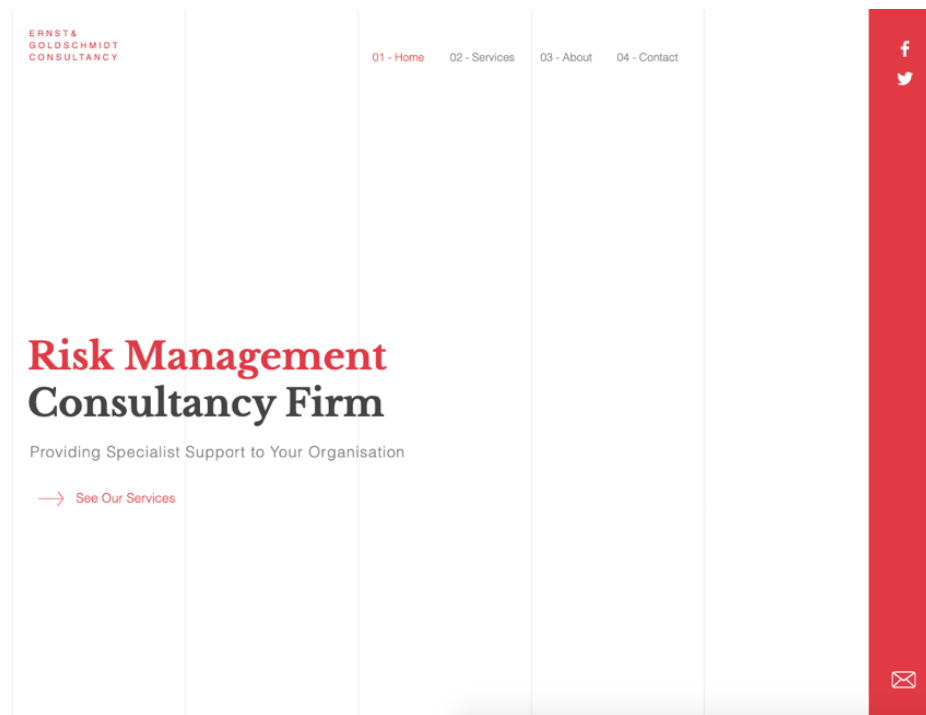


Figure 5: Color stimulus

3.3.6 Text-style stimulus

Different text-styles, such as using different fonts and type formats, can be used to attract attention and highlight meaningful words or texts (Faraday, 2000). The typeface personality signifies the font size, weight, underlining, and italics; it provides the user with nonverbal cues of the text. Such as how underlined links in blue often signify hyperlinks. Still (2018) suggested manipulating a block of text, *i.e.*, using italics or having the text bolded to emphasize text-style. For this study, a short text-block was underlined and bolded (see figure 6). A call-to-action button, log-in icon, and the logo were kept on the web page, along with another short block of text. Additionally, a background fitted for the theme was added but subdued with a low opacity.

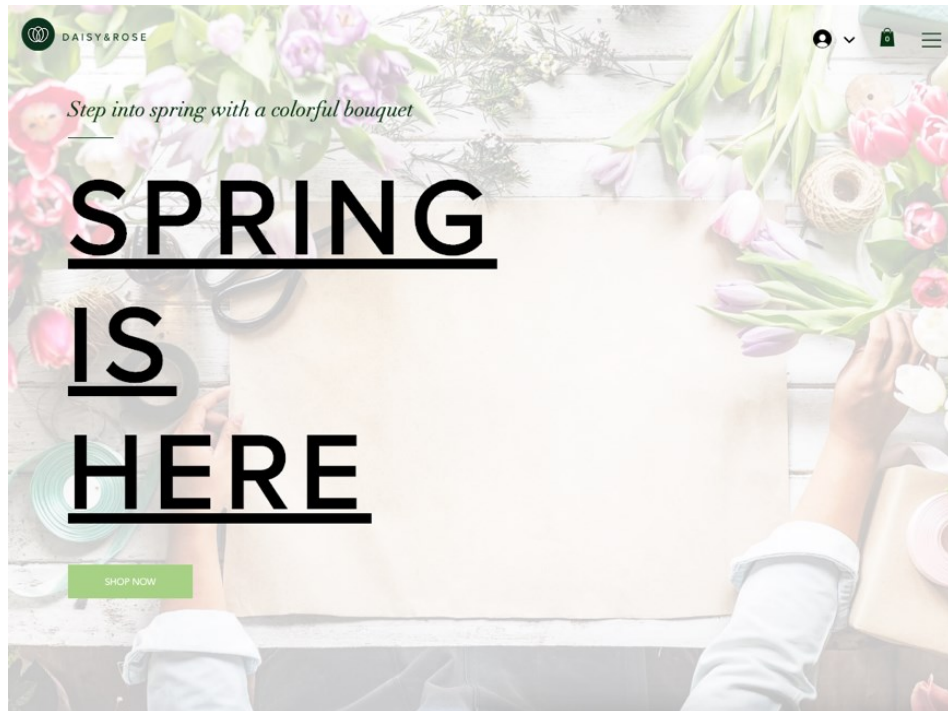


Figure 6: Text-style stimulus

3.3.7 Position stimulus

According to Faraday (2000), objects' placement will guide the entry point if a distinction has not already been made by size, image, color, and text-style. The user will exhibit a top-left bias, directing its attention to the left, where reading begins. However, if no text is present, the center will most likely be dominant. Eventually, users will "favor elements at the top and left of the page" (Faraday, 2000).

Still (2018) created the position stimulus with a block of text positioned on the web page's upper part. Influenced by Still's study, the designed position stimulus included a text block in the upper middle part of the web page (see figure 7). An image was placed in the lower part of the web page in order for the stimulus to look more authentic. Additionally, a logo and navigation bar was included, as well as a call-to-action button to maintain credibility and prototypicality.

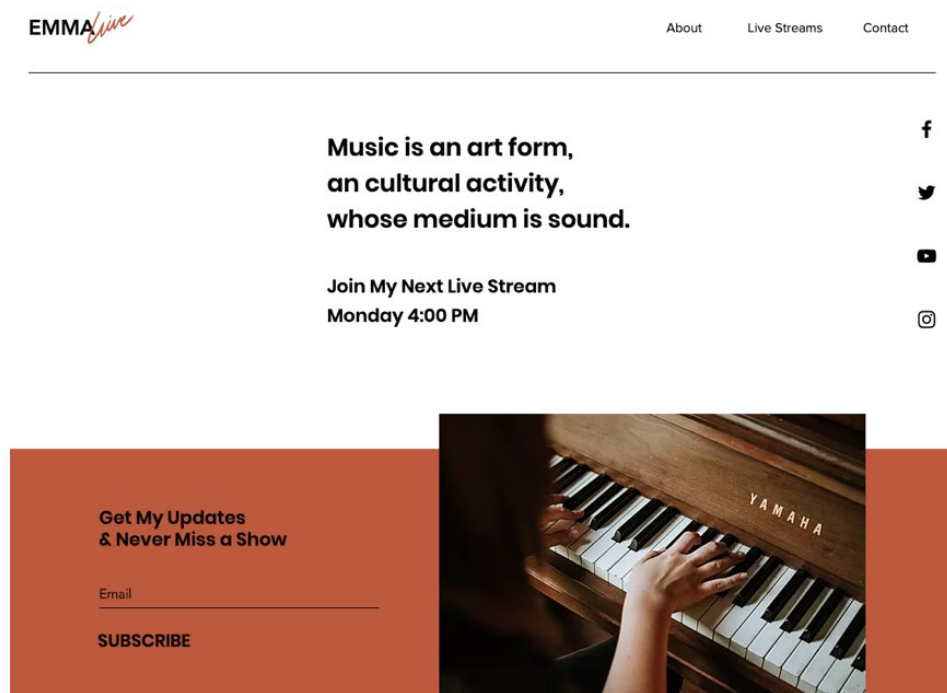


Figure 7: Position stimulus

3.3.8 No hierarchy stimulus

The purpose of the additional stimulus, no hierarchy, was to include a web page stimulus that did not have an apparent visual hierarchy or prominent visually salient elements. Visual displays without significantly salient objects are categorized as conjunction targets. Any visual stimulus will contain elements that the brain assesses as somewhat salient, and the gaze will initially fall on that object or region. However, since conjunction targets lack significantly salient objects, it causes the user to scan the display aimlessly in order to find these non-significant salient objects or regions (Treisman & Gelade, 1980). The aimless scanning can leave the user feeling frustrated or confused, leading to a negative perception of the viewed stimulus.

For the study, the web page was designed to display a high prototypicality; however, contrary to the other created web pages, without a clear entry point. The stimulus contained several similar attention-drawing objects without an evident contrast that would indicate specific objects to be significantly salient (see figure 8). Additionally, all the

placed design elements were similar in size, form, and positioning, forming an inadequate visual hierarchy. In order to create an operating visual hierarchy, the elements in the entry point's proximity should vary in such a degree that the elements guide the user to the next essential region.

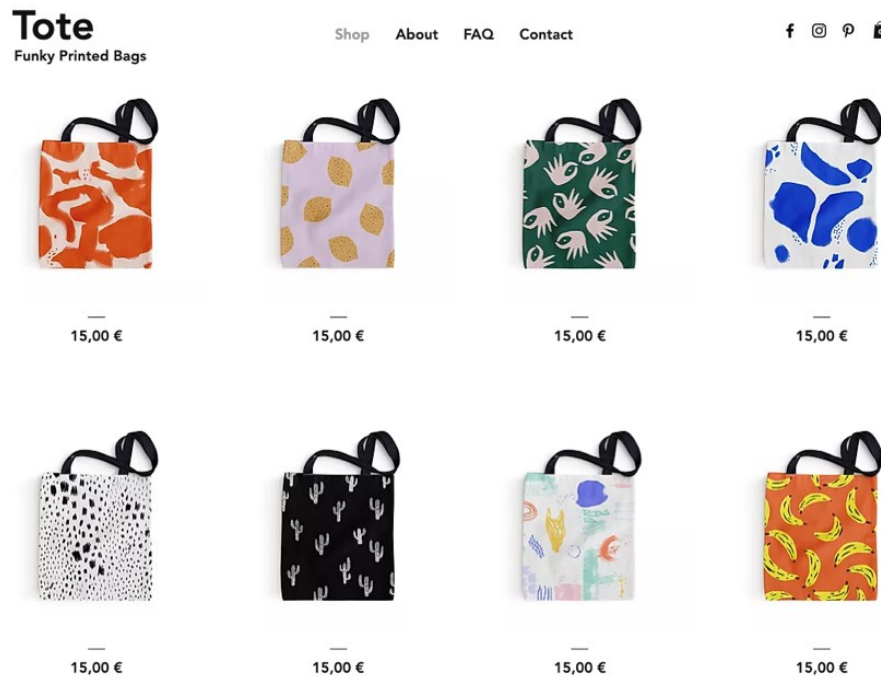


Figure 8: No hierarchy stimulus

3.4 Survey design

The survey for the study was constructed with the online survey tool Typeform. The tool was chosen because of its versatility, features, and simplicity. The survey consisted of two parts: the demographic questions and stimuli exposure. The demographic questions asked for information such as year of birth, gender, and education. For clarity, the year of birth was asked rather than age. Since individuals who are color-blind might perceive the effect of color differently, a question was included asking whether or not the participant is color-blind. The second part of the survey involved the created web page stimuli, each stimulus presented and followed by the formulated survey questions.

