First Impression - The Importance of Aesthetics for a Website's Success

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Master Thesis

Institute of Psychology

University of Basel

April 2017

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Abstract

In human-computer interaction research, a widespread belief attributes the first impression to be decisive for retaining users on websites. However, empirical investigation on this conjecture has been largely omitted. This paper examines the influence of positive and negative initial impressions on subsequent website usage decisions by means of three experiments. All experiments were performed with information website screenshots, differing only in their level of aesthetics. Additionally, participants were induced with a 'mode of use' (i.e., having either an explicit goal or not). In experiment 1 and 2, websites were presented for two seconds each, examining the willingness to view websites and the intention to stay on websites. In experiment 3, participants acted like real users: scanning websites, deciding whether to use, and taking action eventually. The dwell time on websites was analyzed as a function of the type of first impression. Further, the critical time intervals for website usage were qualified. The results of all experiments consistently suggest the high importance of first impressions regarding whether a website is used or not.

First Impression - The Importance of Aesthetics for a Website's Success

Introduction

The World Wide Web counts over 1 billion active websites. Google provides you with 4'510'000 [1] search results when looking for 'chocolate cake recipe'. To come out on top against this plethora of websites, a positive first impression is considered of advantage. Internet users draw inferences based on outer appearance to other website characteristics, making aesthetics a key factor in website interfaces (e.g., van Schaik, Hassenzahl, & Ling, 2012). Since the aesthetic processing occurs instantly (Leder, Belke, Oeberst, & Augustin, 2004; Thielsch & Hirschfeld, 2010), the first impression is considered as major factor for website success (e.g., Lindgaard, Dudek, Sen, Sumegi, & Noonan, 2011).

Within psychological domains involving human interaction it is widely accepted that the first impression is crucial in regard to how people perceive, judge and, consequentially, act (e.g., Lindgaard, Dudek, Sen, Sumegi, & Noonan, 2011; Olivola & Todorov, 2010). However, research in the field of Human-Computer-Interaction (HCI) has focused upon usability for years, disregarding the role of aesthetics and its interrelated domain of first impression. The topic gained center stage when Lindgaard, Fernandes, Dudek, and Brown (2006) jolted with their study, showing that an exposure time of 50 milliseconds is sufficient for reliable and consistent appraisals of website aesthetics. Those findings evoked comprehensive research on aesthetics in the context of users' first impression, bringing together further evidence on the immediacy of aesthetic appraisals (e.g., Harrison, Reinecke, & Chang, 2015; Tractinsky, Cokhavi, Kirschenbaum, & Sharfi, 2006) as well as specific features contributing to its formation (e.g., Tuch, Presslaber, Stöcklin, Opwis, & Bargas-Avila, 2012b).

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[1] Retrieved on the 6th of February 2017

In the course of this research movement, a general acceptance emerged that accredits to the first impression of being the decisive factor for capturing users' interest and, on top of that, determining the users' subsequent behavior in terms of whether they stay on or leave websites (Douneva, Jaron, & Thielsch, 2016; Geissler, Zinkhan, & Watson, 2006; Lindgaard, Dudek, Sen, Sumegi, & Noonan, 2011; Robins & Holmes, 2008; Tuch et al., 2012b; van Schaik & Ling, 2009). Indeed, in reference to the aesthetics' wide-ranging impact (van Schaik et al., 2012) and considering the close relationship between aesthetics and first impression (Lindgaard et al., 2011), the assumed influence of first impressions on users' subsequent behavior stands to reason. However, this prevalent opinion has no empirical basis in fact - it reflects solely a conjecture.

In this study we address this lack of research by investigating the effect of first impressions in regard to its actual impact on users' subsequent website usage behavior. We aim to contribute to the clarification of this issue by setting up three complementary controlled laboratory experiments. To this end, we manipulated interface aesthetics in order to evoke positive and negative first impressions. The study proceeds in an information search context including two different mindsets (i.e., mode of use). For a better understanding from where the often-claimed impact of first impressions originates, the following section will first briefly attend the role of aesthetics in different psychological domains. Then, the interplay of aesthetics and first impression will be reviewed. Finally, the context of use will be introduced.

Theoretical background

Aesthetics in Psychology

A great body of research from different psychological domains illustrates the power of attractiveness, aesthetics, beauty, or visual appeal.[2] In social psychology it has been shown that attractive individuals are not only assigned to a series of positive traits compared to less attractive individuals (see Langlois et al. (2000) for an overview), attractiveness also influences people's actions, as for instance in the labor market, where attractive indivuduals are favored over the unattractive (Hamermesh & Biddle, 1993). In a field experiment on dating behavior, Walster, Aronson, Abrahams, and Rottman (1966) displayed that attractiveness was the major determinant for attraction as well as an important predictor for a second date. In HCI, aesthetics proves equally effective. Research has been highlighting the positive impact of website aesthetics on constructs such as overall impression (Thielsch, Blotenberg, & Jaron, 2013; van Schaik et al., 2012), website utility (Jiang, Wang, Tan, & Yu, 2016), trust and credibility (Lindgaard, Dudek, Sen, Sumegi, & Noonan, 2011; Karvonen, 2000; Robins & Holmes, 2008), perceived information quality (De Angeli, Sutcliffe, & Hartmann, 2006; Hartmann, Sutcliffe, & Angeli, 2008), or, arguable, perceived usability (e.g. Sonderegger & Sauer, 2010; Tractinsky, Katz, & Ikar, 2000; Tuch, Roth, Hornbaek, Opwis, & Bargas-Avila, 2012) for several years by now. The psychological mechanism behind that deductive reasoning of visual cues to other characteristics is often referred to by the 'halo effect' (e.g., Moshagen & Thielsch, 2013). Thus, perceived aesthetics may affect people's attitude towards a website and its inherent qualities. Put another way, it can be conceived as people's tendency to tolerate certain product shortcomings following a positive first impression.

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[2] There is no consensus among different authors; we use the terms aesthetics and appeal synonymously in this paper.

The Interplay of Aesthetics and First Impression

In previous years, aesthetics has been established as multidimensional construct in HCI, labeled with diverging definitions (e.g., Lavie & Tractinsky, 2004; Moshagen & Thielsch, 2010). In this paper the definition of Moshagen and Thielsch (2010) is adopted, which is read as 'an immediate pleasurable subjective experience that is directed towards an object' (p. 3). As appears from this definition, the aesthetic processing occurs instantaneous and thus makes the first impression valuable. The relation between aesthetics and first impression is also empirically underpinned since aesthetics was shown to be highly relevant in the development of first impressions (Thielsch & Hirschfeld, 2010). It was further demonstrated that aesthetics has clearly the greatest impact on websites' first impression in comparison to content and usability (Flacke, Jaron, & Thielsch, 2015; Thielsch et al., 2013) or credibility and usability (Lindgaard et al., 2011; Kim & Fesenmaier, 2008). The aesthetics' influence on the first impression is evident and hence, a deeper understanding of the underlying factors contributing to the formation of first impressions had been demanded. As a result, various studies on first impression with regard to aesthetics identified critical properties of websites, which affect the initial impression. Thereby, colors (Reinecke et al., 2013), visual complexity (Michailidou, Harper, & Bechhofer, 2008; Tuch et al., 2012b; Reinecke et al., 2013) and prototypicality (Tuch et al., 2012b) were shown to be most influential.

For all that, defining the first impression's time frame proves difficult. Indeed, research within different psychological areas demonstrated that 500 milliseconds or even below suffice to form reliable preferences towards websites or people (e.g., Lindgaard et al., 2006; Tractinsky, Cokhavi, Kirschenbaum, & Sharfi, 2006; Willis & Toderov, 2006). Moreover, these initial decisions are manifested of being stable over time (e.g., ratings after 500 milliseconds correlated highly with those after 10 seconds, Tractinsky et al., 2006). This

is commonly attributed to the confirmation bias, which depicts the mannerism to look for confirming evidence supporting the initial impression and ignoring conflicting information (Nickerson, 1998).

Not only is it tricky to put a number on the first impression's time frame, the time span of the first impression's ability to affect users' actions is somewhat elusive as well. Some authors separate the first impression into *immediate* and *deliberate* first impression (e.g., Douneva et al., 2016; Thielsch & Hirschfeld, 2012; van Schaik & Ling, 2009). *Immediate* refers to a bottom-up process of the visual perception, and *deliberate* corresponds to a top-down processing, whereby reflective cognitive processes and reasoning occur. Thielsch and Hirschfeld (2012) suggest that deliberate judgments are not feasible within 50 milliseconds but may start around 500 milliseconds as these judgments correlate highly with judgments after 10 seconds. Their conception complies with Zajonc (1980), saying that judgments below 50 milliseconds are due to affective responses, starting even before cognitive processing happens. Still, both phases are interrelated; the deliberate first impression is built on the immediate affective response and only performs slight modifications upon it (van Schaik & Ling, 2009). This seems to be relevant when considering that *staying on* (or *remain*) and *leaving* (or *abandon*) a website are deliberate decisions.

