

Too Close for Comfort: A Study of the Effectiveness and Acceptability of Rich-Media Personalized Advertising

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ABSTRACT

Online display advertising is predicted to make \$29.53 billion this year. Advertisers believe targeted and personalized ads to be more effective, but many users are concerned about their privacy. We conducted a study where 30 participants completed a simulated holiday booking task; each page showing ads with different degrees of personalization. Participants fixated twice as long when ads contained their photo. Participants reported being more likely to notice ads with their photo, holiday destination, and name, but also increasing levels of discomfort with increasing personalization. We conclude that greater personalization in ad content may achieve higher levels of attention, but that the most personalized ads are also the least acceptable. The noticeability benefit in using someone's photo to make them look at an ad may be offset by the privacy cost. As more personal data becomes available to advertisers, it becomes important that these trade-offs are considered.

Author Keywords

Targeted advertising; personalization; privacy.

ACM Classification Keywords

H.1.2 User/Machine Systems: Human Factors.

General Terms

Human Factors

INTRODUCTION

Display advertising (banner ads and pop-ups) accounts for approximately one third of the total online advertising market and is predicted to reach \$29.53 billion this year [21]. Many users are desensitized to traditional display advertising and actively avoid looking at online banner ads [10]. Over time, response rates to banner ads have fallen dramatically [15]. Techniques used by advertisers to overcome this problem include targeted advertising and personalization. *Targeted advertising* refers to the practice where ads are matched to the user's interest. The more

relevant the ad is to the user, the more attractive it is. *Personalization* refers to the inclusion of information in the ad content that identifies or characterizes the recipient. It is sometimes used alongside targeting to further increase the appeal of an ad. These techniques have been found to achieve higher click-through rates [33] and in turn more sales. However, they also create ads which have the potential to be more invasive to users, intruding on their privacy [31]. Yet there exists scope for even greater personalization of advertisements. Facebook, for example, is planning to allow companies to advertise products on users' profiles [11]. What will happen to internet users' perceptions of privacy should these more powerful techniques for personalization become common? Will increasingly personalized ads lead to increased revenues for advertisers and their clients, or might it lead to a still greater experience of privacy invasion, and rejection of products, services and sites hosting the ads?

We report a study that explored participants' responses to ads with varying degrees of personalization toward the individual recipient, including a newer type that incorporates personally identifying information (PII) about the viewer within each ad (i.e. the participant's name and photograph). We first present background on users' perceptions of targeted advertising and personalization. We then describe the study where participants interacted with web pages with increasingly targeted and personalized ads. Their attention towards the ads was measured using eye-tracking while their perceptions were collected using questionnaires and interviews. The results show that greater personalization in ad content may achieve higher levels of attention, with participants spending almost twice as much time looking at an ad containing a photo of themselves than at a standard picture ad. However, increasing personalization also increased discomfort, with 80% of participants uncomfortable with their photos being used in the ads. We conclude that advertisers should strive to identify high-value data items that can be used to achieve 'sweet spot' personalization that results in noticeable, interesting ads that are also comfortable for the user, and avoid data items that may increase the noticeability of their ads at the expense of users' comfort.

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CHI'12, May 5–10, 2012, Austin, Texas, USA.

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BACKGROUND

Display Advertising

Targeted ads are mainly plain content text ads – such as Google’s AdSense, which generates \$6 billion in revenue [12]. The two most common forms of targeting are contextual and behavioral. *Contextual advertising (CA)* describes ads delivered based on an automated matching of keywords from the content a user is currently viewing with keywords for an advertisement. CA aims to complement the website content and relies on information collected in real-time. *Behavioral advertising (BA)* describes ads which are delivered based on information collected about a user’s web browsing behavior over time, such as websites visited, topics viewed and search engine queries. This data is used to profile users into interest categories (e.g. ‘golf enthusiast’) and relevant ads are served. Examples of BA ad networks include Google’s Double Click, Yahoo! Network, AOL Advertising and Scientific Media.

Past research suggests that BA can improve the click-through rate (CTR) of an ad by as much as 670% [33]; and the action-through rates (ATR; percentage of ads resulting in sale) are more than double those of standard advertising, 6.8% and 2.8% respectively [4]. It is likely that targeted ads are more effective because they are more relevant to users. A strong correlation was found between users liking an ad and its perceived relevance, those who dislike

advertising being the least likely to see any relevance in what they see [16].

