Smart, Useful, Scary, Creepy:
Perceptions of Online Behavioral Advertising

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ABSTRACT

We report results of 48 semi-structured interviews about online behavioral advertising (OBA). We investigated non-technical users' attitudes about and understanding of OBA, using participants' expectations and beliefs to explain their attitudes. Participants found OBA to be simultaneously useful and privacy invasive. They were surprised to learn that browsing history is currently used to tailor advertisements, yet they were aware of contextual targeting.

Our results identify mismatches between participants' mental models and current approaches for providing users with notice and choice about OBA. Participants misinterpreted icons intended to notify them about behavioral targeting and expected that they could turn to their browser or antivirus software to control OBA. Participants had strong concerns about data collection, and the majority of participants believed that advertisers collect personally identifiable information. They also misunderstood the role of advertising networks, basing their opinions of an advertising network on that company's non-advertising activities. Participants' attitudes towards OBA were complex and context-dependent. While many participants felt tailored advertising could benefit them, existing notice and choice mechanisms are not effectively reaching users.

Categories and Subject Descriptors

H.5.2 [**Information Interfaces and Presentation**]: Miscellaneous

General Terms

Human Factors, Design

Keywords

Privacy, User Perception, Online Behavioral Advertising, Tracking, Notice and Choice, Interviews, Advertising Networks, Cookies

1. INTRODUCTION

In recent years, Internet advertising has become increasingly tailored to individual users. In the simplest case, *contextual advertising*, advertising networks choose which ads to display on a webpage based on the contents of that page. In the more complex technique of *online behavioral advertising* (OBA), advertising networks profile a user based on his or her online activities, such as the websites he or she visits over time. Using this profile, advertising networks show ads that are more likely to be of interest to a particular user, charging a premium price to do so [3]. Targeting advertising based on web searches has been shown to increase ad click-through rates considerably when compared with untargeted advertisements [34].

OBA presents both benefits and downsides to users. If their interests have been accurately profiled, users will receive more relevant advertising. However, collecting data about users' online activities can potentially violate their privacy. Previous research has found that users have substantial privacy concerns about OBA [20, 26, 31], while marketing surveys have found that consumers like OBA and that discomfort with OBA is reduced when users are properly informed that non-personally identifiable information is used for OBA [16]. This past work has employed surveys, which can sample a large number of individuals but are not conducive to open-ended questions or follow-up questions to explore attitudes and motivations. In contrast, we conducted interviews to learn how past experiences, knowledge, and understanding factor into users' attitudes towards online behavioral advertising.

Gaining a deeper understanding of consumers' attitudes towards OBA is particularly timely since initiatives are currently in progress to bolster consumer privacy concerning OBA. In March 2012, the U.S. Federal Trade Commission released a report on consumer privacy that discussed OBA at length. In this report, the FTC called on the advertising industry to "[give] consumers greater control over the collection and use of their personal data through simplified choices and increased transparency" [10]. Having a thorough understanding of how consumers perceive behavioral advertising and how they make choices about their privacy enables both technologists and policymakers to provide options and interfaces that better support consumers' privacy expectations.

In this paper, we report results of 48 semi-structured interviews that unpack the factors fueling users' attitudes about OBA. Beyond asking participants their opinions, we investigated their knowledge of the current practice of OBA, their understanding of how profiles can be created, and the extent to which the circumstances of data collection and the identity of the advertising network influence their attitudes.

Participants found OBA to be useful, yet they also expressed strong concerns about its privacy implications. In particular, the majority of participants believed that advertisers could access personally identifiable information. Furthermore, participants were surprised that OBA occurs; while a number of participants believed that browsing history could theoretically be used to target advertising, few were aware that this technique is currently used.

Participants' responses suggested that current approaches for providing notice about OBA are ineffective. Only a handful participants understood the meaning of icons intended to notify consumers about OBA. Participants could not accurately determine what information is collected for OBA purposes, or by whom, and they assumed the worst, leading them to oppose a practice they expected would involve the collection of personally-identifiable and financial information.