As just indicated, the field of interest of the present study concerns the deliberate website usage behavior in dependence of positive and negative first impressions. That is, whether participants will use (e.g., remain) or not use (e.g., abandon) a given website. Studies on that subject matter are virtually absent. Yet, little research with regard to the general impact of aesthetics on users' subsequent behavior is reported. However, the subsequent behavior has been understood in many ways such as buying intentions (Hall & Hanna, 2004; Parboteeah, Valacich, & Wells, 2009), intention to revisit (Thielsch et al.,

2013), or task performance. For the latter, literature provides somewhat inconsistent findings (for overview see Sonderegger, Zbinden, Uebelbacher, & Sauer, 2012). In respect of the relationship between aesthetics and website usage, only one study yields a subtle hint that users occasionally dismiss websites as a result of non-appealing websites (Sillence, Briggs, Harris & Fishwick, 2007).

A successful website is characterized best by its actual use. Users' dwell time on a page can act as an indicator for its success. In a large-scale log analysis Liu, White and Dumais (2010) made a remarkable effort, investigating the dwell time of 205'873 different websites with 10'000 visits per page at least. Their findings support the notion of the first impression's importance in general but are also indicative of a longer sphere of action than the 50 milliseconds range suggested by Lindgaard et al. (2006). According to their data, websites experience a strong negative aging effect, which basically consists of two phases. First, websites undergo an initial screening, resulting in a substantial probability of leaving the pages. Second, in case the screening is overcome, the likelihood of leaving reaches a plateau, that means, the leaving rate decreases gradually. More precisely, their findings suggest that the first 10 seconds are pivotal for a website's success in terms of persuading users to use a website.

However, to our knowledge no study has explicitly investigated the effects of first impressions on the subsequent website usage behavior. Hence, the current study strives to shed light on how users dwell time on websites is affected by antecedent first impressions.

Context of Use

The first impression's subsequent behavioral response is hardly straightforward since, apart from design characteristics, it depends on several other factors including contextual factors such as mode of use or website genre (Lindgaard et al. 2011). Naturally,

the website's genre and its content provide the framework for website usage. Among those, searching for information has classed a top position in daily internet activities (Wellman & Haythornthwaite, 2008), which pertains to date as can be retrieved from several internet statistics websites.

Yet, just like the presence of a hammer alone does not cause people to use it, website usage underlies inevitable some sort of behavioral intention. This leads up to the mode of use. Hassenzahl (2003) strongly emphasized that website usage always inlcudes a particular mode. The concept behind refers to two different mental states, called *goal* and *action* mode. Users experience either of them when interacting with software (Hassenzahl, 2003; Hassenzahl, Kekez, & Burmester, 2002). In goal mode, users pursue an objective that determines all actions and the system embodies no more than 'a means to an end'. Thus, users strive to accomplish a task efficiently without getting sidetracked. No such endeavor exists in action mode, instead, the software represents 'an end in itself' and may refer to what is colloquially known as 'surfing the web' (i.e., exploring) (Hassenzahl, 2003).

The possible significance of context regarding the perception of aesthetics (De Angeli et al., 2006), performance (Sonderegger & Sauer, 2010), or online information search behavior (Kim & Fesenmaier, 2008), has been mentioned occasionally. Thereupon, several researchers integrated the mode of use by inducing participants into either task-oriented (i.e., goal mode) or explorative (i.e., action mode) usage modes (e.g., Kauer, Theuerling, & Bruder, 2013; Van Schaik & Ling, 2011; Van Schaik & Ling, 2009; Wechsung, Naumann, & Möller, 2010). This manipulation is achieved by providing participants a context (e.g., visiting a specific website) and either inflicting them with a specific task such as information retrieval (goal mode) or simply let them explore the given website in their own interest (action mode). The findings of the aforementioned researchers imply that perceptual judgments (e.g., on the website's visual appeal) depend to some extent on the mode of use.

For users with an explicit goal in mind, perceived website aesthetics relies on what Hassenzahl calls hedonic (e.g., aesthetics) and pragmatic qualities (i.e., usability), whereas in action mode only hedonic quality counts as an influential variable for perceived appeal. The consequences arising thereby can be of behavioral nature such as spending more time on a website (Hassenzahl, 2003). To summarize, user in action mode (‘playful and spontaneous’) go by stimulation and aesthetics, whereas users in goal mode (‘serious’ and ‘planning’) let them not solely get carried away by hedonic but rather appreciate pragmatic features beyond (Hassenzahl et al., 2002; Van Schaik & Ling, 2011).

Although the relationship between aesthetic perception and mode of use has been highlighted, the mode of use has not been taken into account by previous research in connection with first impressions (cf. Lindgaard et al., 2006; Tractinsky et al., 2006; Tuch et al., 2012b). Thus, the current paper aims to expand this course of research by inducing participant into a particular mode of use.

To sum up, the first impression of websites is shaped within a fraction of a second, proves to be resilient, and has a carry-over effect on other website attributes (e.g., Lindgaard et al., 2006). Also, there is evidence on the factors that trigger first impressions such as complexity (e.g., Tuch et al., 2012b). Then, the influence of interface aesthetics on user experience factors such as usability (e.g., Tractinsky et al., 2000), or trust (e.g., Lindgaard et al., 2011) was examined successfully. Moreover, it was shown that usage behavior not only depends on website characteristics (e.g., aesthetics or usability) but also on the specific mode of use (e.g., Hassenzahl et al., 2002). Eventually, the first impression is taken for granted to be the gatekeeper for either viewing, or dismissing websites, even though empirical research on that relationship is missing to best of the author's knowledge.

Aim of the study

The present research has one prime objective, namely to validate experimentally the often echoed impact of the first impression on the subsequent usage behavior. For this purpose, three complementary studies were designed. Table 1 gives an overview of the hypotheses in each experiment.

The first experiment has the aim to analyze the first impression's impact on participants' willingness to view a given website. It is expected that positive first impressions increase the willingness to view websites compared with negative first impressions (H_1). Based on Hassenzahl (2003), suggesting that individuals in action mode depend only on hedonic aspects, it is further expected that negative first impressions lead to lesser willingness to view websites in action mode than in goal mode (H_2). Experiment 2 pursues a similar target as the previous albeit with a modified procedure with greater relation to reality. We anticipate a difference between the intentions to stay on websites following either positive or negative first impressions (H_3). The goal of the third experiment is twofold. First, we believe that negative first impressions cause faster website leaving behavior than positive first impressions (H_4). We further assume that the effect of H_4 is more pronounced in action mode than in goal mode (H_5), since in action mode aesthetics is of higher importance (Hassenzahl, 2003). Second, we want to decode the critical phases that determine whether a website is used or not.

Table 1

Overview of Hypotheses Regarding the Effects of First Impressions on Dependent Measures

Hypotheses	
Experiment 1	
H_1	Positive first impressions lead to increased willingness to view websites compared to negative first impressions.
H_2	Negative first impressions lead to lesser willingness to view websites in action mode than in goal mode.
Experiment 2	
H_3	Positive first impressions differ from negative first impressions regarding usage intention.
Experiment 3	
H_4	Negative first impressions cause faster website leaving behavior than positive first impressions.
H_5	The effect of H_4 is more pronounced in action mode than in goal mode.

Methodological Approach

This study consists of three consecutive experiments. Hence, participants and the materials were the same in all three experiments.

Assessing users' usage behavior on websites by means of questionnaires is a common (cf. Hall & Hanna, 2004; Parboteeah et al., 2009; Thielsch et al., 2013) but perhaps limited approach, because stated behavior may not correspond with actual behavior. To address this gap, this study is modeled in order to retrieve participants' behavior directly by gathering their actions during certain tasks.

All three experiments were conducted in the context of different information search scenarios. Apart from the topic's relevance, the information search genre appears suitable to address and control, respectively, the constructs of aesthetics, content, and usability, which were previously found to contribute to first and overall impressions of websites (Thielsch et

al., 2013). However, as mentioned at the beginning, aesthetics was shown to make the major contribution to the first impression of websites (e.g., Lindgaard et al., 2011). Therefore, the manipulation of the first impression was performed by varying the website's aesthetics (i.e., appealing and non-appealing, respectively). These websites were tested in a preliminary study that is reported in the section hereafter. In order to reduce confounding factors, content was held constant (experiment 1 and 2) or was counterbalanced (experiment 3). As the information websites are confined to scrolling up and down, we further believe that usability has no or very weak interfering effects. The mode of use was implemented for providing a context in which the participants act, as every online activity includes either a goal or action mode (Hassenzahl, 2003). Furthermore, it was shown that the mode of use influences the aesthetic perception (Hassenzahl et al., 2002), thus it quite possibly affects the first impression as well.