There is also evidence to suggest that BA is more effective than CA. Studies conducted by advertising agencies found that the same ads received 17% more fixations in unrelated-content sites than related-content sites [20]; and the CTR was more than 100% higher for ads in unrelated-content sites, and the ATR was 19% higher, compared to related-content sites [26]. Such results could be due to the ‘*surprise effect*’: when a user looking for a product finds an ad on an unrelated site, s/he might react to the unexpected event by engaging with the ad [20, 26]. Another explanation is that contextual ads could suffer from the ‘*clamor effect*’: when too many adverts for the same product try and catch the user’s attention, the user might avoid looking at any of them and instead choose to stay focused on the editorial content [20, 26].

However, being served more relevant adverts does not necessarily mean that users will perceive targeted advertising positively – as can be seen in Table 1, studies exploring the perceptions of users have had mixed results.

Reasons for disliking targeted advertising include **perceived privacy costs**. Users dislike the idea of being followed, describing BA as ‘*invasive*’ [16, 24]. This has

Researchers	Year	N	Population	Survey Method	Findings
Internet Advertising Bureau and Olswang [15]	2009	1,004	UK	Online	23% found the concept of BA appealing and 20% found it unappealing. When asked whether they would prefer BA as opposed to non-targeted ads, 27% opted for BA while 17% preferred non-targeted ads.
Turow et al. [30]	2009	1,000	US	Phone	66% did not want ads tailored to their interests, compared to 32% yes and 2% maybe.
McDonald and Cranor [23]	2009 2010	14 314	US US	In-depth interviews. Online	Only 21% wanted the benefits of relevant advertising. 40% said that they would be more careful online if they knew that advertisers were collecting data; 15% said that they would stop using sites with BA.
Hastak & Culnan [13]	2010	2,064	US	Online	46% were uncomfortable with BA, 31% were neutral and 22% were comfortable.
Office of Fair Trading [26]	2010	1,320	UK	Not Reported	40% held neutral views about BA, 28% disliked it and 24% welcomed it. 57% said that the practice of BA would make no difference to their internet use, 5% that they would limit their internet use, and 1% that they would stop using the internet altogether.
TrustE [1]	2011	1,004	US	Not Reported	54% did not like BA and 37% had experienced a time when they had felt uncomfortable with a targeted online ad.

Table 1. Surveys investigating targeted advertising

been termed the '*creepiness factor*', a sense that someone has been 'snooping' into a part of your life that should remain private [17]. Other perceived privacy costs identified in the literature include:

- Cookies being installed on the user's computer [27];
- The storage of personal data without the user's knowledge [16];
- PII being attached to the user's Internet browsing [1];
- Being labeled by advertisers in ways the user considers unfair [31];
- Potential embarrassment to the user if using a shared computer [27];
- Other companies having access to the user's data [16];
- Data collected being used for purposes other than advertising [27].

CA raises fewer objections than BA [27]; because no tracking is involved, there are fewer risks associated with data storage or data sharing.

The **benefits** of targeted ads include:

- Free access to ad-funded content [2, 27];
- A reduction in irrelevant ads [27];
- A reduction in the cost of good services [27];
- Decreased search times [27].

The Internet Advertising Bureau suggest that the benefit of ad-funded Internet services to the user outweighs the privacy costs: they found that users were only prepared to pay one-sixth of the total surplus gained to avoid advertising and personal information-usage nuisance [2]. Users might argue, however, that it is not fair for advertisers to expect them to make such a trade-off. McDonald and Cranor [24] found that 69% believe privacy is a right, 61% think it is 'extortion' to pay to keep their data private, and only 11% say they would pay to avoid ads.

Factors that could help alleviate users' privacy concerns include transparency and control. Research findings suggest that users feel more comfortable with BA in situations where they are actively told when targeted ads are being shown [14, 27]. Users are also more comfortable after finding out PII is not stored [1, 16] and that they have the option to opt-out [14, 16, 27].