The web page stimuli were presented for all participants in the following randomized order:

1. Text-style
2. Image
3. No hierarchy
4. Color
5. Size
6. Position

3.4.1 Tool restrictions and solutions

Several different survey tools were considered, however, discharged due to a lack of desirable features. Even the chosen survey tool lacked a few desirable features, such as a timing feature. A timing feature would have made it possible to restrict the exposure time and assured that the stimulus would only be seen once. Since the survey aims to explore pre-use first impressions, a specified exposure time had to be included. The issue was solved by presenting the web page stimuli in separate video clips. Thus, controlling the exposure time and incorporating a neutral screen both before and after the exposure time for a more concentrated observation. A limitation with this solution was that the participant could accidentally or intentionally see the stimuli multiple times; however, clear instructions were given to see the video clip only once. The constructed video clips consisted of seven seconds of a black screen, followed by the web page stimulus for four seconds, finishing with a black screen an additional four seconds. Each video clip lasted 14 seconds in total. The clips were assembled in the Apple Inc. software iMovie and uploaded onto the video hosting and sharing platform Vimeo, and from there embedded into the survey.

In order to obtain comparable data resembling real web page viewing, participants were urged to use desktop computers or laptops and view the video clips containing the stimuli in full screen. Based on previous research, the exposure time was limited to four seconds. Since the chosen exposure time was short, a test round was included to minimize the

effect of possible confusion for the first stimulus, as well as for the results to be equal, regardless of the order of the video clips. Participants were made aware that the first round was a test round to minimize stress.

3.4.2 Data collection

The formulated survey was published on June 8, 2020, and open for 16 days until June 24, 2020. No specific audiences were targeted; however, a sample diverse in age and gender was desired. The only prerequisite presented at the start of the survey was that the survey would be done on a computer desktop or a laptop.

The survey was shared at the communication channel Yammer for Åbo Akademi University, accessible for all students and all of the university faculty. Additionally, the survey was shared on social media platforms such as Facebook and directly to the author's friends and acquaintances. The survey was promoted to be quick and different, only taking 5 – 10 minutes to complete. The participants were urged to send an email to the author if they had any questions or wished to know more about the research. Results from 47 participants were recorded and analyzed; the obtained results are presented in chapter four.

4 RESULTS AND ANALYSIS

The following chapter presents and summarizes the obtained results from the conducted study. First, an analysis of the descriptive information is provided, followed by the quantitative data analysis results from repeated measures ANOVA's and one-way ANOVA's.

4.1 Descriptive analysis

Four demographic questions were included at the beginning of the survey: gender, year of birth, education, and whether the participant is color-blind. The obtained information was summarized in the survey tool Typeform as well as processed in Microsoft Excel for better readability. A total of 47 participants responded to the survey, of which 55% of participants were female and 45% male. Options for education were limited to; upper-secondary, bachelor's degree, master's degree, and other. The greater part of participants, 49% had a master's degree, 23% had a bachelor's degree, 17 % had an upper-secondary education, and 11 % reported their education level as other (see figure 9).

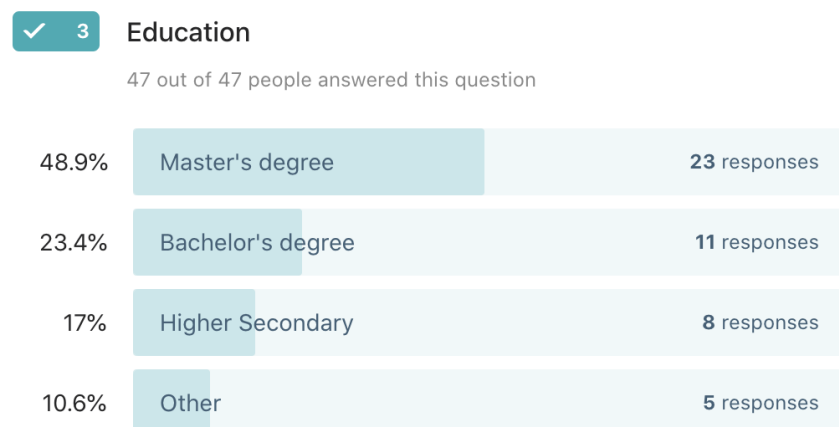


Figure 9: Distribution of education ($n = 47$)

Year of birth was an open-ended question and based on the answers divided into four categories; 1995 – 2000, 1994 – 1985, 1984 – 1975, 1974 – 1965, 1964 – 1954. The age distribution is illustrated in figure 10. The 1994 – 1985 category is the largest one with 23 participants, an equivalent of 49%, followed by the 1974 – 1965 category with 9 participants.

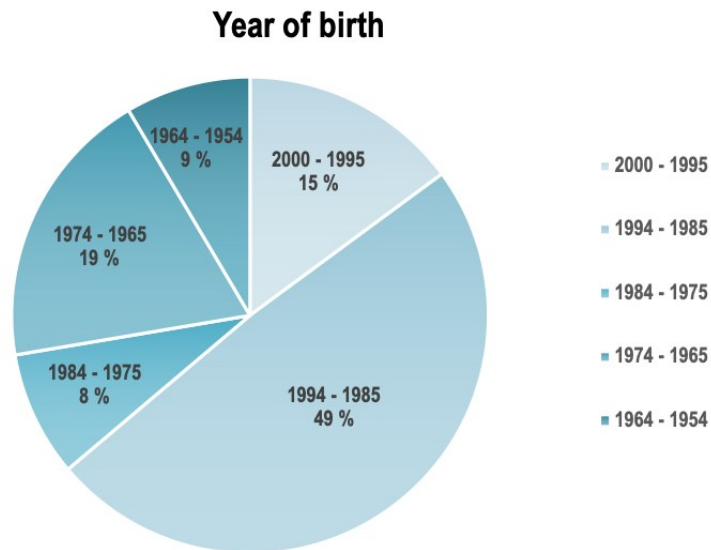


Figure 10: Age distribution (n = 47)

Lastly, participants were asked if they are color-blind. As mentioned before, color blindness might affect how webpages are perceived, specifically regarding the use of color. Therefore color-blind participants had to be excluded from the analysis of the rest of the results. Only three out of 47 participants reported color blindness and were excluded from the results from this point on.

4.2 Quantitative data analysis

The results of 44 participants were examined. The stimuli were showed in a randomized order from Faraday's (2000) initially proposed hierarchy. All participants viewed the stimuli in the following order; (1) text-style, (2) image, (3) no hierarchy, (4) color, (5) size, (6) position. Participants rated each web page stimulus on a scale of 1 – 5 regarding

visual appeal, overall impression, and trustworthiness. For the questions regarding further use, options “yes,” “no,” and “I don’t know” were presented.

4.2.1 Appeal ratings

For appeal ratings, the size stimulus had the highest mean value ($M = 3.9$), followed by the no hierarchy stimulus ($M = 3.8$). The image and color stimuli both had the lowest mean ($M = 2.5$), whereas the text-style stimulus ($M = 3.2$) and the position stimulus ($M = 3.1$) had average mean values (see table 1).

	Size	Image	Color	Text-style	Position	No hierarchy
Mean	3,9	2,5	2,5	3,2	3,1	3,8
Standard deviation	0,96	1,00	0,90	1,10	0,98	0,90

Table 1: Mean and standard deviation for appeal ratings

The text-style stimulus presented the highest standard deviation ($SD = 1.10$) for appeal ratings. As seen in figure 11, the results indicate a divided opinion among the respondents. For the position stimulus, the standard deviation is relatively high ($SD = 0.98$). In comparison to the text-style stimulus, responses were evenly spread out for both the position and the image ($SD = 1.00$) stimulus.

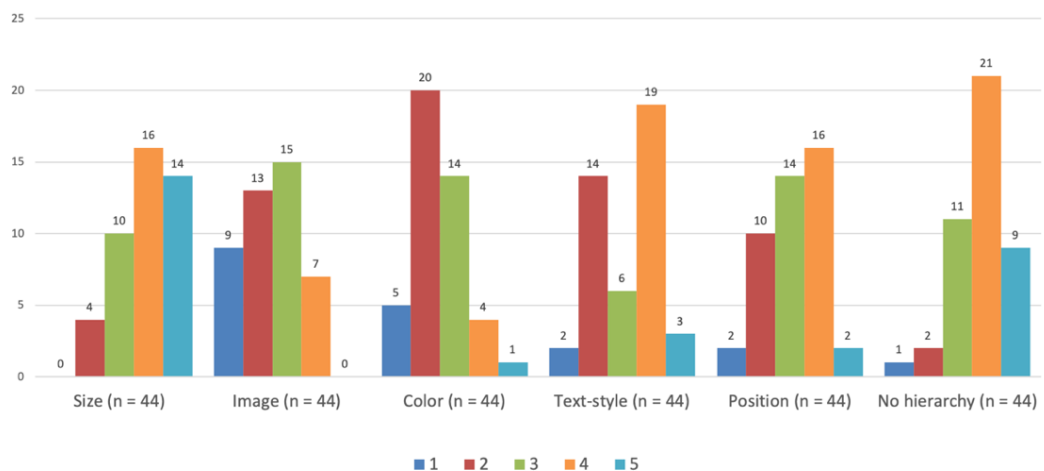


Figure 11: Distribution of appeal ratings (unappealing - appealing)

4.2.2 Trustworthiness ratings

As in the appeal ratings, size ($M = 3.8$) had the highest mean in trustworthiness ratings. The standard deviation was considerably low ($SD = .65$), and most of the participants seemed to agree (see figure 4). The stimulus for text-style and color received similar responses resulting in identical mean and standard deviation values ($M = 3.2$, $SD = .94$). All of the stimuli had considerably high means and low standard deviations compared to the results from the other questions (see table 2).