Please note that positive first impressions correspond to appealing websites and negative first impressions correspond to non-appealing websites throughout this study.

Preliminary Study

To ensure that participants truly experience a first impression we developed 28 website layouts and validated them in an online study in regard to their visual appeal. To reduce workload, the ninety-four participants (M_{age} = 24.2, SD = 14.8; 64 women, 28 men, 2 other) were presented with 15 randomly assigned website screenshots each. The screenshots were displayed for 2 seconds. Previous research in the context of first impression used exposure times of 1 second (Thielsch & Hirschfeld, 2012; Tractinsky et al., 2006). We used a 2-second exposure because we reckoned with loading delays due to the relatively large size of the screenshots. All websites were rated between 43 and 56 times on 7-point Likert scale regarding their visual appeal by use of a validated questionnaire (i.e., VisAWI-Short,

published by Moshagen & Thielsch, 2013). All websites contained the same filler text (lorem ipsum) and the same placeholder image. The seven best-rated (M = 4.65; SD = .84) and the 7 worst-rated (M = 2.67; SD = .94) websites were applied as stimuli material for the three experiments of the main study. Therefore, the filler text as well as the placeholder image was replaced with a content and image relating to the respective experiment's topic. All screenshots were taken at 2560 x 1440 pixels. In the preliminary study the size of the screenshots was reduced to 1200 x 679 pixels.

Experiment 1

The experiment aimed at establishing clarity regarding post-first impressions behavior in terms of users' *willingness to view* a given website. Participants were shown eight websites on the topic of wound healing. Each website was presented for two seconds. After each website, participants decided whether they want to use the website at a later point.

Method

Design. This experiment used a two-way, mixed design with the within-subject independent variable *website aesthetics* (appealing, non-appealing) and the between-subject independent variable *mode of use* (goal, action). The goal condition consisted of a specific task (i.e., finding an answer). The action condition included no specific task (i.e., exploring). The dependent variable was the willingness to view a given website.

Participants. Participants were recruited through the recruiting database of the Department of Psychology at the University of Basel, where students may subscribe for studies in exchange of course credits. Students who already met their study quota received an equivalent of 5 US$ instead. Overall, there were n = 120 participants (90 females) with a mean age of 22.9 years (SD = 3.8) and an age range from 18 to 36.

Materials. The experiment was implemented with the survey tool Unipark EFS survey and conducted on iMacs (Mac OS X 10.8.5) using 21.5" monitors with a resolution of 1920 x 1080 pixels.

Stimuli. Four appealing and four non-appealing screenshots of information websites were used. Additionally, a neutral website, in terms of being neither particularly appealing nor particularly non-appealing, as assessed in the preliminary study, was applied. The resolution of the screenshots was 1600 x 906 pixels.

Figure 1. Screenshots of experiment 1.

Measures. After seeing each website participants in goal mode were asked: 'would you like to keep this website in order to use it for answering the question afterwards?' Participants in action mode were asked: 'would you like to keep this website in order to explore it self-paced afterwards?' The number of appealing and non-appealing websites participants indicated to be willing to keep (i.e., view) was counted. The maximal count for both website aesthetics versions was '4' and the minimal count '0', respectively.

Procedure. The experiment was conducted in the computer lab of the Department of Psychology, consisting of 20 independent computer workplaces. Participants took part alone or in groups of up to ten people who worked independently. They were allocated in front of an iMac with at least one empty seat in between every participant. Thereafter, the experimenter informed them that a connection error with the Internet occurs occasionally[3]. Further, they were told that in such a case, insofar as possible, they should follow the instruction on the computer screen. All other instructions were displayed on the screen. They were able to control the progress of the experiment by clicking the continue button. The survey software assigned the participants randomly to one of the two experimental between-subject conditions (i.e., goal or action mode).

After a welcoming screen, participants were briefed about the procedure of the first experiment. Subsequently, they were asked to project their thoughts into the following scenario: '*you fell down on the street sustaining a sore knee. You are unsure whether a plaster or air (i.e. no plaster) is better for the wound's healing.'* Participants allocated to the goal condition were given the following add-on: '*Needless to say, you want that wound to be healed as quickly as possible. For that reason you will look in the Internet for the right answer.'* Then, eight screenshots were presented to all participants in a random order for 2 seconds each. This exposure time was used due to the same reasons as described in the

[3] This information was of importance in regard to experiment 2 and is explained in its method section.

preliminary study. Following every screenshot, participants were asked to indicate whether they want to keep that website for later use. At the outset they were informed that from all the websites they keep, one would be drawn by chance after making the decisions for the eight websites. Once all decisions were made, participants were presented with a neutral website (regarding its visual appeal) for at least 30 seconds. This website was not part of the stimuli shown beforehand. To minimize confusion, participants were told at the beginning that in case they 'keep' no website, one website is available in a 'random pool' already. In addition, participants in the goal condition were requested to answer the question in note form. Finally, participants were instructed that the first part of the experiment is completed and that they may start with the second part when ready.

Results

The average numbers of appealing and non-appealing websites participants were willing to keep (i.e., visit) in both modes of use are shown in Table A1. A two-way mixed analysis of variance (ANOVA) was applied with website aesthetics as within-subject independent variable and mode of use as between-subject independent variable. The amount of websites participants were willing to visit was analyzed as dependent variable. For all statistical tests an alpha level of .05 was used and all data were checked to ensure that they met the requirements for the statistical tests.

There was a significant two-way interaction between website aesthetics and mode of use, $F(1, 118) = 4.41$, $p = .038$, partial $\eta^2 = .036$. This indicates that for appealing as well as non-appealing websites the willingness to view differs in dependence of the mode of use.

Due to a significant interaction, the interpretation of main effects may be misleading (Girden, 1992); therefore, data was analyzed post hoc on simple effects using the Bonferroni correction. The simple effect comparing goal and action mode did not reach a statistically

significant difference either in appealing ($F(1, 118) = 0.91$, $p = .342$) nor in non-appealing ($F(1, 118) = 3.10$, $p = .081$) websites.

Simple effect analysis revealed a statistically significant effect of website aeshtetics on the willingness to view a website within goal mode ($F(1, 59) = 32.25$, $p < .001$, partial $\eta^2 = .353$) as well as within action mode ($F(1, 59) = 111.92$, $p < .001$, partial $\eta^2 = .655$). In goal mode, the willingness to view appealing websites was significantly greater than for non-appealing websites ($M = 1.096$, $SE = .193$, $p < .001$). The same held true for action mode ($M = 1.612$, $SE = .152$, $p < .001$).

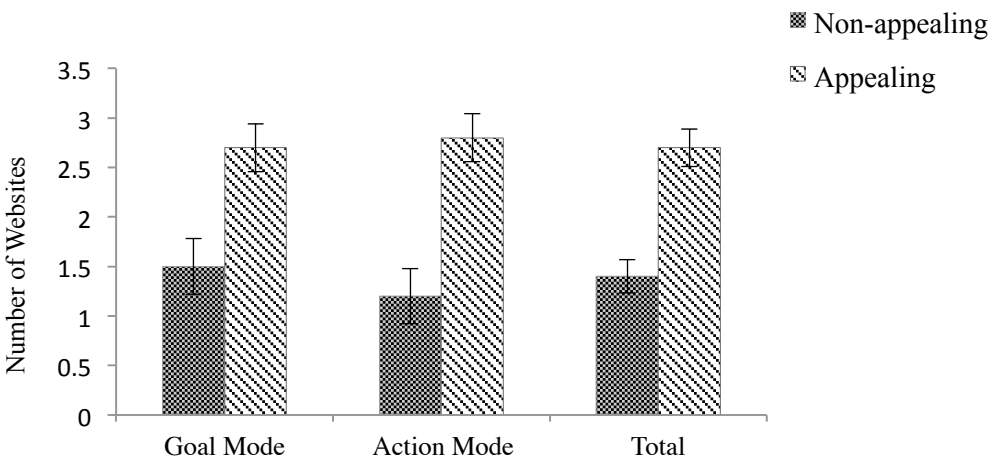


Figure 2: Number of websites participants were willing to view by website aesthetics (i.e., first impression) and by mode of use. Error bars are 95% confidence intervals.