Our results also identify disconnects between participants' mental models and current approaches for giving consumers control over OBA. Existing privacy tools ranging from opt-out pages to browser plugins expect consumers to express OBA preferences on a per-company basis. However, participants misunderstood the role of advertising networks in the OBA ecosystem, evaluating companies based solely on activities unrelated to advertising. Participants were unsure where to turn to control OBA, and they most frequently expected they could use settings built into their browsers or antivirus software. Participants expressed complex OBA preferences that depended on the context of their browsing, an approach that is unsupported by current mechanisms.

We discuss related work in Section 2 and our methodology in Section 3. We report participants' background knowledge of Internet advertising and understanding of OBA icons in Section 4. In Section 5, we report participants' reactions to learning about OBA, in addition to factors that potentially influence participants' attitudes towards targeted advertising. We unpack the preceding results and discuss directions for better aligning notice and choice mechanisms with users' mental models of OBA in Section 6.

2. BACKGROUND AND RELATED WORK

Online advertisers track users as they traverse the Internet, constructing profiles of individuals to enable targeted advertising based on each user's interests. Targeting advertisements can provide benefit to advertisers, helping advertisers find users who are more likely to be interested in the advertised product [8]. Furthermore, since advertising networks can charge higher prices to serve targeted advertising rather than general ads, OBA is "a way to support the websites and products you care about" and may reduce the number of ads consumers see that are not relevant to their interests [23].

In order to provide a baseline for examining misconceptions our participants held, we begin by explaining how OBA works from a technical perspective. We then discuss notice and choice mechanisms for OBA in the United States. Finally, we discuss prior surveys of consumer sentiment towards advertising and OBA. These surveys, conducted by both academics and the advertising industry, have found a range of positive and negative consumer attitudes about OBA. Our interview results provide deeper insight into the genesis and interrelationship between the attitudes reported in these surveys.

2.1 The Mechanics of OBA

Since the details of data collection and usage by specific advertising networks for the purpose of OBA can be considered trade secrets, the exact mechanics of how OBA works are generally not public. Nevertheless, basic mechanisms for enabling tracking, as well as methods currently used "in the wild," have been examined in the literature.

In general, the goal of online behavioral advertising is to create a profile of a user's Internet activities, such as the websites he or she visits. This profile can later be used to target advertisements. When a user visits a web page, that page's content can come from both a first party (the page that the user is explicitly visiting) and third parties (companies that have a relationship with the first party

allowing them to place content, visible or not, on that page). Third parties include advertising networks, analytics companies, and social networks that contract with first-party websites. These third parties can set a unique identifier on a user's computer. Then, as the user visits different websites that include content from the same third party, that third party can associate these visits with the same computer. In recent years, a small number of third parties have increasingly served content on a larger number of pages, enabling these companies to track a user's browsing across large portions of the Internet [15].

On a technical level, this tracking can be accomplished in many ways. In one of the simplest cases, an advertiser can set a cookie with a unique identifier on a user's computer, correlating browsing activity with that unique identifier [15]. In a study proposing a method for measuring behavioral advertising, Balebako et al. found that blocking third-party cookies in a web browser achieved a reduction in behavioral targeting similar to opting out of behavioral advertising using industry opt-out websites, albeit only testing behavioral targeting in text ads from Google [2]. However, there exist myriad means of uniquely profiling a particular computer, ranging from browser fingerprinting [7] to using Flash Local Shared Objects (LSOs), HTML5 local storage, or other methods of maintaining a unique identifier on a user's computer over time [18]. Many of these techniques aim to uniquely associate browsing activity with a particular computer, rather than with an individual's real-life identity. The Network Advertising Initiative, a U.S. trade group for advertisers, notes, "It is possible to merge PII [personally identifiable information] and Non-PII for OBA and other uses. However, no NAI member ad networks currently engage in this practice" [22].

2.2 Notice and Choice

Behavioral advertising has led a number of parties to voice privacy concerns. For instance, the U.S. Federal Trade Commission has noted that data collection can be invisible, privacy notices may be difficult to understand, consumer profiles are sometimes very detailed, and that there is a "risk that data collected for behavioral advertising – including sensitive data regarding health, finances, or children – could fall into the wrong hands or be used for unanticipated purposes" [9].

