Visual Representations of Gender and Implications for Website Trust

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ABSTRACT
This paper examines the relationship between visual representation of gender in website design, user gender, and perceptions of trust of websites. The study found no statistically significant difference of trust ratings for sites showing male representation images versus female representation images, neither in general nor when compared with user gender. There was a difference was found between different regions and the trust ratings given to websites of the same gender group. Ultimately, more research is needed to explore both the role of gender and the role of representation in establishing trust.

Author Keywords
Trust, gender, visual representation, websites.

INTRODUCTION
Our perceptions of trust guide our online activity. We make decisions about whether we should trust websites based on a number of factors—reputation, web design, security credentials, past experiences—and we then use these perceptions to inform our decision making. We might immediately abandon a site that seems "sketchy," or we might willingly hand over credit card information to a site that seems credible. Web designers generally want to create as much trust as possible, because trust converts visitors to customers [11]. Media such as images should have some benefit in order to earn the valuable space they take up on a page. Research has shown that images on webpages can influence notions of trust [4, 8, 10], but what images should designers include in order to increase user feelings of trust?

This paper seeks to explore how images of either males or females on webpages can influence trust, with the following hypotheses:

H_0: The gender represented on a website will have no effect on its perceived trustworthiness.

H_1: The gender represented on a website will have an effect on its perceived trustworthiness.

It also will examine the role that a user's own gender influences their trust of the male represented web pages compared to the female represented webpages, with the following hypotheses:

H_0: An individual's gender has no effect on whether they judge sites with male representation or female representation more trustworthy.

H_1: An individual's gender has an effect on whether they judge sites with male representation or female representation more trustworthy.

RELATED WORK
Much work exists examining trust in web design, particularly in the domains healthcare and consumer websites [5, 13]. The very definition of trust has been the subject of debate within the HCI community. Corritore et al. define online trust as "an attitude of confident expectation in an online situation or risk that one's vulnerabilities will not be exploited," which can be used to make information processing and decision making less complex [1, 10].

Research has shown that the use of human imagery can increase trust in users. This concept is rooted in the idea that imagery is one way of recreating social connections that are lost when interacting with technology, and by adding psychological social elements into an experience, we can effectively "draw on interpersonal trust cues to build affective trust [4, 8]" This concept, called "virtual re-embedding" was developed by Riegelsberger et al. [8], and the claim that it can increase trust was supported by work by Steinbrück et al. [10]. These social connections can come from any number of different media, but imagery has generally been a focus of much of the research on the topic, and has been shown to be effective [8, 10].

Research has also examined the relationship between gender and website trust. Several studies have shown female representations are perceived as being more trustworthy than males [8]. This holds across different domains such as instant messaging & video, photographs, and voice [6, 8, 12]. However, Dianne Cyr and Carole Bonanni [3] found that women themselves were less trusting of websites in area of e-business [8]. In a study examining the relationship the role of social connections through virtual re-embedding on user loyalty, Dianne Cyr et al. [4] warn against generalizing the effect of social presence across genders, since they found differences how it influenced males vs. females. This is supported by other research which suggests that there are gender differences in website design preferences [9].

Methodology for this research also drew on past work, specifically from Katharina Reinecke and Krzysztof Gajos' work on visual website design preferences around the world [7]. They gathered a large collection of websites and then had participants from different ages, genders, and cultures/nationalities rate these sites quickly (500ms) on visual appeal. They were then able to see how different groups' preferences varied. This technique inspired the research methods used in this study to test the impact of visual gender representation on trust ratings.

STUDY METHOD

Participants

The audience for this study was adult (18 years and older) internet users in the United States. In all, there were 100 participants, 51 who identified as male, and 49 as female. The sample size of 100 was determined by the maximum number of participants that could be recorded with the version of the survey tool used. Participants were recruited using convenience sampling from sources including Facebook (23 participants), Amazon's Mechanical Turk (59 participants),[1] and Survey Tandem.com (18 participants)[2]. The first 90 surveys were open to all US internet users 18 years and older. After 90 surveys, the responses were limited to female respondents in order to achieve a more balanced number between genders. The median age was between 25 and 34, and the vast majority (72%) were white, followed by Asian (10%), and black (8%). Most participants were from the western US states (mode: Washington, 26 participants). Data was collected over the course of five days.