Discussion

The results of this experiment are clearly indicative of the first impression's effect on planned website usage. Supporting H_1, positive first impressions (i.e., appealing websites) caused increased willingness to view websites in comparisons to negative first impressions (i.e., non-appealing websites). Contrary to what was expected in H_2, negative first impression did not cause lesser willingness to view websites within action mode compared to goal mode. Nonetheless, as indicated by the significant interaction effect, the first

impression's impact differs in dependence of the usage mode. Accordingly, the first impression carries more weight in absence of explicit goals, suggesting that negative first impressions could be all the more influencing for individuals who are just browsing through the Internet (i.e., in action mode). This implies, individuals are more likely to dismiss a website due to a negative first impression. However, in consideration of the interaction's effect size (η_p^2 = .04) and non-significant simple effects, this assumption must be treated with care and needs further investigation.

The reached decisions (i.e., willingness to view a given website) are attributable to website appeal for the most part. This conclusion is based on the context that other factors (i.e., usability and content, which were previously stressed contributing to first impressions besides aesthetics, Thielsch et al., 2013) presumably only scratched the surface of the participants' perceptions due to the short exposure. This notion achieves support from Robins & Holmes (2008) who were showing that despite equal content, more appealing websites received increased credibility within roughly three seconds. They argue that during that short time grasping the content's value seems unlikely. Although we equipped our websites with unvarying content in order to reduce the content's potential confounding influence on the perception of aesthetics (cf. Thielsch et al., 2013), it reveals likewise a conceptual limitation of the experiment. Despite the short exposure time, a few participants (equal number in both modes) noted in an optional comment field that they observed the invariability of the content over all presented websites. However, there is no reason to believe that this shortcoming influences the results systematically either for appealing or non-appealing websites. The strong effect sizes (η_p^2 goal mode = .35; η_p^2 action mode = .66) back up the notion that the existing effect was a consequence of the manipulation of the websites' appeal.

The experiment was geared to overcome simple yes-no questions in regard to the willingness to view a website. We provided a context in which we were able to assess the participants' actual behavior. This experiment presents a promising first step, laying the foundation for further research on the first impression's influence on behavioral variables. Hence, experiment 2 continues on that topic by aiming to perform a more realistic approach, which is specified in the next section.

The implications of experiment 1 will be examined in the general discussion.

Experiment 2

The second experiment planned to reach further verification of the first impression's impact on usage decisions. It examined the *intention to stay* on a website following both positive and negative first impressions. While in the authors' opinion experiment 1 can be criticized for its somewhat artificial character, this experiment came closer to a natural scenario. Participants landed directly on a website, skipping only the click on a search result (assuming that the first step includes the entry of a search term into a search engine). The main extension of experiment 2 concerns the participants' mindset. Whereas in experiment 1 participants were aware of seeing the websites only for a brief span, we aimed to control for that consciousness by conveying a sense of seeing only one website. Ostensibly, we did not provide any time designation for this task.

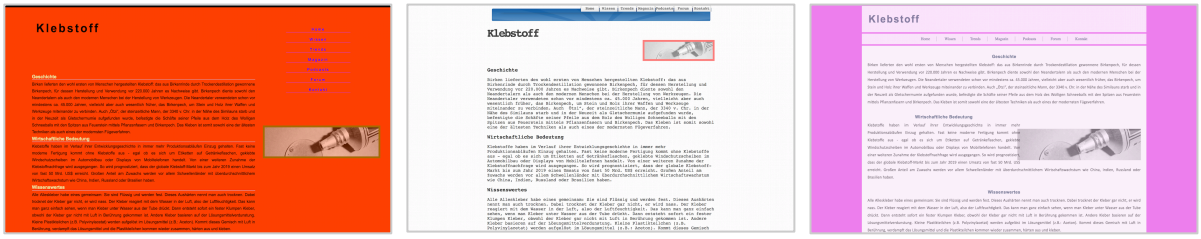
Method

Design. The same experimental variables as in experiment 1 were used. The dichotomous dependent variable was whether participants wanted to stay on a given website or not.

Participants. The same participants as in experiment 1 participated in experiment 2.

Stimuli. Three appealing and three non-appealing screenshots of information websites were used. The resolution of the screenshots was 1600 x 906 pixels.

Non-appealing Websites



Appealing Websites

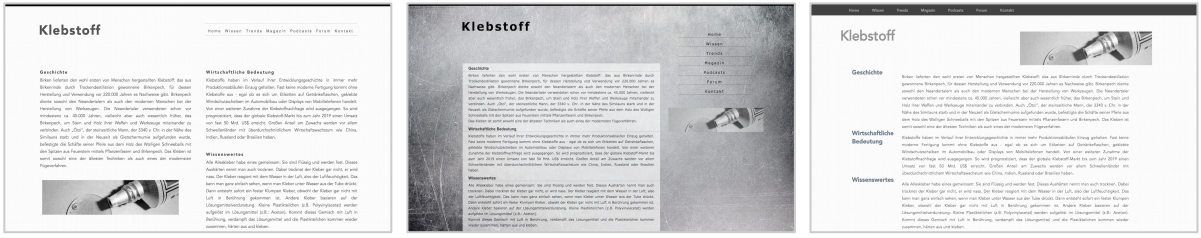


Figure 3. Screenshots of experiment 2.

Measures. While seeing a website, a pop-up window appeared. Participants were asked: 'would you like to stay on this website or would you prefer to see another website instead?' The number of appealing and non-appealing websites participants indicated to stay on or to leave, respectively, was counted.

Procedure. The second experiment took place immediately after the first experiment. Participants were informed on the screen that the second part of the study is about to start. Following that, participants were asked to project their thoughts into the following scenario: '*you are having a discussion with your friends on the subject why glue does not stick to the inside of the bottle. You are sure that you know the correct answer but your friends simply do not believe you.'* Participants allocated to the goal condition were given the following add-on: '*in order to show your friends that you are right, you will search the Internet for a*

website which supports your argument.' All participants were lead to believe that they will see randomly one website from an existing sample of eight websites on the subject of glue. Subsequent to the instruction, a random either appealing or non-appealing website appeared on the screen for 2 seconds until a new window popped up, asking whether the participants wanted to stay on this website *'in order to explore it self-paced'* (action mode) / *'for answering the question'* (goal mode) or whether they prefer to see another website instead (goal and action mode). After they continued (i.e., stayed or left) a loading animation showed up for 3 seconds. Subsequently, a loading error message was displayed saying that the page could not load and that the 'Continue'-button needs to be pressed to reload the page. Next, a new website appeared (regardless of whether participants indicated to stay or leave). Determined by the level of website aesthetics (appealing or non-appealing) participants were presented before, the opposite aesthetics level was presented, again for 2 seconds. The following procedure was the same as described above but the loading error message was replaced by an error message, stating that a system error occurred. Then, participants were redirected to a page where they were informed that the second part is completed and that they may start the third part when ready.

Please note: We wanted to assess the intention to stay on a website for each participant for both appealing and non-appealing websites. Therefore, the implementation of the error message was an effort to prevent awareness about the research objective (first impression) within participants.

Results

The McNemar's test was used for examining differences on the dichotomous dependent variable. The test allows only one independent variable, thus the analysis was conducted for the two modes of use separately.

Analysis of goal mode. Within goal mode 41 participants (68.3%) intended to stay on the website when the website was appealing, whereas 19 participants (31.7%) intended to leave the website albeit its appealing design. Vice versa, the exactly same amount of participants (68.3%) indicated to leave the website when confronted with a non-appealing design and 31.7% indicated to stay, respectively. 50% of the participants behaved just according to the alternative hypothesis, meaning, they intended to stay on the website when coming upon an appealing design and to leave in case it was non-appealing. In the contrary, 13.3% intended to stay in the event of a non-appealing website and to leave when it was appealing.

A McNemar's test (McNemar, 1947) with continuity correction (Edwards, 1948) was run to determine if there was a difference in the proportion of the intention to stay on appealing versus non-appealing designs. The difference was statistically significant, $\chi^2(1) = 11.60$, $p = .001$ at an alpha level of .05.

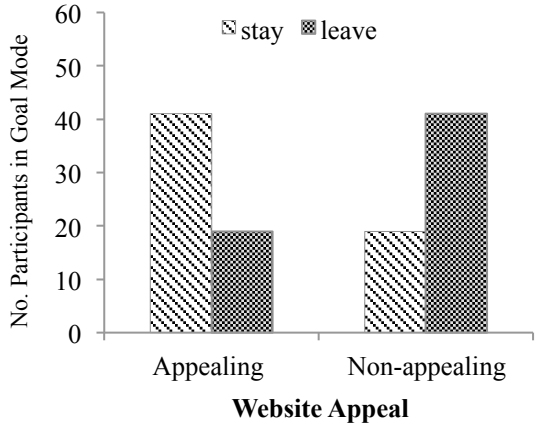


Figure 4. Number of participants staying on and leaving by website aesthetics for goal mode.