	Size	Image	Color	Text-style	Position	No hierarchy
Mean	3,8	3,4	3,2	3,2	3,6	3,5
Standard deviation	0,65	0,95	0,94	0,94	0,82	0,82

Table 2: Mean and standard deviation for trustworthiness ratings

As seen in figure 12, participants ranked the stimuli close to the average for all elements. Hardly any participants rated the stimuli as untrustworthy (1) or trustworthy (5). Indicating that not many participants felt like the web pages were untrustworthy, nor did they think that the web pages were entirely trustworthy.

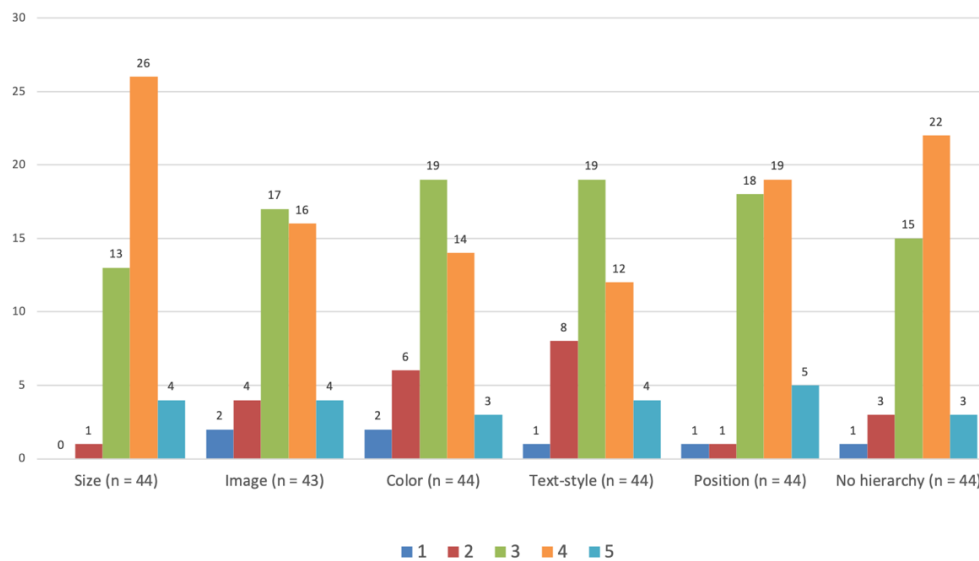


Figure 12: Distribution of trustworthiness ratings (Untrustworthy - Trustworthy)

4.2.3 Impression ratings

Impression ratings were relatively high for all stimuli. The no hierarchy stimulus had the highest mean ($M = 3.8$), followed by the size stimulus ($M = 3.6$). The text-style and position stimuli had the same mean value ($M = 3.5$) but different standard deviations. Text-style had $SD = .98$, conversely position had a lower $SD = .90$. The color and image stimulus had the lowest means ($M = 2.7$, $M = 2.8$).

	Size	Image	Color	Text-style	Position	No hierarchy
Mean	3,6	2,8	2,7	3,5	3,5	3,8
Standard deviation	0,82	0,79	0,93	0,98	0,90	0,94

Table 3: Mean and standard deviation of impression ratings

As seen in figure 13 and the standard deviation values (see table 3), there is a consensus among the participants. Many participants chose the same values, resulting in lower standard deviations, as well as average results. Only a few participants rated the stimuli as negative or positive. None of the participants rated the impression of size, position, and no hierarchy as negative.

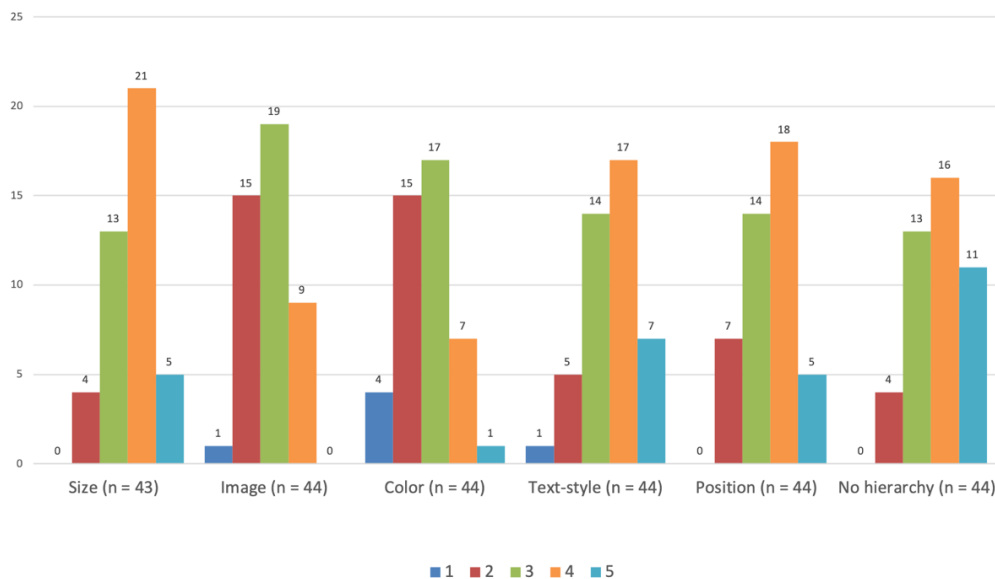


Figure 13: Distribution of impression ratings (Negative - Positive)

4.2.4 Results of further use

As for all of the questions, the size and no hierarchy stimuli generated positive answers regarding further use. Distinctly seen in figure 14, participants were most likely to explore further the web page stimuli made for size and no hierarchy. For the size stimulus, 30 participants stated that they would continue using the web page. Correspondingly, for the no hierarchy stimulus, 32 participants replied yes regarding further use. Participants answered mostly yes, closely followed by no, and I don't know for the text-style and position stimuli. The color stimulus was the only stimulus where more participants replied no than yes or I don't know.

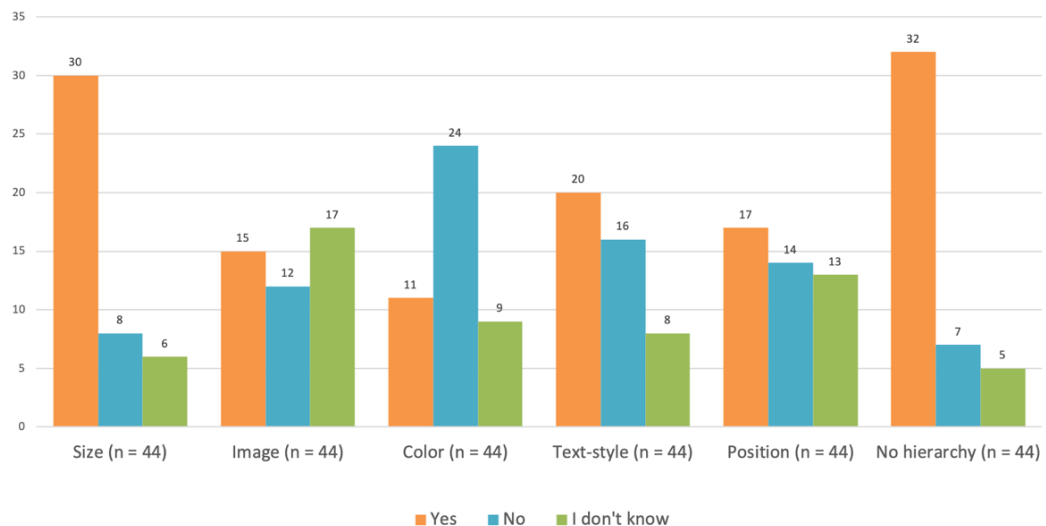


Figure 14: Distribution of further use replies

4.3 Repeated measures ANOVA

In order to discover possible statistically significant relationships, the obtained data was processed and analyzed with the statistical tool IBM SPSS Statistics (v.26.0). Repeated measures ANOVA's were used to analyze relationships between designs. Bonferroni was used as adjustment for multiple comparisons, and the level of significance was set to $\alpha = 0.05$. Mauchly's test of sphericity was assumed if $p \geq .05$.

For the appeal ratings, Mauchly's test $\chi^2(14) = 12.48$, $p = .57$ did not indicate any violation of sphericity. The differences between appeal rating means were statistically significant: $F(2, 215) = 19.44$, $p < .001$.

Pairwise Comparisons for Appeal

(I) appeal stimuli	(J) appeal stimuli	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
Size	Image	1.455*	.207	.000	.812	2.097
	Color	1.455*	.164	.000	.945	1.964
	Text-style	.750*	.209	.012	.102	1.398
	Position	.773*	.220	.016	.088	1.457
	No hierarchy	.114	.170	1.000	-.414	.641
Image	Size	-1.455*	.207	.000	-2.097	-.812
	Color	.000	.203	1.000	-.631	.631
	Text-style	-.705*	.212	.028	-1.364	-.045
	Position	-.682*	.218	.047	-1.358	-.006
	No hierarchy	-1.341*	.198	.000	-1.955	-.727
Color	Size	-1.455*	.164	.000	-1.964	-.945
	Image	.000	.203	1.000	-.631	.631
	Text-style	-.705*	.220	.038	-1.387	-.022
	Position	-.682*	.197	.019	-1.295	-.069
	No hierarchy	-1.341*	.178	.000	-1.894	-.788
Text-style	Size	-.750*	.209	.012	-1.398	-.102
	Image	.705*	.212	.028	.045	1.364
	Color	.705*	.220	.038	.022	1.387
	Position	.023	.231	1.000	-.695	.741
	No hierarchy	-.636*	.175	.011	-1.181	-.091
Position	Size	-.773*	.220	.016	-1.457	-.088
	Image	.682*	.218	.047	.006	1.358
	Color	.682*	.197	.019	.069	1.295
	Text-style	-.023	.231	1.000	-.741	.695
	No hierarchy	-.659*	.198	.026	-1.273	-.045
No hierarchy	Size	-.114	.170	1.000	-.641	.414
	Image	1.341*	.198	.000	.727	1.955
	Color	1.341*	.178	.000	.788	1.894
	Text-style	.636*	.175	.011	.091	1.181
	Position	.659*	.198	.026	.045	1.273

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Table 4: Pairwise comparisons for appeal ratings

Pairwise comparisons revealed that size and image, size and color, image and no hierarchy, as well as color and no hierarchy, were highly statistically significant with the significance level $p < .001$. Size and text-style, size and position, image and text-style, image and position, color and text-style, color and position, text-style and no hierarchy, along with position and no hierarchy were all statistically significant, $p < .05$ (see table 4). The only nonsignificant pairs for appeal ratings were size and no hierarchy, image and color, and text-style and position.