Rich Media

Rich media - such as images, video and pop-ups - are increasingly being used in display advertising. By making the ad highly visible relative to the website content, the ad is made harder for the user to ignore. Pop-ups have been found to be more memorable than standard banner ads [9]. However, such advertising can also be experienced as *disruptive* because it diverts the user from their online

goals. When an ad is considered disruptive, negative attitudes can develop, affecting brand perception and leading to '*ad avoidance*' [23]. The more important the task, the more disruptive the interruption is likely to be perceived.

With the growth of targeted ads, it is possible that advertisers will try to combine targeting with high visibility. Only one study has investigated users' possible response to this approach. Goldfarb and Tucker [12] conducted a large-scale field experiment on 2,892 web advertising campaigns, comparing CA campaigns, rich media campaigns, and campaigns that did both. They conclude that users' purchase intent increased when CA and rich media were used as separate strategies; but when these strategies were combined, users' purchase intent decreased. They suggest that users may tolerate CA more than other ads because they potentially provide useful information; however, when such ads are made highly visible, this has a negative effect because it increases the user's awareness of being targeted and their perceptions of being manipulated by advertisers.

Personalization

Personalization is said to increase the appeal of an ad, because the user is more likely to assume that there is a match between his/her self and the product [3]. However, highly personalized messages can also have negative effects, depending on the degree to which the personal information used in the message uniquely identifies or characterizes the recipient. This is referred to as '*personalization reactance*' - when the user feels constrained in the sense of being too identifiable or observable by the firm. White et al. [32] suggest that three factors influence personalization reactance: the level of personalization, whether or not justification for personalization is present, and the perceived utility of the service. In their study, they used highly personalized email ads that addressed the customer by their name, state of residence and movie preferences. They found that when the perceived utility of the service was low, participants experienced personalization reactance in response to highly personalized messages that were not justified, resulting in lower click-through intentions. By contrast, when the perceived utility of the service was high, the justification of personalization was less important because highly personalized messages were less likely to elicit reactance.

Only one research study has investigated the effects of targeted display advertising and personalization. Tucker et al. [30] conducted a randomized field experiment where they compared the CTRs of two different Facebook ad formats, before and after the introduction of improved privacy controls. In the targeted and personalized ad format, the ad explicitly mentioned the user's undergraduate institution, or the name of a celebrity the user was a 'fan' of, e.g. '*As a [undergraduate institution*

name] graduate, you know that strong women matter...’ In the targeted and non-personalized format, the message referred to a broader user characteristic, e.g. ‘You know that strong women matter...’ They found that after Facebook’s introduction of improved privacy controls, users were twice as likely to click the targeted personalized ads. As a result, they suggest that if sites are successful at reassuring consumers that they are in control of their privacy, personalization of online ads can be used to generate higher CTR.

Compared to email personalization, relatively low levels of personalization are currently used in targeted display ads. In particular, PII has not yet been used to personalize targeted display ads. PII has been formally defined as ‘information that can be used to distinguish or trace an individual’s identity’; examples include a person’s name and photographic images [22]. Research studies suggest that PII can make a message more noticeable. For example, in psychology, the famous ‘cocktail party effect’ describes how a person can hear his/her own name being said amongst many voices in a crowded room [6, 25]. More recently, it has been suggested that people have prioritized processing for their own name and their own face [29], and that people have difficulty disengaging their attention from self-referential stimuli [7, 8].

The majority of advertisers involved in BA claim not to keep people’s real names in their databases and often cite this layer of anonymity as a reason why BA should not be considered intrusive [28]. However, it is reported that some companies, such as Rapleaf, do keep PII [28]. Also there is evidence to suggest that advertisers have access to PII, even if they are not using it: several studies have found that there is ‘information leakage’ from online social networks to third-party advertisers, which can include PII and sexual-orientation [13, 18, 19].

Another relevant finding is that it is a common belief amongst Internet users that advertisers have access to PII. A recent study found that over 30% of users believed that sites they are registered with (e.g. Facebook, Google, Microsoft Live, Yahoo) share PII with advertisers without their consent; and more than half of users (52%) believe that their PII are attached to tracking activity [1]. Following on from this, we question how would users respond if advertisers were open about having access to PII, and PII was used to personalize advertising content?

Research Aims

The effects of personalization and the use of rich-media in TA have been under-investigated in previous research. In this paper we ask: what will happen to internet users’ perceptions of privacy when these powerful advertising techniques become more common? This question gains relevance now that companies like Facebook plan to leverage their users’ profiles to advertise products [11].