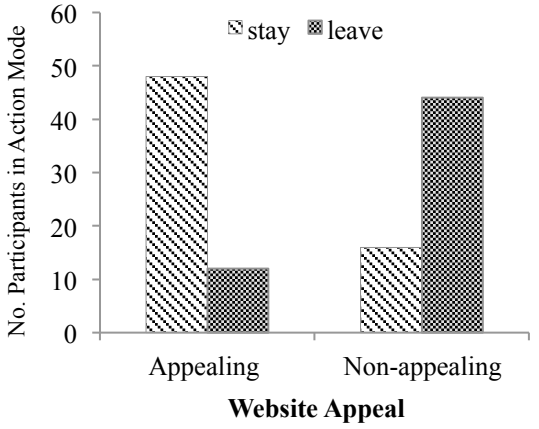


Figure 5. Number of participants staying on and leaving by website aesthetics for action mode.

Analysis of action mode. In action mode the intention to stay on appealing websites was manifested by 48 participants (80%), whereas 12 participants (20%) did not want to

stay. 44 participants (73.3%) indicated the intention to abandon non-appealing websites, yet 16 participants (26.7%) remained on non-appealing versions. 61.7% of the participants behaved according the alternative hypothesis, i.e. they intended to stay when the website was appealing and to leave when it was non-appealing. 8.3% intended to stay on a website with non-appealing design and to leave despite an appealing design.

A McNemar's test (McNemar, 1947) with continuity correction (Edwards, 1948) determined that the difference in the proportion of the intention to stay on appealing versus non-appealing websites was statistically significant, $\chi^2(1) = 22.88$, $p = .000$ at an alpha level of .05.

Discussion

The results of the second experiment are in line with H_3 and provide a realistic insight on the first impression's significance in terms of behavior it triggers.

In relation to the reported impact of first impressions on subsequent decisions (experiment 1), these findings largely confirm that effect, yet the subsequent behavior was operationalized differently. In both modes of use, the major part of participants intended to remain on websites following a positive first impression. In contrast, an antecedent negative first impression caused mainly website abandonment. The findings presage that positive first impressions loom slightly larger in a setting without explicit goals (i.e., action mode). However, due to the McNemar's test properties (allows only one independent variable) this conjecture could not be substantiated statistically.

As in experiment 1, content and usability are believed to be barely accessible within two seconds of exposure (cf. Robins & Holmes, 2008). Thus, we suggest that the positive effect of a favorable first impression on the intention to remain on websites is again mainly due to a successful manipulation of the website's aesthetics.

The first two experiments show that individuals make fairly consistent decisions following both positive and negative first impressions. These findings shed light on the potential powerfulness of first impressions in regard to website usage behavior, but yet we should not leap to conclusions as one major pitfall comes along that constrains the meaningfulness of the results. In both experiments, the assessed behavior (i.e., the willingness to view websites and the intention to stay on websites, respectively) came into being by forcing participants to act after a brief exposure. However, this shortcoming can be justified as short exposure times are standard in the context of measuring first impressions (e.g., Lindgaard et al., 2006; Tuch et al., 2012b). In experiment 3 we will address whether the absence of external time pressure, in terms of forcing participants to call a decision, the first impression proves equally powerful.

Further implications of experiment 2 will be debated in the general discussion.

Experiment 3

The third part of this study aimed to explore how the first impression affects participants' website usage behavior when acting self-paced. It focus upon the general dwell time and on different time intervals until leaving a website, both in dependence of the first impression. This experiment goes once again a step further in terms of relation to reality as it contains a search result page with links to different websites. But we omitted the usual brief descriptions of the contents (i.e., snippets) below the links, because recent research indicates that those snippets may influence users' behavior (Clarke, Agichtein, Dumais, & White, 2007; Marcos, Gavin, & Arapakis, 2015).

Method

Design. The same experimental variables as in experiment 1 and 2 were used. The

dependent variable was dwell time (i.e., the time spent on websites until leaving).

Participants. The same participants as in experiment 1 and 2 were used.

Measures. Dwell time was operationalized as the time participants spend on websites until leaving the pages. The total time was restricted to 60 seconds as it was deemed to be sufficient time in order to quantify the first impression's effect on website usage. Time was tracked the moment participants arrived from the instruction page to the search result page.

Stimuli. Three appealing and three non-appealing screenshots of information websites were used. All stimuli were provided with different contents on the same topic. After 60 participants participated in this study, the contents of the non-appealing websites were changed with the contents of the appealing websites.

Procedure. The third experiment took place immediately after the second experiment. Participants were instructed that they were about to see a search result page containing six links labeled as *Website 1, Website 2,* etc. with different websites on the topic of microwaves' effect on vitamins behind it. Participants in action mode were further told '*to explore these websites self-paced.'* The further instruction for goal mode was: '*to look for the answer whether microwaves destroy food's vitamins.'* Additionally, all participants were informed that they would be redirected automatically after some time and, presumably, the time might not suffice to read through all websites. Once the participants continued, they could click on the search result links and when being on a website, they could go back to the search results again to switch websites. In order to prevent sequence effects, the websites behind the links were randomly arranged for every participant.

After 60 seconds, participants were redirected to another page where they were asked to provide some demographical information and to indicate whether they had the feeling of being imposed with a certain task during the study or not. Finally, participants were thanked and received their compensation.

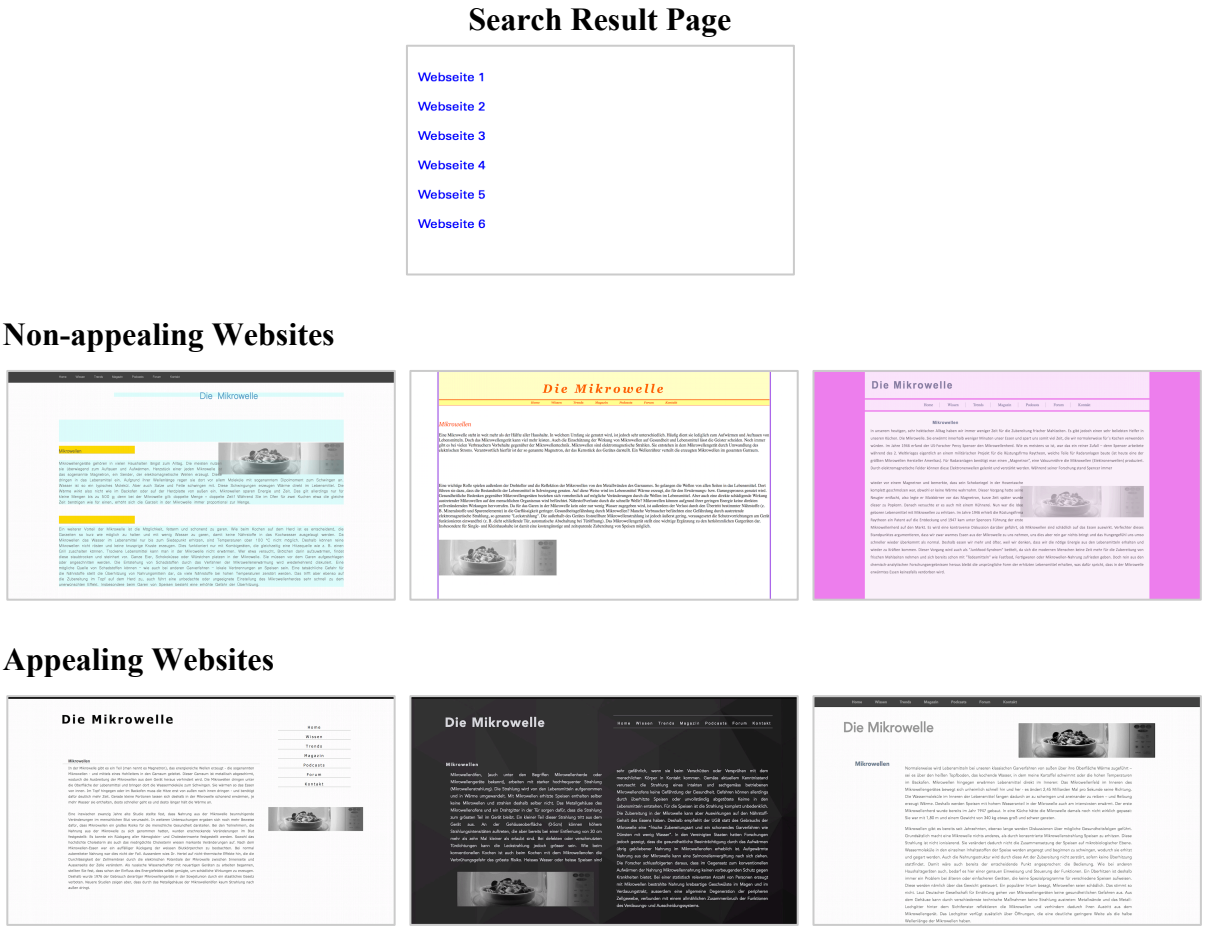


Figure 6. The first row shows the starting point (search result page). By clicking on a link each participants arrived randomly either on a non-appealing website (second row) or on an appealing website (third row).