The repeated measures ANOVA results present only a few statistically nonsignificant pairings, four highly statistically significant pairs, and the rest statistically significant. The results for appeal ratings thus indicate that the differences in participant responses result from differences in stimuli. Based on the results, it could be assumed that even with a different and larger sample, the same statistically significant results would be present.

The ratings for trust did indicate a violation of sphericity, Mauchly's test $\chi^2(14) = 29.32$, $p = .010$. As proposed by Howell (2012) and Field (2013), the Greenhouse-Geisser level of significance $p = .84$ advocates the use of the Huynh-Feldt results since $p > .75$. The differences between the means were statistically significant: $F(4, 197.75) = 2.74$, $p = .028$ using Huynh-Feldt results. The pairwise comparisons disclose that only the size and color stimuli ($p = .022$) along with size and text-style stimuli ($p = .011$) are statistically significant (see table 5).

Compared to the repeated measures ANOVA results from appeal ratings, the results from trust ratings demonstrate a lack of statistical significance. The differences in stimuli were only statistically significant for trust ratings when size and color, and size and text-style were compared. The lack of statistically significant pairings indicates that differences in participant responses are not due to differences in stimuli design.

Pairwise Comparisons for Trust

(I) trust stimuli	(J) trust stimuli	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
Size	Image	.372 [*]	.141	.177	-.068	.812
	Color	.512 [*]	.150	.022	.044	.979
	Text-style	.535 [*]	.146	.011	.079	.990
	Position	.163	.166	1.000	-.354	.680
	No hierarchy	.233	.128	1.000	-.166	.632
Image	Size	-.372	.141	.177	-.812	.068
	Color	.140	.204	1.000	-.495	.774
	Text-style	.163	.202	1.000	-.467	.792
	Position	-.209	.215	1.000	-.877	.458
	No hierarchy	-.140	.207	1.000	-.783	.504
Color	Size	-.512 [*]	.150	.022	-.979	-.044
	Image	-.140	.204	1.000	-.774	.495
	Text-style	.023	.184	1.000	-.549	.595
	Position	-.349	.202	1.000	-.978	.280
	No hierarchy	-.279	.186	1.000	-.859	.301
Text-style	Size	-.535 [*]	.146	.011	-.990	-.079
	Image	-.163	.202	1.000	-.792	.467
	Color	-.023	.184	1.000	-.595	.549
	Position	-.372	.182	.714	-.940	.195
	No hierarchy	-.302	.161	1.000	-.805	.200
Position	Size	-.163	.166	1.000	-.680	.354
	Image	.209	.215	1.000	-.458	.877
	Color	.349	.202	1.000	-.280	.978
	Text-style	.372	.182	.714	-.195	.940
	No hierarchy	.070	.177	1.000	-.482	.622
No hierarchy	Size	-.233	.128	1.000	-.632	.166
	Image	.140	.207	1.000	-.504	.783
	Color	.279	.186	1.000	-.301	.859
	Text-style	.302	.161	1.000	-.200	.805
	Position	-.070	.177	1.000	-.622	.482

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Table 5: Pairwise comparisons for trust ratings

For impression ratings Mauchly's test $\chi^2(14) = 16.41$, $p = .29$ did not indicate any violation of sphericity. The differences between impression mean values are statistically significant: $F(2, 210) = 12.06$, $p < .001$. The pairwise comparisons reveal that size and image, size and color, image and text-style, image and position, image and no hierarchy, color and text-style, color and position, color and no hierarchy are statistically significant pairs (see table 6).

The repeated measures ANOVA for impression ratings shows that roughly half of the pairings are statistically significant, whereas the other half of the pairings are not. The results indicate that for statistically significant pairings, the difference in stimuli provokes a difference in response. In contrast, for nonsignificant pairings, the response is not a product of differences in the stimulus.

Pairwise Comparisons for Impressions

(I) impression stimuli	(J) impression stimuli	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
Size	Image	.767*	.156	.000	.283	1.251
	Color	1.000*	.149	.000	.537	1.463
	Text-style	.093	.176	1.000	-.453	.639
	Position	.186	.206	1.000	-.455	.827
	No hierarchy	-.116	.183	1.000	-.686	.453
Image	Size	-.767*	.156	.000	-1.251	-.283
	Color	.233	.172	1.000	-.304	.769
	Text-style	-.674*	.175	.006	-1.220	-.129
	Position	-.581*	.180	.036	-1.141	-.021
	No hierarchy	-.884*	.197	.001	-1.498	-.269
Color	Size	-1.000*	.149	.000	-1.463	-.537
	Image	-.233	.172	1.000	-.769	.304
	Text-style	-.907*	.202	.001	-1.535	-.279
	Position	-.814*	.192	.002	-1.411	-.217
	No hierarchy	-1.116*	.183	.000	-1.686	-.547
Text-style	Size	-.093	.176	1.000	-.639	.453
	Image	.674*	.175	.006	.129	1.220
	Color	.907*	.202	.001	.279	1.535
	Position	.093	.215	1.000	-.577	.763
	No hierarchy	-.209	.168	1.000	-.733	.314
Position	Size	-.186	.206	1.000	-.827	.455
	Image	.581*	.180	.036	.021	1.141
	Color	.814*	.192	.002	.217	1.411
	Text-style	-.093	.215	1.000	-.763	.577
	No hierarchy	-.302	.198	1.000	-.920	.315
No hierarchy	Size	.116	.183	1.000	-.453	.686
	Image	.884*	.197	.001	.269	1.498
	Color	1.116*	.183	.000	.547	1.686
	Text-style	.209	.168	1.000	-.314	.733
	Position	.302	.198	1.000	-.315	.920

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

Table 6: Pairwise comparisons for impression ratings

Pairwise Comparisons for Further Use

(I) furtheruse_stimuli	(J) furtheruse_stimuli	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
					Lower Bound	Upper Bound
Size	Image	.591*	.179	.029	.034	1.147
	Color	.500*	.140	.013	.065	.935
	Text-style	.273	.143	.950	-.172	.717
	Position	.455	.164	.123	-.055	.964
	No hierarchy	-.068	.154	1.000	-.546	.410
Image	Size	-.591*	.179	.029	-1.147	-.034
	Color	-.091	.152	1.000	-.563	.381
	Text-style	-.318	.171	1.000	-.851	.214
	Position	-.136	.171	1.000	-.667	.394
	No hierarchy	-.659*	.156	.002	-1.143	-.175
Color	Size	-.500*	.140	.013	-.935	-.065
	Image	.091	.152	1.000	-.381	.563
	Text-style	-.227	.152	1.000	-.700	.245
	Position	-.045	.138	1.000	-.474	.383
	No hierarchy	-.568*	.147	.005	-1.025	-.112
Text-style	Size	-.273	.143	.950	-.717	.172
	Image	.318	.171	1.000	-.214	.851
	Color	.227	.152	1.000	-.245	.700
	Position	.182	.163	1.000	-.326	.690
	No hierarchy	-.341	.162	.625	-.846	.164
Position	Size	-.455	.164	.123	-.964	.055
	Image	.136	.171	1.000	-.394	.667
	Color	.045	.138	1.000	-.383	.474
	Text-style	-.182	.163	1.000	-.690	.326
	No hierarchy	-.523	.177	.075	-1.071	.026
No hierarchy	Size	.068	.154	1.000	-.410	.546
	Image	.659*	.156	.002	.175	1.143
	Color	.568*	.147	.005	.112	1.025
	Text-style	.341	.162	.625	-.164	.846
	Position	.523	.177	.075	-.026	1.071

Based on estimated marginal means
 *. The mean difference is significant at the .05 level.
 b. Adjustment for multiple comparisons: Bonferroni.

Table 7: Pairwise comparisons for further use replies

Further use ratings did not indicate any violation of sphericity with Mauchly's test $\chi^2(14) = 9.74, p = .78$. The differences in means are statistically significant: $F(5, 215) = 5.97, p < .001$. Size and image ($p = .029$), size and color ($p = .013$), color and no hierarchy ($p = .005$) were the only pairs that were statistically significant (see table 7). The repeated measure ANOVA for further use replies produced only three statistically significant pairings. The results imply that the differences in replies are derived from differences in

stimulus design for the statistically significant pairings; size and image, size and color, and color and no hierarchy. Since most pairings were statistically not significant, it could be generally assumed that the difference in stimuli does not significantly impact further use replies.

4.4 One-way ANOVA

One-way ANOVA's were conducted to analyze the statistical relationships between participants in different age groups, as well as the results from genders. In order to obtain a better frame of reference, age groups were modified into three groups; 1991 – 2000, 1990 – 1971, 1970 – 1954 (see figure 15). Grouping the participants that are in their 20's in one group, participants in their 30's and 40's in one, and lastly participants in their 50's and older. For the age group, ANOVA post hoc tests were made according to Tukey, Bonferroni, and Games-Howell. The level of significance was set to $\alpha = 0.05$, and a test of homogeneity of variances was conducted.

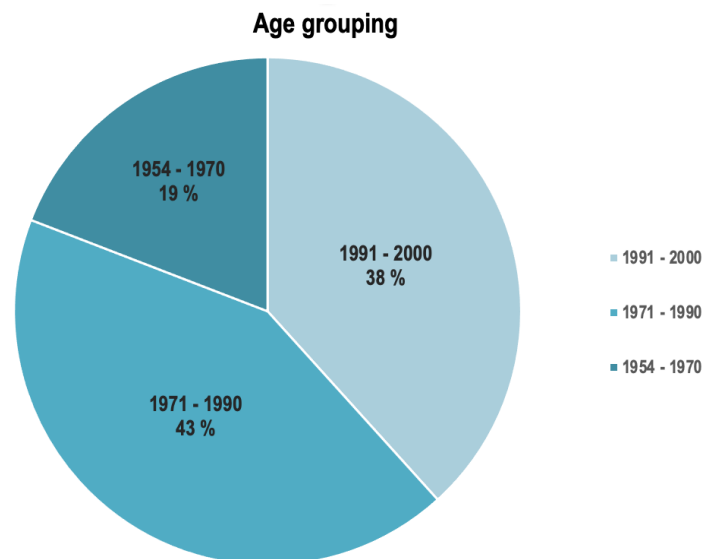


Figure 15: Age distribution for updated age groups ($n = 44$)

For appeal ratings Levene's statistic on homogeneity of variance was not significant $p > .05$. The one-way analysis showed that differences in year of birth had no significant impact on ratings of appeal for size, $F(2, 41) = .15, p = .86$, image, $F(2, 41) = 2.74, p =$

.08, color, $F(2, 41) = 0.36, p = .49$, text-style, $F(2, 41) = .36, p = .70$, position, $F(2, 41) = .83, p = .45$, or no hierarchy, $F(2, 41) = .28, p = .76$. The results demonstrated that a difference in age had no statistically significant impact on participants ratings. Meaning that specific age groups did not within the group generate similar results.