In particular, we wanted to explore and compare participants’ reactions to the following types of ads:

- Untargeted rich media ads;
- Targeted rich media ads;
- Personalized rich media ads, using PII of first name and photo.

User studies investigating people’s opinions of targeted ads have tended to be survey-based, asking participants to rate their level of agreement with various statements [15, 23, 13]. We argue however, that how a person feels about the practice of targeting might be different to how they feel when presented with targeted ads in an actual browsing situation. To explore people’s responses to our ad types, we designed a study where participants were given the task of booking a holiday. As the participant went through the booking process, they were exposed to ads that became increasingly personal – on the first page they were presented with standard ads, on the second page they were presented with ads that targeted them based on their holiday booking input, and on the final page they were presented with personalized ads that used their name and photo in the ad content. In particular, we wanted to understand the following research questions:

- RQ1. Which ads did participants notice most / least?
- RQ2. Which ads did participants find the most comfortable / uncomfortable?
- RQ3. Which ads were participants most / least likely to take an interest in?

METHOD

Participants

There were 30 participants (15 male, 15 female). Their ages ranged from 19 to 55 years (mean age = 28 years, SD = 10.1). 22 were university students and 8 were university staff, recruited from an opportunity sample.

Stimuli

A travel website (‘Flyaway’) was created using HTML, CSS and JavaScript. The website was split into three pages, each page containing four banner adverts (top left, top right, bottom left, bottom right). The adverts were all the same size (221 by 336 pixels) and consisted of text and rich media. See Figure 1 for examples of the adverts.

Page 1 allowed the participant to select their journey information (destination, journey type, departure date and time, return date and time) and a series of additional questions to ‘qualify for our exclusive offers’ (relationship status, do you own a car, do you have travel insurance, age group). The ads on this page were general ads about holidays and flights. See Figure 1, top left ad, for an example.



Figure 1. Examples of ‘Flyaway’ ads. Top left: a general holiday ad. Top right: a holiday ad based on holiday selection ‘Dubai’. Bottom left: an ad based on the age selection ‘18-34’. Bottom right: an anti-aging cream ad using the participant’s first name and modified photo

Page 2 allowed the participant to select the number of tickets and to enter their name, address and payment details. The ads on this page were targeted using the holiday destination the participant chose on Page 1 (e.g. local hotels, restaurants) and their answers to the additional questions on Page 1 (e.g. dating website, car loan, travel insurance). See Figure 1, top right, for an example.

Page 3 confirmed the booking and informed the participants that their booking reference would be emailed to them shortly. The ads on this page were targeted using the age range the participant chose on Page 1 (e.g. clubbing, life cover), addressed the participant by their first name, and used the participant’s photo (both modified and unmodified) to show them what they could look like with / without a particular product (e.g. hair salon, anti-wrinkle cream). See Figure 1, bottom left and right ads, for examples. The participant’s photo was obtained from the university database when the participant signed up for the study and was modified using Photoshop. The modifications were changing the hair-style in one version, and artificially aging the appearance of the individual by 40 years in another version.

Apparatus

The website was displayed on a Dell desktop computer using Internet Explorer 7. Eye movements were measured with a Tobii X50 eye tracker and Tobii Studio 2.0.4 software. Total fixation duration (TFD) was collected in order to gauge noticing of the stimuli ads (RQ1), with longer durations indicating ads that had been noticed more. The post-task interview was recorded using an audio recorder.

Materials

A post-task questionnaire was created that consisted of 13 statements, which participants had to rate how on a 5-point scale, indicating their level of agreement. Q1 was a general statement, where participants rated their awareness of the website’s ads. The 12 questions that followed then focused on four of the targeted ads: holiday destination, age, name and photo. Participants were asked to rate each of the ad types for how likely they were to notice the ad (RQ1), how comfortable they felt with the ad (RQ2) and how likely they were to take an interest in the ad (RQ3).

Procedure

The experimenters applied for permission to conduct the study through the university’s ethical review process. Permission was granted to use the participant’s university ID photo (from a publicly accessible page) and to display modified versions of it to the participant during the study.