Data preparation and statistical test selection. Due to erroneous data tracking, four participants (3.3%) were excluded from this experiment. The remaining data points were aggregated across the three appealing and three non-appealing websites, respectively, resulting in one appealing and one non-appealing value per participant. This led to the exclusion of 41 participants (about 35%) as not all had data points on both appealing and non-appealing websites. Thereof, 30 participants remained on the same website during the

entire time, which was equally distributed on appealing and non-appealing websites. The final sample consisted of $N = 75$ (goal mode = 33; action mode = 42).

We refrained from using imputation methods because on condition of sizeable missing data, using listwise deletion is the preferable method (Cheema, 2014). In addition, the mean difference of dwell time between the aggregated appealing and aggregated non-appealing websites was comparable with the whole data set.

In a first step, a mixed two-way ANOVA with repeated measures in the website aesthetics variable was conducted, in order to assess the general effect of first impressions on dwell time, meaning, the total time on either appealing or non-appealing websites.

Secondly, the life-table method was used in order to gain insights in greater detail on the time-dependent course of the first impression's behavioral influence. Life-tables are part of the survival analysis, which is a technique for observing temporal changes to an event using different time intervals. The procedure is classically applied within clinical or medical assessments, investigating the time to an event (e.g., onset of disease until death) (Luke & Homan, 1998). For analyzing the survival rate of websites, we simply replaced 'death' with 'website abandonment'. An alpha level of $\alpha = .05$ was used for all statistical tests.

Results

Mixed ANOVA. The data undergoing two-way mixed ANOVA violated the assumption of homogeneity of covariance as assessed by Box's M test. This is associated with an ordinary shortcoming of task time data because it tends to be positively skewed (Sauro & Lewis, 2012). Anyhow, ANOVA is considered to be a sufficiently robust test procedure when sample size are equal (Field, 2009) and for that, log transformation is not an action deemed necessary (Sauro & Lewis, 2012).

Effect of website appeal and mode of use on dwell time. There was no significant interaction for website aesthetics and mode of use on dwell time $F(1, 73) = .32$, $p = .571$. The main effect of website aesthetics showed a statistically significant difference in dwell time between positive first impressions (i.e., appealing websites) and negative first impressions (i.e., non-appealing websites) $F(1, 73) = 18.32$, $p = .001$, partial $\eta^2 = .201$, showing that participants spend more time until leaving subsequent to positive first impressions than after negative first impressions. There was also a statistically significant main effect of mode of use $F(1, 73) = 23.22$, $p < .001$, partial $\eta^2 = .241$, which indicates that participants in action mode abandon websites more quickly. The descriptive measures are depicted in Table 2 (for comparison of descriptive data including all participants see Table A3).

Table 2

Mean (and Standard Deviation), Median and 95% CI for Dependent Variables by Mode of Use in Seconds

	Mode of Use	Mean (SD)	Median	95% CI		N
				Lower	Upper	
Non-appealing	Goal	21.76 (14.32)	18.50	17.3	26.2	33
	Action	17.29 (11.76)	14.50	13.3	21.3	42
	Total	19.25 (13.05)	16.25	16.5	22.5	75
Appealing	Goal	32.45 (13.68)	35.45	28.2	36.7	33
	Action	31.26 (11.18)	33.33	27.5	35.1	42
	Total	31.79 (12.27)	34.58	29.0	34.7	75

Effect of mode of use on dwell time on non-appealing websites. An independent-sample t-test was conducted to compare dwell time after negative first impressions between goal mode and action mode. There was no statistically significant effect for dwell time between goal mode ($M = 21.76$ seconds, $SD = 14.32$) and action mode ($M = 17.29$ seconds, $SD = 11.76$); $t(73) = 1.49$, $p = .142$.

Survival Analysis of Websites. As all participants who were visiting only one website were excluded from this analysis, this report provides a complete period life table, that means, all websites got abandoned at some point. The term 'survival' denote that the website remains in force (i.e., users are still on the website). To the contrary, website failure constitutes the point of leaving a website (i.e., abandonment).

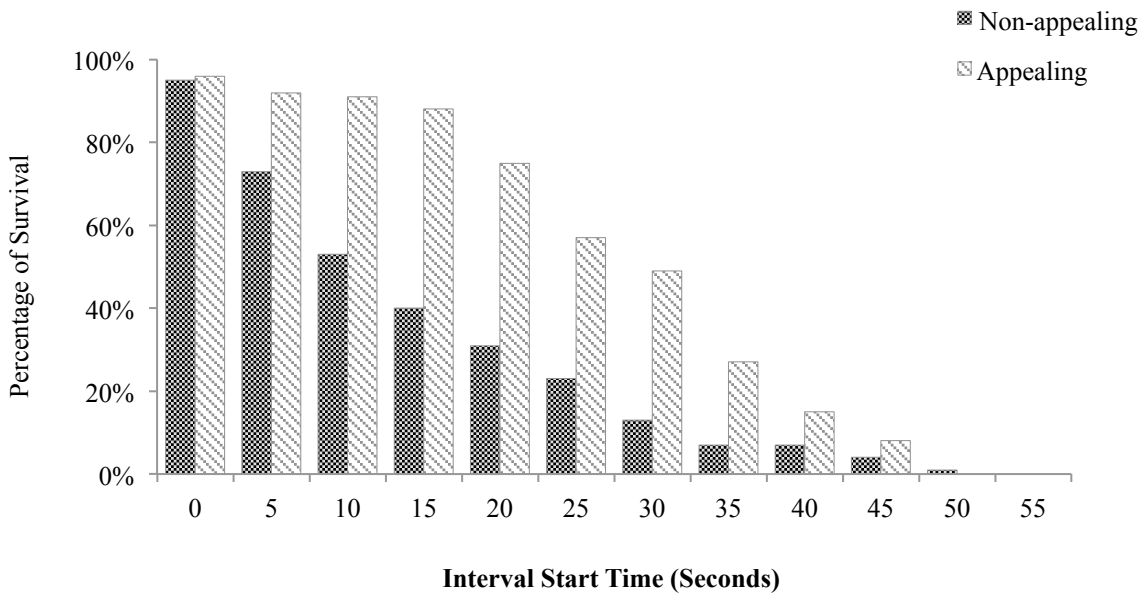


Figure 7. Any bars measure up the percentage that participants remain on the respective website category (website aesthetics) past that time interval.

A large percentage (60%) of participants left websites until the twentieth second following a negative first impression. In contrast, subsequent to a positive first impression, websites fail to a considerably lesser extent for the same time frame (12%), meaning that participants remained on these websites beyond 20 seconds. In other words, subsequent to negative first impressions, websites have only a 40% chance to survive until the twentieth second. In comparison, the chance for websites to outlast that boundary is with 88% after positive first impressions. The ratio of website failure for positive and negative first impressions is somewhat smaller until the tenth second; websites were left by 27% of

participants following a negative first impression, whereas only 8% of the participants left following a positive first impression. Remarkably, from 39 participants landing first on a non-appealing website and thus, experiencing a negative first impression, only four abandoned the website until the fifth second. From 36 participants landing first on an appealing website, only two abandoned the website until the fifth second. The overall comparison of the survival rate was different between positive and negative first impressions, suggesting faster website abandonment for negative first impressions (Wilcoxon Gehan statistic = 30.32, $p < .001$). For an overview see Table A4.

Regarding the mode of use, only 9% of participants in goal and 7% in action mode abandoned a website following a positive first impression until the tenth second. The ratio for negative first impression was 24% in goal to 29% in action mode for the same time frame. Following a positive first impression, nothing much changed until the twentieth second; 15% of participants in goal 10% in action mode abandoned the website. After a negative first impression, 55% of the participants in goal and 64% in action mode left websites until the twentieth second. For more details see Table A5.