For ratings on trust, Levene's statistic on homogeneity of variance was not significant $p > .05$. Differences in the year of birth had no significant impact on size, $F(2, 41) = 1.34, p = .27$, image, $F(2, 40) = .11, p = .90$, color, $F(2, 41) = 2.54, p = .09$, text-style $F(2, 41) = .08, p = .92$, position, $F(2, 41) = 2.04, p = .14$, or no hierarchy, $F(2, 41) = .92, p = .41$. The results from trust ratings indicate that a difference in age had no statistically significant impact on any of the ratings of stimuli.

Levene's statistic on homogeneity of variance for impression ratings was not significant $p > .05$. Differences in the year of birth had no significant impact on the ratings for size $F(2, 40) = .01, p = .99$, image $F(2, 41) = 3.09, p = .06$, color $F(2, 41) = 2.91, p = .07$, text-style $F(2, 41) = .01, p = .99$, position $F(2, 42) = 0.24, p = .79$, or no hierarchy $F(2, 41) = .13, p = .88$. As for appeal and trust ratings, there were no statistically significant differences between age groups on impression ratings.

For replies on further use, Levene's statistic on homogeneity of variance was not significant $p > .05$. Neither for ratings on further use did differences in the year of birth significantly impact ratings for size, $F(2, 41) = .99, p = .38$, image, $F(2, 41) = .19, p = .83$, color, $F(2, 41) = .12, p = .88$, text-style, $F(2, 41) = .04, p = .97$, position, $F(2, 41) = .93, p = .40$, or no hierarchy, $F(2, 41) = .54, p = .59$. The analysis results display that for further use replies as well, there were no statistically significant differences between age groups. No statistically significant differences between age groups were found for appeal, trust, or impression ratings and neither for replies on further use. The results illustrate that the likelihood for further use, preferences in appeal, and impression generation are not bound to age, nor are the elements that signify trust.

For significant differences in ratings as per gender, the responses of 44 participants were analyzed, of which 43% male and 57 % female (see figure 16). For the gender one-way ANOVA, no post hoc tests were conducted since there were only two factor-variables;

male and female. The level of significance was kept at $\alpha = 0.05$, and a test of homogeneity of variances was conducted.

Levene's statistic on homogeneity of variance for appeal ratings was not significant $p > .05$. The one-way analysis revealed that the difference in gender had no significant impact on ratings for size $F(1, 42) = .29, p = .59$, image, $F(1, 42) = 1.80, p = .19$, color, $F(1, 42) = .30, p = .59$, text-style, $F(1, 42) = .56, p = .41$, position, $F(1, 42) = .56, p = .46$, or no hierarchy, $F(1, 42) = .40, p = .53$. The results demonstrate that the differences between male and female responses of appeal were not statistically significant. Meaning that the results are not a consequence of male or female appeal preferences.

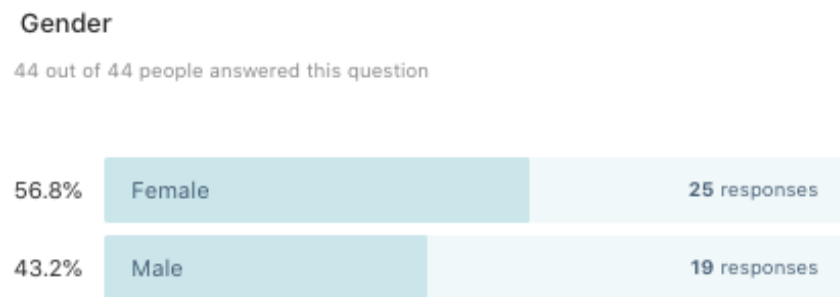


Figure 16: Distribution of female and male participants ($n = 44$)

For trust ratings, Levene's statistic on homogeneity of variance was not significant $p > .05$. The gender difference did not either have a significant impact on ratings for size, $F(1, 42) = .34, p = .57$, image, $F(1, 41) = .01, p = .92$, color, $F(1, 42) = .29, p = .59$, text-style, $F(1, 42) = 2.02, p = 0.16$, position, $F(1, 42) = .43, p = .52$, or no hierarchy, $F(1, 42) = .58, p = .45$. As for appeal ratings, the difference between male and female trust ratings was not statistically significant.

For impression ratings, Levene's statistic on homogeneity of variance was not significant $p > .05$. A gender difference had no significant impact on ratings for size, $F(1, 41) = .12, p = .73$, image, $F(1, 42) = 1.83, p = .18$, color, $F(1, 42) = .10, p = .76$, text-style, $F(1, 42) = 1.89, p = .18$, position, $F(1, 42) = .42, p = .52$, or no hierarchy, $F(1, 42) = 1.17, p = .29$. The results demonstrate that neither for impression ratings do gender differences have a statistically significant impact.

For replies on further use, Levene's statistic on homogeneity of variance was statistically significant for size ratings $p < .001$, however, for image color, text-style, position, and no hierarchy, Levene's statistic was not significant $p > .05$. A difference in gender for size replies was close to significant, $F(1, 42) = 4.00, p = .05$. However, for image, $F(1, 42) = .09, p = .76$, color, $F(1, 42) = .004, p = .95$, text-style, $F(1, 42) = .11, p = .75$, position, $F(1, 42) = .07, p = .79$, and no hierarchy, $F(1, 42) = .02, p = .88$ a gender difference had no significant impact. The difference in male and female responses was not statistically significant for replies for the image, color, text-style, position, and no hierarchy stimuli. However, for the size stimulus, a gender difference was close to significant $p = 0.05$, implying that a statistically significant result could be found with a larger sample. Meaning that for replies on further use of the size stimulus, gender could have a statistically significant impact.

5 DISCUSSION

The following chapter will focus on the main findings from the conducted analyses presented in the previous chapter. Main findings will be discussed as well as conclusions derived from the discussion. Furthermore, possible practical implications, limitations, and suggestions for further research will be presented.

This thesis aims to understand factors that influence pre-use first impressions, along with studying how visually salient design elements influence first impressions of web pages. In order to gain this insight, a survey was conducted with 47 respondents, from which the answers of 44 participants were analyzed. Participants were asked to assess six fictional web pages regarding visual appeal, trust, overall impression, and further use. The web page stimuli: *i.e.*, size, image, color, text-style, and position, were formed according to Still's (2018) guidelines of web page visual hierarchy derived initially from Faraday's (2000) study. A web page stimulus without any visually salient element was included in order to observe whether web pages with visually salient elements generate higher ratings. Even though previous research has confirmed that reliable judgments are formed within milliseconds, the exposure time was extended to four seconds due to the study's nature.

5.1 Main findings

In order to examine the effect that the lack of a clear entry point has, the no hierarchy stimulus was designed not to possess a clear entry point or visual hierarchy as opposed to the other created stimuli. The no hierarchy stimulus ratings were high in all categories; appeal, trustworthiness, impression, and further use. The larger part of participants responded that they would continue to explore the no hierarchy web page. As seen in the results for the conducted repeated measures ANOVA's, many of the no hierarchy stimulus pairings were statistically significant for appeal, impression, further use, and even one of the few for trust ratings. The results demonstrate that the statistically significant differences found between the pairings are due to the differences in stimuli design. In this study, the overall high results indicate that the absence of a clear entry point and visual hierarchy does not lead to inferior ratings or impressions.

Regarding visual appeal ratings, the stimulus for size and no hierarchy had the highest mean values, whereas ratings for image and color had the lowest. The distribution of ratings for each web page stimulus demonstrates that a consensus of perceived appeal existed among the participants. Nevertheless, judgments of appeal can still be considered subjective, as seen in the distribution of ratings for the text-style web page stimulus (see figure 17). The text-style stimulus divided the participants roughly into two categories, one group that perceived the web page as relatively appealing and another that perceived the page as somewhat unappealing. The results from repeated measures ANOVA for appeal ratings demonstrate that the statistically significant differences in ratings were due to stimulus differences. Especially regarding the differences between the no hierarchy stimulus and image, no hierarchy and color, as well as pairings of size and color, and size and image, where $p < .001$. The highly statistically significant results indicate that similar results should appear in other samples, regardless of size and diversity.

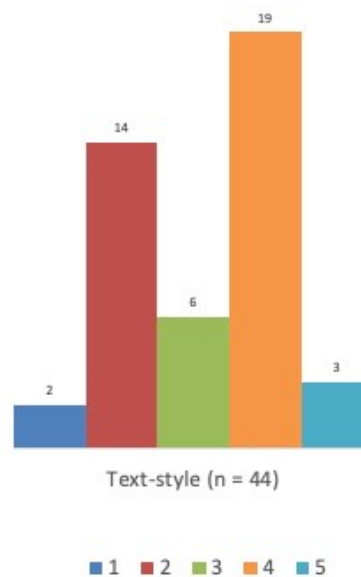


Figure 17: Distribution of appeal ratings for text-style stimulus

The stimulus for image and color received below-average mean values for visual appeal. Designed according to Still's (2018) guidelines, the web page stimulus for image represented a blog, including an image surrounded by blocks of text (see figure 18). The web page stimulus for color emphasized only one color and did not have any images, only

text (see figure 19). Djamasbi et al. (2010) demonstrated that users prefer web pages with large elements and little text, offering a plausible explanation as to why the web pages for image and color had lower mean values than the other web pages. In addition to the user's preference for large elements, visual complexity and prototypicality could explain the low ratings.

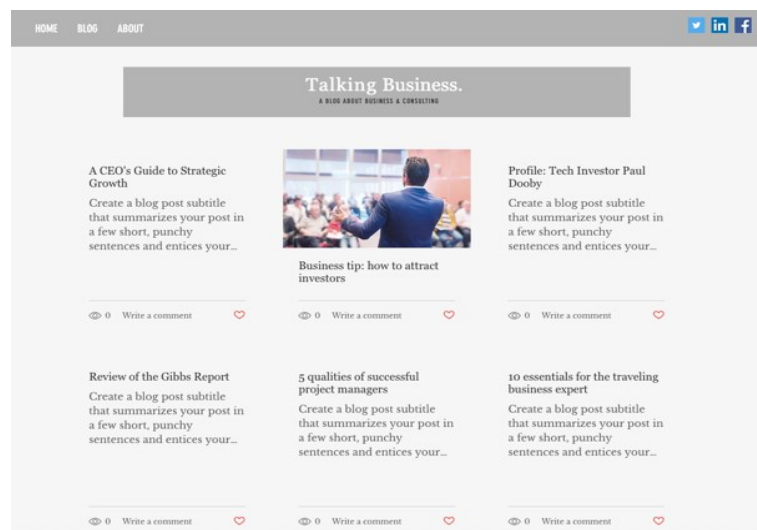


Figure 18: Web page stimulus for image

According to Tuch et al. (2012), high levels of visual complexity and prototypicality lead to negative appeal ratings. The image stimulus included several text blocks and other structural elements, arranged in a way that is characteristic for blogs, concluding that the image stimulus presents a high level of visual complexity as well as prototypicality. Conversely, Tractinsky et al.'s (2006) study demonstrated that lower levels of expressive aesthetics lead to negative appeal judgments. Expressive aesthetics indicating the level of creativity, richness, and originality of the design, suggesting that the color stimulus exhibits lower levels of expressive design in its simplicity and lack of different elements.