The study took place in a usability lab and took approximately 30 minutes per participant. It was advertised as an experiment to investigate ‘Perceptions of a Travel Website.’ Participants signed a consent form detailing the procedure of the experiment, what equipment would be used, informed that the data would be held in accordance with local data protection law, and of their right to withdraw from the experiment at any time without consequence. However, participants were not told that the focus of the study would be the website’s adverts, and that their photo would be used for a subset of the ads.

Participants were asked to book a flight to a destination of their choice and to ‘talk aloud’ about their thoughts of the website. While they did the task, eye tracking and video recording were used to record their reactions. Once the task was completed, the researcher reviewed the Tobii screen recording with the participant and this time asked participants to specifically talk about what they thought of the ads on each page.

Next participants were asked to complete a post-study questionnaire, which asked them to rate the ads with regard to how noticeable, comfortable and likely to elicit interest they were. They then took part in an interview exploring their perceptions of targeted and personalized advertising in the context of their prior experience.

At the end of the study participants were fully debriefed and informed that the photos of themselves would not be published, and that all data relating to them from the

experiment could be destroyed at their request. All participants were paid £5 for their time.

RESULTS

Attention

Eye tracking data was analyzed using Tobii Studio 2.0.4 Software. The four ads on each page were defined as areas of interest (AOI). Aggregating the data for the four AOIs, descriptive statistics for total fixation duration (TFD) were then calculated for each page. (Note that 5 participants were excluded from the sample due to poor data quality.)

Page	Total Fixation Duration (s)	
	Mean	SD
1	4.6	3.8
2	4.7	5.4
3	9.5	6.3

Table 2. Descriptive statistics for total fixation duration (n=25)

As can be seen in Table 2, the ads on Page 3 received twice as much attention (mean TFD = 9.5 seconds) as the ads on Page 1 and Page 2. A repeated measures one-way ANOVA was revealed that there was a significant effect for TFD, $F(2, 48) = 10.16, p < .001$. Bonferroni-corrected pairwise comparisons (sig. level = .016) revealed that the TFD for Page 3 was significantly higher than Page 1 ($p = .009$) and Page 2 ($p < .001$).

Two ads on Page 3 were compared, to test the effect of displaying an ad with the participant's photo while controlling for potential differences between pages. An ad which used the participant's age and a standard picture (which appeared on the top-left of the webpage) was compared against an anti-ageing cream ad using the participant's photo (which appeared on the top-right). The ad with the participant's photo was looked at for 5.8 seconds longer than the standard picture ad (mean TFDs = 13.0 seconds and 7.2 seconds respectively). A repeated measures t -test revealed that this difference was statistically significant, $t(24) = 3.2, p = .003$.

Questionnaire Results

The questionnaire responses for all participants (n=30) were analyzed using SPSS. Four questions were negated (Q6, Q7, Q9, Q11), so that for all items 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree.

Likely to Notice

The majority of participants agreed that they were more likely to notice ads that use their photo (97%), holiday destination (77%) and name (57%); see Table 3. Descriptive statistics revealed that participants rated adverts using their photo highest for being noticeable (M=4.6), followed by adverts using their holiday destination (M=3.8), their name (M=3.5) and age (M=3.0).

I am more likely to notice adverts that use my...	+ ve	0	- ve
Holiday destination (Q2)	23 (77%)	5 (17%)	2 (7%)
Age (Q5)	7 (27%)	13 (43%)	9 (30%)
Name (Q8)	17 (57%)	6 (20%)	7 (23%)
Photo (Q11)	29 (97%)	0 (0%)	1 (3%)

Table 3. Frequencies for Noticing. +ve = Strongly Agree or Agree, 0 = Neutral, - ve = Disagree or Strongly Disagree (n=30)

A repeated-measures one-way ANOVA revealed that there was a significant effect for Noticing, $F(3, 87) = 16.0, p < .001$. Bonferroni-corrected pairwise comparisons (sig. level = .008) revealed that photo was rated significantly more noticeable than holiday destination ($p = .005$), age ($p < .001$) and name ($p < .001$). Holiday destination was rated significantly more noticeable than age ($p < .001$).

Feeling Comfortable

87% of participants agreed that they would feel comfortable with their holiday destination being used in ads and more than two-thirds of participants disagreed that they would feel comfortable with their photo (80%) or name (66%) being used in ads; see Table 4.