It must be noted that from the initial sample ($N = 116$), 30 participants remained for the entire 60 seconds on the same website (15 on appealing and 15 on non-appealing websites).

Discussion

According to our hypothesis (H_4), negative first impressions led to faster website leaving behavior as compared to positive first impressions. Corroborating H_5, participants in action mode abandoned websites faster than those in goal mode.

Most notably, additional analyses revealed the first impression's influence within certain time intervals. These findings provide evidence that the first twenty seconds are

crucial for a website's success in terms of convincing users to stay on the website. Within the first twenty-seconds, individuals experiencing negative first impressions abandoned websites five times more often than after positive first impressions (60% versus 12%). A little less pronounced and yet still interesting, three times as many abandoned websites subsequent to negative first impressions as opposed to positive first impressions until the tenth second (27% versus 8%). The reason that eventually all participants, even in goal mode, abandoned the websites within 60 seconds, is most likely down to the fact that the contents did not provide the exact answer to the posed question. This was done on purpose since we were interested in how long it takes until participants abandon a website. In addition, this counteracted the probability that participants remained on the websites due to its content and not due to its level of aesthetics.

The third experiment differs from the previous two experiments on two basic aspects: Content und usability gain more relevance with more available time (see Thielsch et al., 2013). It is conceivable that content becomes more important since participants actually had the chance to look at it more thoroughly. Yet, we controlled a possible confounding effect by changing the content between all appealing and non-appealing websites for 50% of the participants. Concerning usability, we believe it barely affected participants' decisions whether to use a page or not, since the interaction was constrained to scrolling the page and it was the same for all websites. On these grounds, we argue that the discovered effects are reducible to the manipulation of aesthetics.

The implications of this experiment will be - along with the implications of experiment 1 and 2 - expounded in the general discussion hereafter.

General Discussion

The unsupported notion of the first impression's influence on the subsequent behavior in terms of website usage is prevalent in existing research literature (e.g., Lindgaard et al., 2011; Tuch et al., 2012b; van Schaik & Ling, 2009). Therefore, the study objective was to deliver empirical evidence of first impressions' post-incident impact on different website usage variables (i.e., willingness to view; intention to stay; time until leaving). In this study, the level of aesthetics is manipulated in order to trigger either positive or negative first impressions. It was clearly demonstrated in a series of three experiments that individuals' decisions whether using a website or not, differ in dependence of the type of first impression they experienced. These findings provide a valuable insight on the first impression's potential; however, regarding experiment 1 and 2, a one-on-one transfer of the assessed behavior to reality may be challenged due to the time-limited exposure. Experiment 3 accounts for this shortcoming by allowing participants to explore the websites self-paced, thus giving evidence of the first impression's sphere of action. The results came off unambiguously, showing a) that negative first impressions cause substantially lesser dwell time and b) that within the first 20 seconds, negative first impressions lead to website abandonment five times more often compared to positive first impressions.

First Impression - Scrutinizing its Effect

As introduced above, plenty of research demonstrated the rapidity of first impression formation (e.g., Lindgaard et al., 2006; Tractinsky et al., 2006; Tuch et al., 2012b), yet does it affect the subsequent behavior in the same pace? Despite Lindgaard et al.'s (2006) argument to investigate first impressions' consequences regarding its subsequent behavior, many authors took it for granted that the first impression determines website success in terms of whether the website is used or not. Attending this issue, this work reveals that participants behave quite homogeneous following either positive or negative first

impressions and, most notably, in experiment 1 and 2 it became apparent that the first impression matters - positive first impressions evoked website usage, negative first impressions did only to a much lesser extent. However, normally users are not coerced to make decisions within two seconds. Taking up this point, experiment 3 shows that first impressions are not equally fast in determining the subsequent behavior when acting self-paced. Neither positive nor negative first impressions did cause website abandonment at the outset. Additionally, it is important to keep in mind that from the initial sample ($N = 116$), 30 participants remained for the entire 60 seconds on the same website.

According to Liu et al. (2010), users skim through websites after landing in order to weigh the benefits the page may provide. In case a website is approved, individuals search for the information needed. Based on their comprehensive calculations, the first ten seconds are the most critical for websites in terms of being used or dismissed. In case of negative first impressions, our data points into similar direction, although the critical phase expands up to the first 20 seconds. Regarding the aftereffect of positive first impressions, increasing but yet consistent website abandonment was observed *from* the twentieth second. The differing critical time phases may be due to the non-experimental approach of Liu et al. (2010). In an experimental setting a Hawthorne effect may occur, depicting the possible influence on participants' behavior due to their awareness of being studied (McCambridge, Witton, & Elbourne, 2014). Thus, the prolonged critical phases could be an artifact from our study. In sum, it is evident that the first impression does not cause action in terms of website abandonment within the very first seconds but rather takes a while before affecting individuals' behavior.

This discovery entails the question about the first impression's time frame, whose clarification is beyond the scope of this study. However, in this study we are not interested in the *immediate* but rather the ensuing *deliberate* first impression, thus the crucial ten-second

line emphasized by Liu et al. (2010) appears a reasonable time frame to narrow down the first impression's behavioral effect. The high correlations in aesthetics ratings between 500 milliseconds and ten seconds, shown by Tractinsky et al. (2006), serve as further support for this time limit. Nevertheless, the greatest website abandonment rate following a negative first impression occurs from the fifth until the twentieth second, making the attribution to the first impression questionable. Arguable, the found effect attributes rather to the construct of aesthetics than its interrelated first impression. Eventually, it might not matter whether the first impression or aesthetics carry of the laurel for triggering website usage or abandonment. Without an appealing design in the first place, positive first impression would not come to existence. The same holds true for non-appealing designs and negative first impressions. Thus, in view of the following website usage behavior, the distinction between aesthetics and first impression appears to overlap highly.

Interestingly, the strong effect of aesthetics is in conflict with the findings from Thielsch et al. (2013). Among others, they examined the influence of content on the overall impression, applying websites of electricity suppliers. First, their participants were instructed to explore the websites. Next, they were asked to retrieve information. They found that 'content was obviously the absolutely most important stimulus for returning to or recommending a website' (p. 11). It can be assumed that individuals would not return or recommend websites, which they previously abandoned after a short time and thus, we may draw a comparison to our outcomes. As stated above, we counterbalanced the content in order to control its effect and moreover, in order to offer an incentive for the participants, we attempted to provide topics that are interesting by its own (e.g., why glue does not stick to the inside of the bottle). Our results suggest that content did not contribute substantially to the observed behavior, thus, website usage or abandonment.

Positive first impressions appear to lead to greater perseverance in individuals when scanning a website for potential benefits corresponding to their goal, regardless of whether it is explicit or not. Vice versa, subsequent to negative first impressions, individuals cease trying to continue the search for information more quickly. This assumption complies with the preliminary findings of Nakarada-Kordic & Lobb (2005), suggesting that aesthetics has a positive effect on search perseverance. Still, it seems that participants tend to give every website a chance to convince them, with the difference that negative first impressions seem hardly repairable. Considering Liu et al.'s (2010) further revelation that less-entertaining websites (e.g., information websites) were more prone to be screened by users than 'fun' websites, the behavioral effect of first impressions might be smaller across different websites genres.

The Effect of Context on the First Impression

Mode of use was included in this study in order examine eventual differences in website usage behavior between participants who were asked to retrieve a specific information (i.e., goal mode) and participants who were instructed to explore the websites ad libitum (i.e., action mode). The instructions of the usage modes were realized based on van Schaik & Ling (2009).

The study yields contradicting findings concerning the mode of use's influence on behavioral actions triggered by first impressions. While the non-exisitng effect of experiment 1 may signify either that the manipulation of the usage mode did not work or that within the very first seconds the mode of use does not come into effect, the relatively strong effect of usage mode in experiment 3 suggest high importance when approaching websites self-paced.