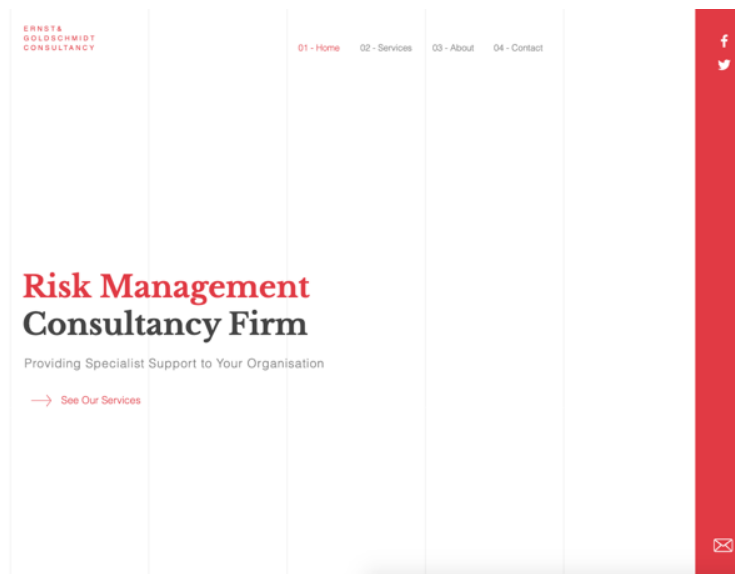


Figure 19: Web page stimulus for color

Trustworthiness ratings were high for all web page stimuli; size, no hierarchy, and position had the highest mean values. The distribution of responses was even, again indicating a consensus among the participants. The web pages with lower mean values for appeal did not, contrary to predictions, have low trustworthiness ratings. Among others, Kim and Fesenmaier (2008), and Robins and Holmes (2008) concluded that high aesthetic treatments lead to a more positive perception of trustworthiness. Tuch et al. (2012) argued that high prototypicality levels lead to higher perceptions of trust, implying that appeal judgments do not dictate how trustworthy the web page is perceived as long as it possesses a high level of prototypicality. For the repeated measures ANOVA of trustworthiness ratings, the statistically significant pairings were size and color, and size and text-style. Implying that for ratings of trustworthiness only in comparing size and color, and size and text-style, the web page design elements impact the level of perceived trustworthiness.

The stimulus for size, no hierarchy, position, and text-style had similar mean values on ratings for overall impression. Image and color had, as in the ratings for appeal, the lowest mean values. The text-style web page had an average mean value, indicating that the divided appeal judgments did not affect the overall impression. The number of statistically significant pairs in the repeated measures ANOVA were more than for

trustworthiness ratings. Statistically significant pairs were: size and image, size and color, image and text-style, image and position, image and no hierarchy, color and text-style, color and position, lastly, color and no hierarchy. The pairwise comparison results indicated that the differences in design stimuli had a statistically significant impact on the perceived impression for these pairs.

According to Thielsch et al. (2014), immediate impressions are predominantly based on the level of aesthetics, meaning that web pages with high levels of aesthetic treatments should generate positive impressions. However, from this study's findings, another outcome can be determined. Web pages with below-average appeal ratings, such as image and color, generated more negative impressions. Whereas web pages with average appeal ratings, such as text-style, position, and web pages with above-average appeal ratings, size, and no hierarchy, generated approximately the same level of positive impressions. Meaning that average and above-average appeal ratings will generate a positive impression, whereas web pages with below-average ratings generate a more negative impression.

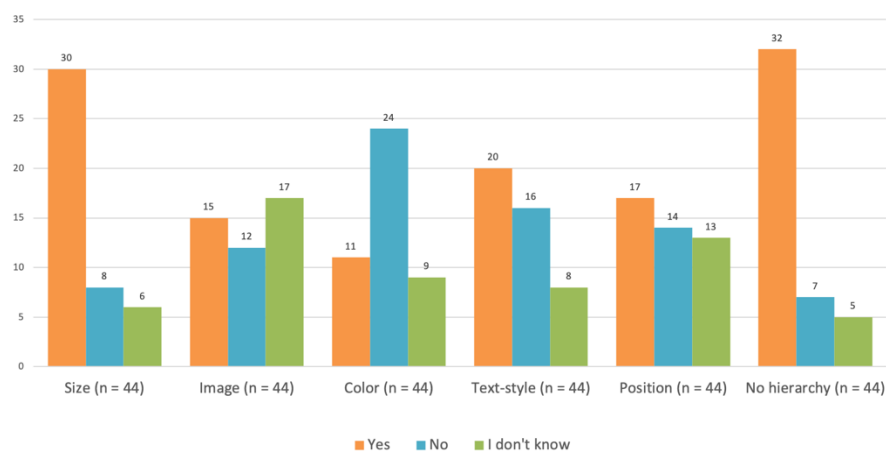


Figure 20: Distribution of replies for further use

The presented responses for further use were; yes, no, and I don't know. Most participants chose yes for size and no hierarchy, and for color, the majority chose no. For the rest of the web pages, the responses were more evenly divided (see figure 20). Djamasbi et al. (2011) implied that visual aesthetics is a strong predictor of the user's willingness to

revisit a web page. Tractinsky et al. (2006) also suggested that aesthetic preferences influence the interaction with a web page and possible outcomes. Likewise, Thielsch et al. (2014) demonstrated that when it comes to the intentional outcome phase, e.g., revisiting a page or continuing exploring it, the content has the highest impact, and aesthetics has a limited but still significant impact. The repeated measures ANOVA conducted of further use replies resulted in three statistically significant pairings. Size and image, size and color, and color and no hierarchy were the only statistically significant pairings, indicating that differences in replies were not derived from differences in stimuli for the rest of the pairings. The statistically significant pairings were the stimuli with the highest and lowest mean values of appeal, partially supporting the conclusions made in prior research. However, it is necessary to keep in mind that the participant's interests might also impact the responses of further use. The four-second exposure time can still be enough time for the participants to apprehend what is seen and thus make conclusions based on personal preferences of the content.

Djamasbi et al.'s (2010) study suggested that generation Y (generally considered as individuals born 1981 – 1995) preferred web pages including “a large main image, pictures of celebrities, little text, and a search feature” (p. 10). The conclusion supports the findings in this study regarding the high mean of the size web page, where the stimulus was constructed of a large image and a small amount of text. However, the conducted one-way ANOVA did not present any statistically significant differences in mean values between different age groups. The results are indicating that for this sample, age was not a factor regarding preference for size. Further use replies of the size stimulus were almost statistically significant between genders, indicating that size could be statistically significant in a larger sample. Significant differences between age groups and male and female responses are often assumed; however, the results of the conducted one-way ANOVA's demonstrated no statistically significant differences.

5.2 Conclusions

The results from the conducted repeated measures ANOVA's revealed statistically significant pairings in all of the categories. The existence of statistically significant

pairings indicates a conclusive difference between the pairings and that similar results are likely to be seen in a different sample. Appeal ratings had the highest number of statistically significant pairings, suggesting that the differences in stimuli greatly influence perceived appeal. Whereas for ratings of trustworthiness and further use, the number of statistically significant pairings were considerably lower, implying that for this study, the perceived trustworthiness and likelihood for further use is not based on differences in design. For impression ratings, roughly half of the pairings were statistically significant, meaning that differences in design had somewhat of an effect. However, the differences were not as distinct as for appeal ratings.

The web page designs used in the study incorporated attributes such as navigation bars, social media icons, call-to-action-buttons, and profile icons. As seen in the results, high aesthetic treatments and the use of familiar icons and features create higher prototypicality and, as a result of that, overall high ratings of trustworthiness. Additionally, web page design has developed considerably during the past two decades, and most web pages are designed in consideration of high aesthetic treatments. Web pages are thus more aesthetic and have more elements that signify prototypicality than at the time prior research was conducted.

In conclusion, visually salient elements influence pre-use first impressions to a different extent. For visual appeal ratings, the differences in visually salient elements had a significant impact on the results. Whereas for trustworthiness ratings, the differences in salient elements had little to no impact. The impact was somewhat distinguishable for impression ratings, and for further use intentions, the effect was insignificant. The lack of a significantly visually salient element and a visual hierarchy did not result in lower ratings as hypothesized, concluding that the applied high aesthetic treatments and prototypicality of the stimulus were enough to ensure favorable perceptions of appeal, trustworthiness, and overall impression.

5.2.1 Practical implications

As previous research within first impressions has demonstrated, the first 50 milliseconds of exposure is essential (Lindgaard et al., 2006; Tractinsky et al., 2006). Pre-use first impressions are predominantly based on visual stimulus, meaning that presented visual stimulus influences the pre-use first impression and the following steps regarding the impression formation process. Web page designers need to consider the first impression of their designs. Because of the halo effect, first impressions have long-lasting effects, both positive and negative.

For web page designers, this study's results illustrate the importance of prototypicality and general aesthetic treatments. The results demonstrated that regarding trustworthiness ratings, the differences in visual design had an insignificant impact. However, ratings were favorable due to the high aesthetic treatments and prototypicality of the created web pages. Further supporting the results suggested in Tuch et al.'s (2012) study, that to achieve trustworthiness, web designers should consider the level of prototypicality and visual complexity.

5.3 Limitations and suggestions for further research

Naturally, there were some limitations to the scope of the study. In order to gain more accurate insight, it would be desired to study a larger and more diverse sample. The sample used in this study was diverse in age; however, the participants' education and backgrounds were reasonably similar. In addition, as for any online survey, it is impossible to know if the participants have replied to the survey truthfully and followed the given instructions.