Measurement

In order to measure the perceptions of trust, participants rated 30 websites (15 sites for the female representation website group and 15 for the male representation website group) on a 1-7 Likert-like scale, with (1) being Very Untrustworthy and (7) being Very Trustworthy. Participants were to define for themselves what was meant by trustworthy. Each of the 15 scores would be summed together to create a 'trust score' for each of the website groups. This continuous trust score could have possible values from 30 to 210. Data about the participant's location (collected via IP address), gender (male, female, or prefer not to say), age (18-24, 25-34, 35-44, 45-54, 55-64, 65 and older), and ethnicity/race (taken from US Census, not limited to one response: white, black/African American, American Indian/Alaska Native, Asian, Pacific Islander/Native Hawaiian, other) [13].

Creating the Website Groups

It was important that the two groups of websites were roughly equivalent, so differences between the trust scores could be attributed to the visual gender representations and not some other difference. First, images of home screens from website templates were collected from six industries: education, law, real estate, business, tech, and medicine. Website templates were chosen as opposed to real websites to ensure that participants had no *a priori* familiarity with any of the organizations/companies because that could impact their trust of the site. Additionally, the number of older individuals and people of color was kept roughly equivalent. Initially, there were a total of 56 sites, 28 in each gender group. These sites were rated by six individuals (3 female, 3 male) on the same 1-7 trustworthiness scale. Their responses were recorded, and the groups were pared down based on which collection of sites minimized variance of responses and kept both the overall median and individual industry medians as similar for both the male and female groups. Both groups had a median score of 5, and the medians of each industry were reasonably close (Business (3 sites): Mdn_{Female}=5, Mdn_{Male}=5, Education (2 sites): Mdn_{Female}=5.5, Mdn_{Male}=5, Law (3 sites)-: Mdn_{Female}=4.5, Mdn_{Male}=5, Medicine (3 sites): Mdn_{Female}=4.5, Mdn_{Male}=4, Real Estate (1 site): Mdn_{Female}=5, Mdn_{Male}=5.75, Tech (3 sites): Mdn_{Female}=5, Mdn_{Male}=5).

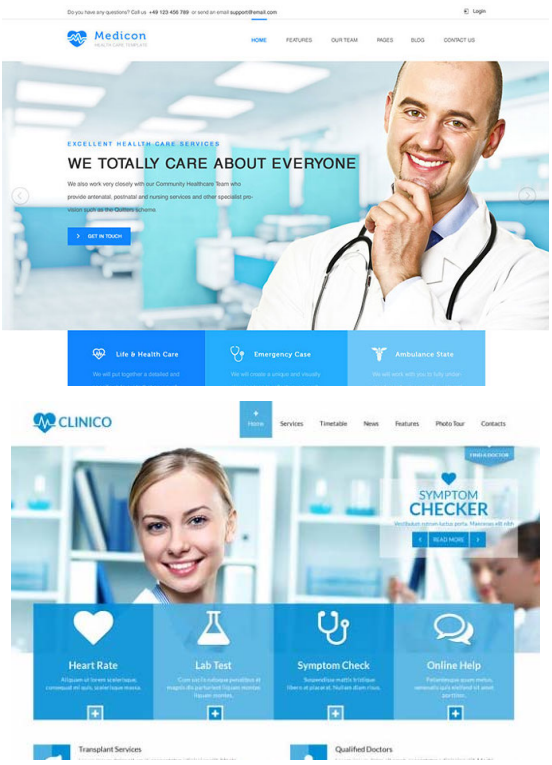

Figure 1. Examples of included male/female website designs included in study from the medical domain

Survey Design & Procedure

The survey was created using a Qualtrics survey tool, and was available on both mobile and desktop. The tool screened

[1] Done in 3 batches, first paying $0.60 (9 participants), second paying $0.50 (40 participants), and third paying $0.50 (10 participants, limited to female only).