I feel comfortable with adverts that use my...	+ ve	0	- ve
Holiday destination (Q3)	26 (87%)	3 (10%)	1 (3%)
Age (Q6)	7 (23%)	13 (43%)	10 (33%)
Name (Q9)	7 (23%)	4 (13%)	19 (66%)
Photo (Q12)	3 (10%)	3 (10%)	24 (80%)

Table 4. Frequencies for Comfort. +ve = Strongly Agree or Agree, 0 = Neutral, - ve = Disagree or Strongly Disagree (n=30)

Descriptive statistics revealed that participants rated adverts using their holiday destination (M=4.0) as most comfortable, followed by adverts using their age (M=2.9), their name (M=2.3) and photo (M=1.7). A repeated measures one-way ANOVA was conducted to test for significance. To compensate for violations of the sphericity assumption (Mauchly's $W(df=5) = .65, p = .037$), the significance levels were adjusted according to the lower-bound procedure. There was a significant effect for Comfort, $F(1, 30) = 26.7, p < .001$. Bonferroni-corrected

pairwise comparisons (sig. level = .008) revealed that holiday was rated significantly more comfortable than age ($p<.001$), name ($p<.001$) and photo ($p<.001$). Age was rated as significantly more comfortable than photo ($p=.001$).

Taking An Interest

77% of participants agreed that they would be more likely to take an interest in ads that used their holiday destination and over half of participants disagreed that they would be more likely to take an interest in ads that used their photo (67%) or name (57%); see Table 5.

I'm more likely to take an interest in adverts that use my...	+ ve	0	- ve
Holiday destination (Q4)	23 (77%)	6 (20%)	1 (3%)
Age (Q7)	7 (30%)	16 (53%)	5 (17%)
Name (Q10)	5 (17%)	8 (27%)	17 (57%)
Photo (Q13)	10 (23%)	0 (0%)	20 (67%)

Table 5. Descriptive statistics for Interest. +ve = Strongly Agree or Agree, 0 = Neutral, - ve = Disagree or Strongly Disagree (n=30)

Descriptive statistics revealed that participants rated adverts using their holiday destination ($M=3.9$) highest for interest followed by adverts using their age ($M=3.1$), their name ($M=2.4$) and photo ($M=2.4$). A repeated-measures one-way ANOVA was conducted to test for significance. To compensate for violations of the sphericity assumption (Mauchly's $W(df=5) = .47, p<.001$), the significance levels were adjusted according to the lower-bound procedure. There was a significant effect for Interest, $F(1, 30) = 13.7, p<.001$. Bonferonni-corrected pairwise comparisons (sig. level = .008) revealed that holiday was rated significantly more comfortable than age ($p<.001$), name ($p<.001$) and photo ($p<.001$).

Interviews

Interview transcripts were analyzed using thematic analysis, a "method for identifying, analyzing and reporting patterns (themes) within data" [5]. This type of analysis involves coding (tagging) interesting sections of the transcript in a consistent way and subsequently grouping those codes into themes. The identification and interpretation of themes help explain what the data means and relate it to the research questions [5]. Five major themes are described in this section: (1) relevance of the ads; (2) perception of own photo; (3) how advertisers obtain personal data; (4) the extent to which advertisers access and use personal data; and (5) other people seeing ads with another person's data.

Relevance

The majority of participants (23) identified 'relevance' of the ads as an important factor in how they perceived targeted and personalized advertising. A relevant ad was described as an ad which was related to the individual's interests, activity on the website, or topic of the website. In the context of our study that meant ads related to holidays were considered by these participants as more relevant. Relevance was associated to a more positive perception of the ads. P5 said "I mean I think that they are more attractive if they have things that are relevant to me [...]".

Own photo

More than half the participants (19) expressed negative reactions to seeing ads with their own photo. When referring to the ads in the study that manipulated their photo into looking older and having different haircuts these participants used adjectives such as: "disturbing" (P2, P25), "strange" (P4), "weird" (P12, P13), "freaky" (P13), "creepy" (P14), or "terrible" (P17).

When asked how they would react to ads that used their own photo these participants said they would feel uncomfortable. P1 said "[...] the face is a very important thing and identifying yourself is important but umm it's creepy yeah and it might turn me off and it might turn several people off a lot."