This study revealed ratings on appeal, trustworthiness, impressions, and the likelihood of further exploring web pages. The used stimuli represented hypothetical web pages of blogs and businesses, possibly affecting the responses of further use. In order to obtain more accurate results, the participants should be asked why they chose to continue exploring the web page and why they did not. Throughout the study, no insight into the

motive of participants' answers was uncovered. A study uncovering the exact influencing elements should be conducted to understand participants' precise perceptions. Additionally, a suggestion for future research would be to include an eye-tracking experiment to ensure the saliency of elements. The stimuli employed in the study could have been altered and designed for months to ensure that none of the other included design elements challenge the suggested entry point. Since an eye-tracking experiment was unavailable, for this study, there is no proof of salience.

6 SUMMARY IN SWEDISH

Webbdesign för första intryck – hur påverkar visuellt framträdande designelement användarnas första intryck?

Följande kapitel presenterar en svensk sammanfattning av avhandlingen som undersöker första intryck av webbsidor, faktorer som påverkar dessa första intryck, samt en granskning av allmänna designriktlinjer och hur dessa påverkar användarnas uppfattningar.

6.1 Inledning

I dagens läge väljer allt fler företag att enbart förekomma online utan några fysiska lokaler eller mötesplatser för möjliga konsumenter. Detta har bidragit till ett överflöd av okända aktörer som tävlar över samma konsumenter. I takt med att nya aktörer ökar online, ökar även konsumenternas skepticism mot dessa. För nya aktörer är det svåraste nödvändigtvis inte att locka konsumenten till webbplatsen utan det komplicerade är däremot att få dem att hållas på en och samma sida mer än några sekunder. I brist på tidigare interaktioner, vad är det som lockar konsumenten att hållas kvar? Vad är det som övertygar konsumenten att webbplatsen är pålitlig och värd att utforska ytterligare?

Vikten av ett starkt intryck online och speciellt ett positivt sådant har argumenterats för aktivt. Även för väletablerade företag spelar webbplatsen en stor roll. Webbplatsen kan till och med vara avgörande ifall företaget önskar behålla existerande och attrahera nya kunder. För företag som ännu inte etablerat sig på marknaden är en välfungerade, attraktiv och pålitlig webbplats grundläggande. I fall användaren inte har någon tidigare erfarenhet av en aktör spelar det första intrycket en stor roll. Enligt tidigare forskning kan både positiva och negativa första intryck ha långvariga effekter på en användare (Lindgaard et al., 2006). Lindgaard m.fl. (2006) studie bevisar att pålitliga första intryck av webbsidor formas ytterst snabbt, så snabbt som inom 50 millisekunder. Detta i sin tur tyder på att första intryck främst baserar sig på visuella element eftersom en användare inte medvetet hinner bearbeta informationen på en så kort tid.

6.2 Syfte och forskningsfrågor

Syftet med denna avhandling är att få en inblick av de faktorer som påverkar första intryck, specifikt inom webbdesign, samt vilken roll specifika visuella designelement spelar när första intryck bildas. Användare formar konstant första intryck då de besöker nya webbsidor eller konsumerar nytt material från bekanta aktörer. Dessa formade intryck har möjligheten att påverka användarens hela användarupplevelse, både med kort- och långsiktig inverkan (Tuch et al., 2012). Det är således viktigt att förstå hur och till vilken grad första intryck inverkar på användarupplevelsen men även hur dessa intryck uppstår och vilka faktorer som påverkar skapandet av första intryck.

För att förstå första intryck och deras inverkan uppstår det även ett behov att förstå hur användare läser webbsidor och vad för slags mönster användarnas beteende ger upphov till. Den virtuella miljön består i hög grad av enbart visuella element och i och med detta är det viktigt att förstå hur dessa visuella element påverkar användaren och hur specifika val inom design kan inverka inte enbart på användarens uppfattning men även användarens uppmärksamhet (Kahn, 2017). Användarens uppmärksamhet har en inverkan på hur användaren betraktar webbplatsen medan användarens uppmärksamhet påverkas av visuellt framträdande element (Peters & Itti, 2007).

För att uppnå det huvudsakliga syftet med denna avhandling har nedanstående forskningsfrågor formulerats:

1. Vilka faktorer påverkar första intryck inom människa-datorinteraktion (Human-Computer Interaction)?
2. Hur påverkar Faradays visuellt framträdande designelement användarens första intryck av visuell attraktion, trovärdighet, allmänna uppfattning och fortsatt användning av en webbplats?

6.3 Litteraturöversikt

Litteraturöversikten kommer att behandla relevanta ämnesområden för avhandlingen, så som användning och granskningsbeteende av webbsidor, användarupplevelse och relevant forskning av första intryck. Ytterligare kommer även visuella designelement och visuell hierarki behandlas som en väsentlig del för att förstå vad som påverkar utformningen av första intryck.

6.3.1 Webbsidor

Framgångsrika och funktionerande webbsidor är enligt Thielsch, Blotenberg och Jaron (2014) en kombination av relevant material, en hög nivå av användbarhet och ett tilltalande utseende. Dessa tre faktorer är essentiella eftersom de påverkar användarens perception och betygsättning av webbplatsen. Användarupplevelse är ett begrepp som ofta missuppfattas vara detsamma som användbarhet men det är viktigt att skilja åt dessa begrepp. Användbarhet mäter hur lätt det är för användaren att fullfölja möjliga uppgifter medan användarupplevelse kan definieras som användarens hela upplevelse, innefattande användarens känslor, tankar och uppfattning av webbplatsen (Albert & Tullis, 2013)

Den visuella designen av ett system eller en webbplats användargränssnitt, kan ha en stor inverkan på användarupplevelsen. Enligt Michailidou m.fl. (2008) kan man med hjälp av visuell design strategiskt implementera designelement för att förbättra användarengagemang, intresse, önskad uppfattning och visuell attraktion. Linjer, former, färger, texturer, typsnitt, former med mera klassas som designelement. Inom människa-datorinteraktion klassas även ikoner, textfält, åtgärdsknappar (call-to-action button) och popup-skärmar som designelement (Lynch, 1994).

Hur användare betraktar webbsidor kan förklaras med hjälp av ögonrörelser. Ögonrörelser styrs i allmänhet av hur bilder bearbetas antingen genom en nerifrån-upp-process eller en uppifrån-ner-process (Sutcliffe & Namouné, 2008). Även om användare är olika uppvisar de ändå relativt liknande allmänna mönster när de bearbetar visuellt material. Nielsen (2006) åskådliggjorde i sin forskning att det så kallade F-mönstret är

det vanligaste användare uppvisar. Allmänna mönster ger upphov till riktlinjer för placering av visuella element och text. Dessa allmänna mönster för ögonrörelser och uppmärksamhet går enligt forskning att manipulera till en viss grad. Enligt Faraday (2000) uppmärksammar användare visuella element enligt en hierarki, där det elementet som står högst upp i hierarkin uppmärksammas först.

Faradays (2000) visuella hierarki:

1. Rörelse
2. Storlek
3. Bild
4. Färg
5. Typsnitt
6. Placering

6.3.2 Första intryck

Första intryck har en betydande roll då det kommer till att forma uppfattningar, åsikter samt till fortsatt agerande. Första intryck kan definieras som en hastig inledande evaluering av en webbplats, ett system eller en applikation. Denna inledande evaluering påverkar måttligt det slutliga intrycket (Sheng et al., 2013). Lindgaard m.fl. (2006) demonstrerade i sin undersökning att tillförlitliga första intryck fastställs inom 50 millisekunder och att dessa hastigt formade intryck kan ha långvariga effekter, även negativa. Ett negativt första intryck kan ge upphov till mer negativa bedömningar av material och användbarhet på webbsidan. Detta i sin tur innebär att en webbsida med relevant material och hög användbarhet klassas ofta som sämre ifall det första intrycket inte är bra.

Effekten av första intryck inom människa-datorinteraktion har studerats bland annat angående användbarhet (Tractinsky et al., 2006), tillit (Karvonen et al., 2000) och kredibilitet (Robins & Holmes, 2008). Forskarna har varit eniga över faktumet att inom första intryck spelar visuell attraktion en stor roll; eftersom det visuella bearbetas

undermedvetet först lämnar det en liten roll för materialet och användbarheten att påverka.

6.4 Metodik

På basen av de formulerade forskningsfrågorna, de korta exponeringstiderna för första intryck och tidigare forskning föredrogs en kvantitativ forskningsstrategi. En kvalitativ forskningsstrategi ger en djupare inblick i hur en användare resonerar, dock skulle effekten av ett första intryck som baserar sig enbart på visuella element vara svårare att säkerställa då användaren får mera tid till att reflektera.

För enkätundersökningen framställdes sex stycken fiktiva webbplatser, en webbplats för varje designelement i Faradays (2000) visuella hierarki. Utöver dessa skapades även en webbplats utan någon klar visuell hierarki för att kunna jämföra skillnader till webbplatser med visuellt framträdande element. Webbplatserna skapades enligt de riktlinjer som presenterades i Stills (2018) undersökning, den allmänna riktlinjer var att designelementet i fråga skall vara det mest framträdande elementet på webbsidan. Designelement som klassas högre upp i hierarkin skall inte kunna uppfattas som mer framträdande.

Den första delen av enkätundersökningen innefattade demografiska frågor så som kön, ålder, utbildningsnivå och en fråga om färgblindhet. Den andra delen av enkätundersökningen omfattade sju stycken korta filmklipp med designstimuli varav det första klippet var en del av en testrunda. Filmklippen presenterades i följande slumpmässigt dragna ordning: (1) typsnitt, (2) bild, (3) ingen hierarki, (4) färg, (5) storlek, (6) placering. Efter varje filmklipp bads deltagaren att betygsätta designstimuli på en skala från 1 till 5 enligt hur attraktiv de upplevde webbplatsen, hur pålitlig de ansåg webbplatsen vara, vilket slags intryck webbplatsen gav (bra – dåligt), samt med hur stor sannolikhet de skulle fortsätta utforska webbplatsen.

Enkäten delades främst via kanaler som nådde både studerande och anställda vid Åbo Akademi men begränsades inte till någon specifik målgrupp. Enkäten besvarades av 47 deltagare och det erhållna data behandlades med Microsoft Excel och IBM SPSS (version

26.0). Av deltagarna identifierade sig 55,3 % som kvinnor och 44,7 % som män. Tre av deltagarna var färgblinda och uteslöts således från resten av undersökningen.

6.5 Resultat och diskussion

Målet med denna studie var att undersöka faktorer som inverkar användarens första intryck inom människa-datorinteraktion, samt granska hur visuellt framträdande designelement påverkar första intryck av visuell attraktion, trovärdighet, allmänna uppfattningar och fortsatt användning av en webbplats. Från enkätundersökningen analyserades svaren av 44 deltagare. Resultaten för visuell attraktion var blandade dock var deltagarna ense över att stimuli för storlek och ingen hierarki upplevdes som de mest attraktiva.