[2] Survey Tandem is a site where users can post a survey and have others take it in exchange for taking others' surveys. The 'compensation' was in survey points awarded that users could apply to their own research.

participants based on their IP address to only allow those in the US to take the survey.

Upon starting the survey, the participants were provided with a short consent form. If they agreed to the study, they would then move on to demographic questions on age, gender, and race. Next, participants were told they would be shown 30 websites, and to rate them on how trustworthy they felt they were, trying to take no more than 5 seconds to decide on a rating. The survey was not timed, however, so this served as guideline more than a strict requirement. The 30 sites would then be displayed in a random order assigned by the survey tool. Images were all set to 500 pixels in width, which made the copy on the templates more challenging to read, encouraging quick judgements rather than lengthy contemplation. Participants would be exposed to both the group of sites containing male representation and female representation. The data from any participant who did not complete all 30 ratings was thrown out. Once they had completed the survey, a code was provided for Mechanical Turk participants to verify they tool the survey. For Survey Tandem, participation was validated by matching IP addresses provided by the site for those claiming to have taken the survey.

RESULTS

Exploring Gender and Trust

From initial exploratory data analysis, it appeared that the trust ratings did not vary greatly between genders of participants for the genders represented in the website groups. Male participants rated the female website group slightly higher on average than the male website group (M=69.98 SD=12.26, M=67.75 SD=11.14). Females also tended to rate the female website group higher than the male website group (M=71.10 SD 11.83, M=68.98 SD=10.89).

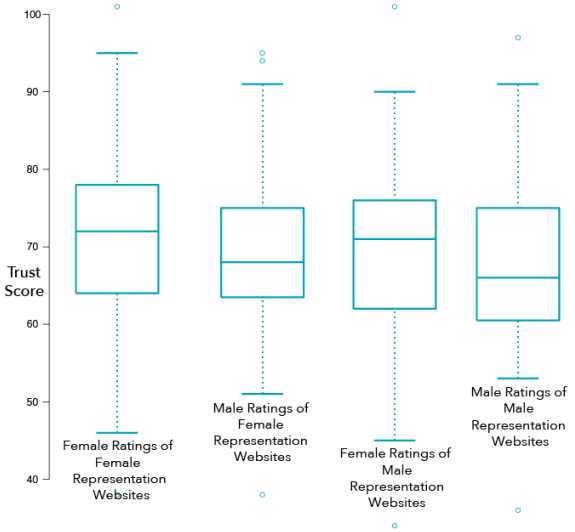

Figure 2. Trust rating of gender representation website group by gender of participant

To examine how user gender and gender representation might relate to ratings of website trust, a linear mixed model (LMM) was used for an analysis of variance (ANOVA) as it capable of handling two factors with two or more levels, repeated measures, fixed and random effects, and unbalanced data. The parametric LMM was used rather than a GLMM as visually the response of trust rating appeared normal. Shapiro-Wilk tests on both female and male website groups confirmed this, with no violation of normality for the response of trust rating (Male: W=0.99, n.s.; Female: W=0.99, n.s.). The fixed effects were gender of participant and gender represented in the website group. Subject was included as a random effect. This analysis showed no statistically significance at a α=.05 threshold. There was no significant main effect of gender of participant or gender represented in website group (F(1,98)=0.82, n.s., F=(1,98)=3.72, n.s.). The interaction between gender and gender representation was also insignificant (F(1,98)=0.03, n.s.).

Looking more generally at differences in trust ratings between the two gender representation website groups across all participants, the female representation group was generally more trusted than the male representation group (M=70.36 SD=12.01, M=68.36 SD=10.98).

A paired-samples t-test was conducted to see if there was any statistically significant difference between the genders represented in the website groups and their ratings of trust for all participants. First, Shapiro-Wilk tests were conducted to test for normalcy for both the male and female representation website groups, with both showing no violation of normalcy (Female: W=0.99, n.s.; Male: W=0.99, n.s.). Modelling the residuals also indicated normality. A Brown-Forsythe test showed no violation of homoscedasticity (F(1,198)=0.32, n.s). Having met the parametric assumptions, a paired-samples t-test was conducted. This test showed no statistically significant difference between the trust ratings of the two gender representation website groups (t(99)=1.94, n.s.).