In order to gauge the strength of feeling and judge possible consequences for ad-hosts of using this level of personalization, participants were asked about how they would feel if a site that is frequently used and relied upon, such as Facebook, started using their photo in ads targeted at them. 5 participants said they would quit the site. 6 said they would continue using it even though they would feel uncomfortable about the use of their photo. 7 said they would be comfortable.

17 participants mentioned that ads with their own photo would be more noticeable. P27 said "[...] well in terms of advertising it might work well if you use someone's picture because you immediately notice that."

How did they get my data?

For 18 participants, how advertisers had obtained their data and where it had come from influenced how they perceived targeted ads. One specific issue was data from one website or company being used to show ads on another website. P10 said "I don't understand how they know what you've been looking at on another website."

Understanding how the ad had been created had a comforting effect. P18 said "Yeah, I would prefer targeted adverts as long as I knew how they got the fact that they're targeted. As long as, yeah, I was aware of, it was just you know that I could see that I looked at it before and they were just advertising something, and that was it, then I'd be more comfortable and happy with that [...]"

In our study, the photos of participants were obtained from the university pages. Knowing this made participants more comfortable with its use in ads. P5 said *"Yeah I would be surprised and a bit umm not comfortable with it, I mean the fact that I know that it is a university, that it is my university picture and that I am at university, then it doesn't make me uncomfortable [...]"*. Not realizing where the photo came from made participants uncomfortable. P14 said *"I think that's weird, because I'm like 'Where did they get that picture?'"*

Access to / use of personal data

For 17 participants the extent of personal data that advertisers had access to, and used for creating ads, had an effect on their perceptions. For example, P7 said *"I don't want anything specifically focused on me because then again it presumes that my life is pretty open but for instance if you're digging into my life it's none of your business."*

Consent to use personal data in targeted advertisement was mentioned by 5 participants. Using individual's personal data without consent in order to create ads was perceived negatively. P4 said *"[...] I don't think I would want my image being used for something without my knowledge, I mean if they like approached people and asked to use it then that would be different but I wouldn't want it used without my knowledge."*

Other people seeing ads with my data

9 participants were concerned about the potential for other people to see ads with their data because of errors in the targeting, or people sharing computers. For example, if personalized ads started to make use of personal photos, the wrong photo could be displayed to the wrong person. P19 said *"Well they have to be rather accurate to know which ... I mean there may be ... are so many, many names, have the same name so they may get the wrong picture from a person with the same name."* Computers storing an individual's web browsing behavior could also introduce problems if they are shared. P11 said *"The computer or the website will have the memory of my searching. The next time my friend or somebody else uses my computer they can see what I bought. If I just, I only buy the cream or moisturizer, those kind of things, that's okay. But if it's very private I don't want them to be able to see that."*

DISCUSSION

The goal of the study was to explore participants' perceptions of rich-media targeted and personalized advertising. We investigated how participants perceive targeted and personalized ads that use increasingly personal data with regards to noticeability, interest, and comfort.

Questionnaire results indicate that depending on the data item used to create an ad it can become significantly more or less noticeable. Ads which use the participant's photo, name, or holiday destination are more likely to be noticed. Ads that used their photo were perceived by participants as being significantly more noticeable than ads that used their

age, name, or holiday destination. An individual's photo is not commonly displayed without her/his knowledge as part of an ad in commercial websites, so it is possible that they were considered highly noticeable due to a 'surprise effect' [20, 26]. An additional explanation is that individuals are slower to disengage their attention when looking at a photo of themselves [7, 8], so it's possible that they looked at ads with their photo for longer periods of time and more times than the other ads. This possibility is supported by the mean TFD results. Ads on Page 3 were looked at for significantly longer than ads on Pages 1 and 2. Also, when comparing the ads at the top of Page 3, the ad with the participant's photo was looked at for significantly longer than the ad with the standard picture.

The level of interest participants had in the different types of ads was significantly influenced by the type of data item used. Questionnaire results revealed that they were more likely to take an interest in ads that use their holiday destination, and less likely to take an interest in ads that use their name and photo. The use of age had no effect on interest. Ads that used holiday destination were considered significantly more likely to raise interest than ads that used age, name, or photo. This can be attributed to the fact that the task participants were asked to complete was intrinsically related to holidays; thus ads with holiday destination may have been seen as more relevant in the context than the other ads. This explanation is supported by the interviews which show that the majority of participants identified 'relevance' of an ad as having a positive influence in how they perceived it. The link between relevance of an ad and whether people like it has also been suggested in past research [16]. This supports the conclusion that in order to make users interested in their ads advertisers should make an effort to make ads relevant for the context users are engaging with.