Envägs variansanalyser (ANOVA) utfördes för att granska signifikanta skillnader mellan tre olika åldersgrupper, samt skillnader mellan män och kvinnor. Nya åldersgrupper uppgjordes enligt följande: 1991 – 2000, 1990 – 1971, 1970 – 1954. Inga statistiskt signifikanta samband hittades förutom för sambandet mellan kön och fortsatt användning. Levene's statistik på homogenitet av varians var statistiskt signifikant för svar på storlek stimulus $p < .001$. Skillnaden mellan genomsnittsvärdet för kvinnor och män var nära till signifikant $F(1, 42) = 4.00, p = .05$. Utgående från detta resultat kan svaren för fortsatt användning av storleks stimulus från ett större sampel även uppskattas vara signifikanta.

För att granska statistiska skillnader mellan webbplatserna utfördes en variansanalys med upprepade mätningar (repeated measures ANOVA) för varje fråga. Resultaten åskådliggjorde statistisk signifikanta par för varje fråga, dock fanns det skillnader mellan antalet av signifikanta par. För värderingar av visuell attraktion var enbart storlek och ingen hierarki, bild och färg, samt typsnitt och placering icke signifikanta. Vilket innebär att för de statistiskt signifikanta paren uppstod skillnaderna i värderingarna på grund av skillnader i webbplatsens stimulus. För värderingar av trovärdighet framkom det enbart några få statistiskt signifikanta par, vilket i tur betyder att skillnader i designstimuli inte har en signifikant inverkan gällande värderingar av trovärdighet.

Resultaten från undersökningen demonstrerade att värderingar av visuell attraktion och skillnader i designstimuli inte hade någon signifikant inverkan på användarens värderingar av trovärdighet. Visuell attraktion påverkade den allmänna uppfattningen positivt då värderingarna var genomsnittliga eller bättre, medan värderingar av visuell attraktion under genomsnitt påverkade den allmänna uppfattningen negativt. Webbplatsen för ingen hierarki genererade genomgående positiva resultat och bevisade således att uteslutandet av visuellt framträdande element och en visuell hierarki, inte gav upphov till sämre resultat. Avslutningsvis hade ålder och kön ingen signifikant inverkan på värderingarna av visuell attraktion, trovärdighet, den allmänna uppfattningen eller benägenheten för fortsatt användning.

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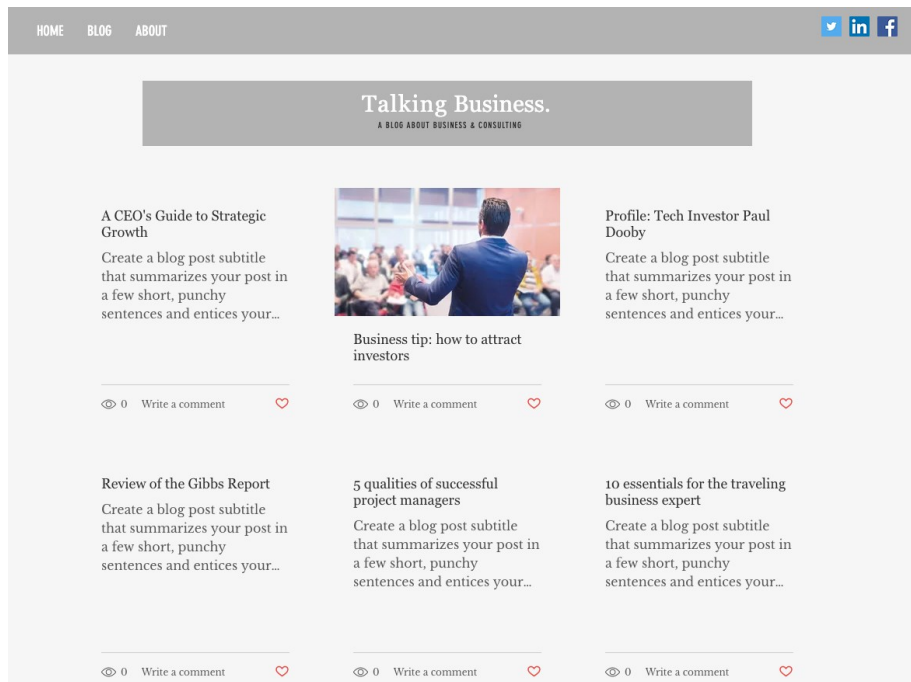
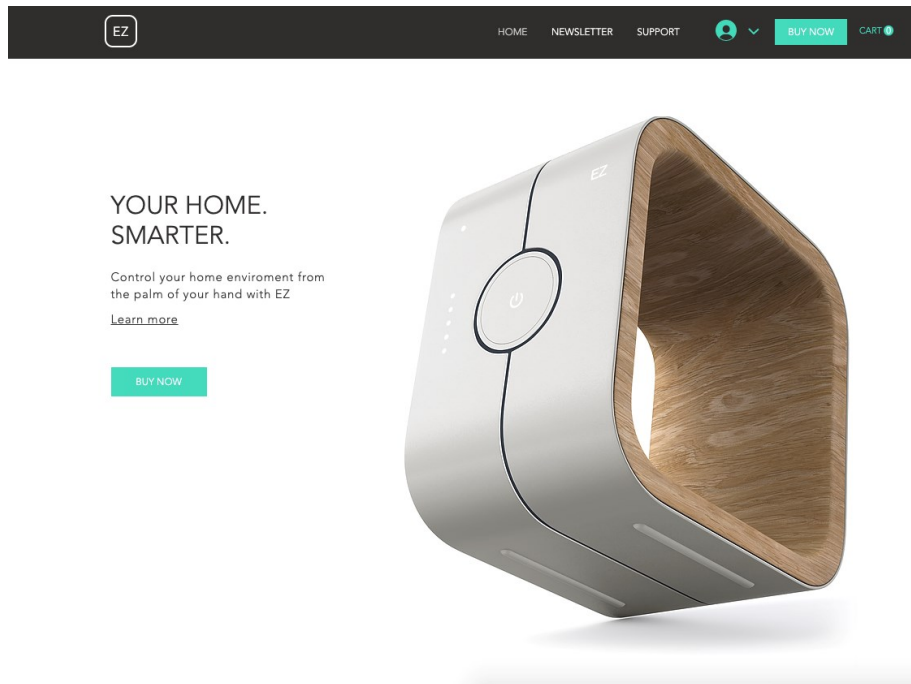
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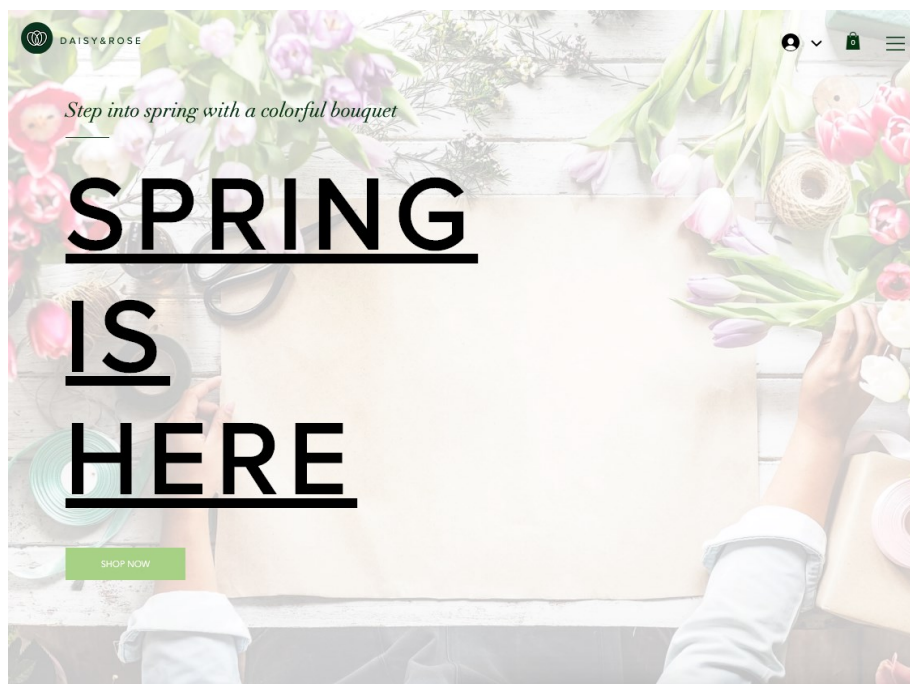
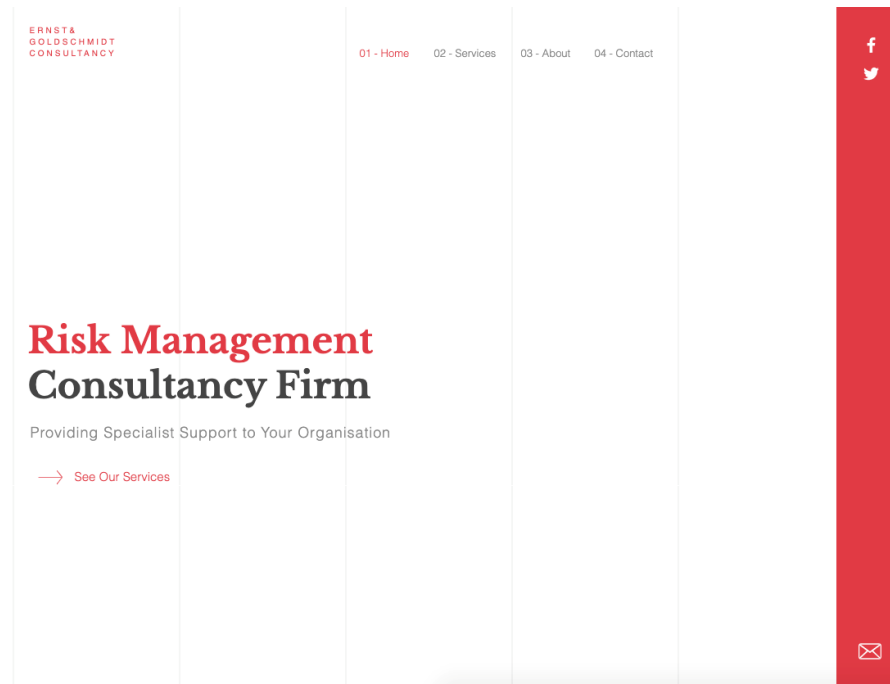
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APPENDIX: SURVEY STIMULI





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