Exploring Covariate Data Collection

The covariate data that was collected for age, location, and race was also looked at to see if it had an effect on trust ratings of the different gender representation website groups. For each factor, an LMM was fit and an ANOVA conducted to see if there was any significant main or interaction effects. Two of these omnibus tests showed statistical significance: the test for age and gender of website representation showed a significant main effect of gender of website representation on trust rating (F(1,95)=7.07, p<.05), and the test for location and gender of website representation showed a significant main effect of location on trust rating (F(3,96)=2.76, p<.05).

For each, pairwise comparisons were made. For the age test, comparisons were made to explore the main effect of gender representation group, looking at comparisons between male and female representation group within age (ex. 35-44 F and 35-44 M). Of these pairwise comparisons conducted, no

comparison received a p-value which met the threshold for significance when using a Holm-Bonferroni adjustment to account for multiple comparisons and prevent type-I errors (α=.05). For location, pairwise comparisons were made looking at location as a main effect on trust rating (keeping website group constant). After using a Holm-Bonferroni adjustment, comparisons for South and West showed significant differences in trust ratings for the both the female and male website groups (South: Female Group vs. West: Female Group (t=2.12, p<.05) and South: Male Group – West: Male Group (t=2.64, p<.05).

DISCUSSION

The data for this experiment showed that the gender represented in an image on a website did not have a significant effect on user trust of that website. Previous research has suggested that female-represented media is seen as more trustworthy, however, these results suggest that trusting the media viewed independently does not equate with trust of the site as a whole [8]. The data also showed that seeing one's own gender represented on a webpage did not have a significant effect on ratings of trust. Design implications arising from this study suggest designers look beyond gender when making decisions about the use of visual representations to build trust.

The analysis of our location covariate suggests that there is some statistically significant difference between where a person lives and how they judge the trustworthiness of websites featuring either male or female representation. Past work has shown differences exist between different cultures and perceptions of trust for website designs [2], which is also seen here as the west and the south in the United States have unique regional cultures.

FUTURE WORK

To more conclusively determine the role gender representation plays in influencing trust in web design, more research is needed. First, there were limitations on this study's experimental design due to limited resources. For example, with additional time wireframes could be designed explicitly for the purposes of research rather than using existing design template images. This would allow more control for other factors that might influence trust, such as website design patterns or the "fakeness" of stock photos. Standardizing the amount of time each site is viewed for, unfortunately not possible with the tools used for this study, would also help control differences stemming from how in depth the judgement of the site was.

Additional research could also work to better understand the role personally identifying with different media representations plays in determining trust. While this study examined gender, it is possible that other aspects of personal identity are more important for users in forming the social connection that supports feelings of trust. It is possible gender was too broad a designation, or not one that users base their identity around. More generally, future research should ask questions examining whether users trust sites where they see people 'like them' more than those they see as different. Research could examine characteristics such as race, age, or profession, as well as examine differences between candid versus stock images, or social media images versus company provided imagery, which might impact how much a user identified with an image. Research has shown that images have the capability of creating trust [10], the next step is determining *which* images accomplish this best, and for what audiences.

Finally, further research could expand the current understanding of the role culture plays on trust to examine cultural and regional differences within the United States. While these differences might not be as distinct as between international borders, the existence of the statistically significant differences between the US west and south is worth further exploration.

CONCLUSION

Trustworthiness is critical to the success of a website, particularly those that handle users' personal, health, or financial information. The choice of images on a site is important—they can support the formation of trust, do nothing to create trust with the user and therefore waste valuable site real estate, or even incite distrust in the user [8]. This study provides evidence that gender representation is not a critical factor in the minds of users in forming trust, and therefore designers might consider focusing on other representational aspects when making decisions on visuals for webpages.

ACKNOWLEDGMENTS

I'd like to thank all of the participants who took part in the survey, as well as Professor Jacob Wobbrock for his guidance on this project.

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