The reason for this difference may be sought in the slightly differing approach of the mode of use's manipulation. In experiment 1 we asked participants to imagine a particular

scenario (i.e., having a sore knee and being unsure whether a plaster or air better supports the wound's healing). Hence, participants may have had an implicit urge to seek after an answer to the scenario. Thus, even participants in action mode would have had a goal, resulting in the equal usage decisions. In experiment 3 no such scenario was imposed. However, in reference to the findings of the website survival analysis in experiment 3, the first ten seconds disclosed no differences between participants in goal and action mode. Ergo, it would rather seem that the mode of use takes full effect only after a certain period of time. From then on, non-appealing websites sustain faster abandonment in action mode than in goal mode. Appealing websites withstand abandonment within both modes until the twentieth second easily. This implies that a negative first impression carries more weight in absence of explicit goals. This observation is in line with previous research on the mode of use (e.g., Hassenzahl et al. 2002). Accordingly, individuals attach more value to aesthetics in action mode than in goal mode. Conversely, individuals with an explicit goal are expected to rely on both hedonic (e.g., aesthetics) and pragmatic (i.e., usability) qualities. But because we deem usability as a matter of no importance on the applied websites, hedonic attributes may have been the chief reference point for participants in both usage modes. In the light of the longer dwell time on non-appealing websites within goal mode, it appears that participants endure unpleasant aesthetics in the presence of an explicit goal more patiently, whereas participants in action mode are more strongly linked to the website's aesthetics. This estimate goes along with Hassenzahl's (2003) descriptions: goal-oriented individuals approach tasks seriously and strive for effectiveness and efficiency. Hence, their attitude would not tolerate to get off course merely due to a lack of aesthetics. In absence of any goals, individuals act spontaneously and they need stimulation as for instance in form of aesthetics, making aesthetics important throughout the interaction with a website.

Nevertheless, according to our data the mode of use starts to affect usage behavior only after some seconds. A reasoning for this effect may be derived from the model of aesthetic perception of art objects, provided by Leder et al. (2004). Current research in HCI uses this model as reference for time-sensitive processing of website aesthetics (e.g., Thielsch et al., 2013; Tuch et al., 2012b). Whereas the early stages of the model depict spontaneous and unconscious aesthetic processing of stimuli, higher cognitive aspects emerge increasingly during the temporal progress. The later stages include the formation of self-related-cognitive information that contains the association of the stimuli with the perceiver's situation, emotional state and interest in the perceived object. By drawing a parallel between mode of use, which represents a mental state of users (Hassenzahl, 2003), and the perceiver's situation and thus its cognitive state, we may give an explanation about the delayed onset of the usage mode within website usage.

Limitations and Further Research

For the interpretation of the results some limitations need to be considered.

Some participants came across websites with the same design characteristics twice over the course of the three experiments, giving rise to the mere exposure effect (Zajonc, 1968). This implies that in experiment 2 and 3 participants' usage decisions may have been intensified because of repeated viewing. However, all experiments used different topics, differed in text length and images used on the websites. Future research on that subject would profit by applying a larger range of stimuli.

In consideration of the manipulation check (implemented at the end of the entire study), only one out of four participants in action mode indicated to be task-free. In regard to goal mode, all indicated the correct mindset. We can think of three reasons for this outcome: (1) it is imaginable that due to the experimental setting participants felt goal-driven from the start of the experiment and even the invitation to explore the websites according to their own

liking could not change that mindset; (2) information websites involve a goal per se since one would normally not expect users to explore such pages without a specific goal (i.e., find an answer on a topic); (3) the manipulation failed. However, we adopted this approach from van Schaik & Ling (2009) and since the manipulation of mode of use yielded a decent effect in experiment 3, showing that mode of use affects participants only after some time, the null-effect in experiment 1 is not necessarily due to failed manipulation. For further research it might be of interest to investigate the mode of use by applying other website genres in which the first impression could be of higher importance (e.g., e-commerce).

Websites with a strongly non-appealing character as we used in our study may be encountered rarely on the web. Although our appealing websites have some room for improvement, the stimuli material was different regarding their aesthetics. For future research it could be useful to manipulate a greater spectrum of aesthetics, in order to determine the required aesthetics level with regard to convince users to remain on websites. Moreover, aesthetics has been established as multidimensional construct (Lavie & Tractinsky, 2004; Moshagen & Thielsch, 2010), thus, it might be that the manipulation of different dimensions of aesthetics compensate or even reinforce the effects found in this study.

Conclusion

Many researchers stressed the influence of first impressions on the subsequent behavior without substance - it turned out that their uncritical acceptance was right after all. The impact of first impressions on individuals' usage behavior is clearly evident from our results. Websites are more likely to be used by participants following positive first impressions compared to negative first impressions. The first impression finds complete expression at a later date as it was expected, though. The same holds true for the mode of

use, since it started to affect participants' usage decisions differently only after some seconds. We conclude that preventing negative first impressions must be the desirable aim for webmasters. In other words, when providing an extraordinary chocolate cake recipe, better wrap it up on an aesthetical website.

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Appendix

Table A1

Experiment 1. Number of Retained Websites by Website Aesthetics and by Mode of Use

	Mode of Use	Mean	SD	N
Non-appealing	Goal	1.53	1.10	60
	Action	1.17	1.08	60
	Total	1.35	1.09	120
Appealing	Goal	2.62	0.93	60
	Action	2.79	0.96	60
	Total	2.70	0.95	120

Table A2

Experiment 2. Number of Participants Either Staying on or Leaving Websites by Website Aesthetics and by Mode of Use.

		Non-appealing					
		Leave		Stay		Total	
		Goal	Action	Goal	Action	Goal	Action
Appealing	Leave	11	7	8	5	19	12
	Stay	30	37	11	11	41	48
Total		41	44	19	16	60	60

Table A3

Experiment 3. Mean, Standard Deviation, Median and 95% CI for Dependent Variables by Mode of Use in Seconds

	Mode of Use	Mean	SD	N
Non-appealing	Goal	32.11	20.03	47
	Action	23.40	17.83	50
	Total	27.62	19.33	97
Appealing	Goal	38.41	15.79	44
	Action	35.10	13.75	50
	Total	36.65	14.75	94

Table A4

Life Table by Website Aesthetics.

Website Aesthetics	Interval Start Time	Number Entering Interval	Number of Terminal Events	Proportion Terminating	Cumulative Proportion Surviving at End of Interval
Non-appeal.	0	75	4	0.05	0.95
	5	71	16	0.23	0.73
	10	55	15	0.27	0.53
	15	40	10	0.25	0.40
	20	30	7	0.23	0.31
	25	23	6	0.26	0.23
	30	17	7	0.41	0.13
	35	10	5	0.50	0.07
	40	5	0	0.00	0.07
	45	5	2	0.40	0.04
	50	3	2	0.67	0.01
	55	1	1	1.00	0.00
Appealing	0	75	3	0.04	0.96
	5	72	3	0.04	0.92
	10	69	1	0.01	0.91
	15	68	2	0.03	0.88
	20	66	10	0.15	0.75
	25	56	13	0.23	0.57
	30	43	6	0.14	0.49
	35	37	17	0.46	0.27
	40	20	9	0.45	0.15
	45	11	5	0.45	0.08
	50	6.0	6	1.00	0.00

Table A5

Life Table by Website Aesthetics and by Mode of Use.

		Website Aesthetics	Interval Start Time	Number Entering Interval	Number of Terminal Events	Proportion Terminating	Cumulative Proportion Surviving at End of Interval
Mode	Goal	Non-appealing	0	33	2	0.06	0.94
			5	31	6	0.19	0.76
			10	25	5	0.20	0.61
			15	20	5	0.25	0.45
			20	15	3	0.20	0.36
			25	12	1	0.08	0.33
			30	11	5	0.45	0.18
			35	6	3	0.50	0.09
			40	3	0	0.00	0.09
			45	3	1	0.33	0.06
			50	2	1	0.50	0.03
			55	1	1	1.00	0.00
		Appealing	0	33	2	0.06	0.94
			5	31	1	0.03	0.91
			10	30	1	0.03	0.88
			15	29	1	0.03	0.85
			20	28	3	0.11	0.76
			25	25	5	0.20	0.61
			30	20	3	0.15	0.52
			35	17	6	0.35	0.33
			40	11	5	0.45	0.18
			45	6	2	0.33	0.12
			50	4	4	1.00	0.00
			55	-	-	-	-
	Action	Non-appealing	0	42	2	0.05	0.95
			5	40	10	0.25	0.71
			10	30	10	0.33	0.48
			15	20	5	0.25	0.36
			20	15	4	0.27	0.26
			25	11	5	0.45	0.14
			30	6	2	0.33	0.10
			35	4	2	0.50	0.05
			40	2	0	0.00	0.05
			45	2	1	0.50	0.02
			50	1	1	1.00	0.00
		Appealing	0	42	1	0.02	0.98
			5	41	2	0.05	0.93
			10	39	0	0.00	0.93
			15	39	1	0.03	0.90
			20	38	7	0.18	0.74
			25	31	8	0.26	0.55
			30	23	3	0.13	0.48
			35	20	11	0.55	0.21
			40	9	4	0.44	0.12
			45	5	3	0.60	0.05
			50	2.0	2	1.00	0.00

Non-Plagiarism Statement

I hereby declare that this thesis is my own work and that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all materials and results that are not original to this work.

Antonin Troendle
Basel, 30.03.2017