The type of data item used in the ads has a significant effect on how comfortable participants were with it. Participants reported being comfortable with ads using their holiday destination, neutral about ads using their age, and uncomfortable with ads using their name or photo. Ads that used holiday destination were rated significantly more comfortable than ads that used the other three types of data. Ads that used photo were rated significantly less comfortable than ads that used age and holiday destination, with the majority of participants saying they felt uncomfortable with the use of their photos in ads. Again, relevance of the ad may be used to explain these results: previous research has shown that individuals are more comfortable with personal data use in ads when it is perceived as relevant [32]. It is likely that participants perceived holiday destination as a relevant data item in that context, but not their own photo. Additionally, the interviews indicated that not knowing how advertisers had obtained the data used to create targeted ads was disconcerting. It is possible that, while it was clear for

participants that holiday destination had been collected from the form they were filling in, it was more difficult to remember the source of their photo. Advertisers should avoid using personal data that make users feel uncomfortable about ads. The use of personal photos in particular may upset users and lead them to reject services, as indicated by participants' answers to the possibility of Facebook employing this type of advertising. The interviews suggest that asking users for consent before using their data in advertising could alleviate their concerns.

The type of personal data used in creating the targeted ads has, according to the questionnaire results, a highly significant effect on noticeability, interest, and comfort. Items such as holiday destination in our scenario help to create ads which are both considered noticeable, interesting, and comfortable – so should be of great value for advertisers since they will help get the attention of potential customers, convert that attention into purchases, while not creating feelings of privacy invasion on the individual. Identifying these data types in different contexts on the web should be of great interest to advertisers. At the same time advertisers should also be careful with data items that can increase noticeability of ads but which are considered too sensitive to be used in ads by individuals. There could be a short term benefit in using someone's photo to make them look at an ad, but if that ad makes the individuals uncomfortable then the privacy cost may offset the noticeability benefit. As more personal data becomes available to advertisers on the web, it becomes more important that these trade-offs are considered.

CONCLUSIONS

The findings described in this paper suggest that users' perceptions of targeted ads using rich-media vary depending on the type of data used to create the ads, with comfort decreasing as the level of personalization increases. Advertisers should strive to identify high-value data items that can be used to achieve 'sweet spot' personalization that results in noticeable, interesting ads that are also comfortable for the user. At the same time, advertisers should be wary of using data items that can increase the noticeability of their ads at the expense of users' comfort since this could be counterproductive for the advertised brand. Our findings can be used as guidance for future research aimed at understanding how to design more attractive and less intrusive ads.

To our knowledge, this is the first study of how personalized rich media ads are perceived by users and where different types of personalization were compared with regards to their impact on user perceptions. Past studies on targeted advertising have typically been surveys, whereas we gauged participant's live reactions to adverts in the lab. It was also the first study to investigate users' reactions to ads that used their own photo. Targeted advertising seeks to make ads more relevant to the recipient

and related to their interests. It is becoming increasingly prevalent and, with advertising companies having access to new sources of personal data such as social networks, we believe the trend toward targeting may become a trend toward personalization (see [11]). Therefore, by using participants' photos in ads for anti-aging cream or makeovers we are anticipating what the future of display advertising can be.

The main limitation of this study was the size and composition of the participant sample. It was also participants' first interaction with ads that used their photo. Further research is needed to determine whether users habituate to these ads over time, if different users perceive these ads more positively than others, or if combination with other types of content changes users' perceptions. A longitudinal between-subjects study with different groups being subject to different types of ads would help answer these questions. Participants being asked to 'talk aloud' may also have artificially increased their sensitivity for the ads.

Although this was a first-step study, we can state confidently that the use of PII in this context is a complex issue that needs to be handled with care and that imprecise targeting or personalization could deter potential customers from engaging with the brand. The effects of data quality errors and imprecise targeting in advertising are currently under-researched topics which we would like to pursue in future research.

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