The most visible attempts in the United States to provide consumers notice and choice about OBA have come about as a result of advertising industry self-regulation by groups such as the Digital Advertising Alliance (DAA) and Network Advertising Initiative (NAI). Policies from both groups have far-reaching implications; for instance, the DAA notes that its members "comprise 85% of the OBA marketplace" [13].

Both groups' principles include the idea of providing consumers notice and choice about behavioral advertising [6, 24]. For instance, the DAA's *consumer control* principle requires that users be able to opt out of receiving targeted advertisements, although it does not require that users be able to opt out of being tracked online [6]. These opt-outs can be enabled via the DAA's opt-out website,[1] on which consumers can opt out of OBA on a per-company basis. The DAA's *transparency* principle requires that consumers receiving OBA be given "enhanced notice," providing "the ability to exercise choice regarding the collection and use of data for online behavioral advertising" via "common wording and a link/icon that consumers will come to recognize" [6]. In 2010, the industry selected the "Advertising Option Icon" to indicate a link to enhanced notice for behavioral ads [32], as shown in the top half of Figure 1. However, some advertisements still display an older icon, shown

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[1] http://www.aboutads.info/choices/

in the bottom half of Figure 1, or none at all [12]. Since our interviews took place with U.S. residents, we included questions about the icons and taglines currently used in the U.S.

2.3 Previous User Studies

Studies from the past decade have examined different facets of user sentiment towards online advertising in general. In a 2002 paper, Rodgers described two studies with 106 student and 38 non-student participants that looked at interactions between user motivation for using the Internet and the effectiveness of certain types of banner ads, finding that for at least some users, "ads that complement the user's motive may have more success at being noticed and clicked on than ads that do not" [28]. In a 2003 paper, Rettie et al. described a survey with 100 UK student participants, finding that only 13% enjoy Internet advertising. Fewer than 20% of participants found Internet ads informative or useful. Although 62% indicated that they prefer that websites not have ads, 69% agreed with accepting "ads as pay for content" [27]. In 2007, McCoy et al. described a study with 536 participants and found that online advertising caused users to report being both less likely to return to a website and less able to recall features of that website [19]. However, Campbell and Wright conducted a survey study with 97 participants and a laboratory study with 118 participants in 2008, finding that the personal relevance of ads increased users' positive attitudes toward repetitive online advertisements [4]. Taken together, this prior work suggests that users find online advertising annoying, yet targeted ad selection may reduce annoyance.

Other studies have looked specifically at user perception of OBA and online tracking, finding significant privacy concerns about the practice. Turow et al. conducted a 2009 survey of 1,000 US adult Internet-users and discovered that 68% of Americans "definitely would not" and 19% "probably would not" allow advertisers to track them online, even anonymously [31]. In a study published in 2010 that included 14 in-person interviews and an online survey of 314 participants, McDonald and Cranor found that just one-fifth of their online respondents preferred targeted ads to random ads, and 64% thought targeted ads were "invasive." The study found that "people understand ads support free content, but do not believe data are part of the deal" [20]. In a 2009 online study of 2,604 participants, Hastak and Culnan found that 46% of respondents were uncomfortable with the identities of the websites they visit being used to target ads, although this number decreased to 30% of participants when the practice was transparent and offered participants the choice not to receive targeted ads [11]. A 2012 Pew telephone survey of 2,253 participants found that 68% of respondents were "not okay with targeted advertising because [they] don't like having [their] online behavior tracked and analyzed" [26].

Stakeholders from both the privacy-services and advertising industries have also surveyed consumers about OBA. TRUSTe conducted a 2011 survey with 1,004 United States residents, asking about perceptions of OBA. 53% of participants agreed that online privacy is "a really important issue that I think about often," and another 41% agreed that it is "a somewhat important issue that I think about sometimes." Over a third of participants agreed with the statement: "I know how to protect my personal information online and consistently take the necessary steps to do so." Over half of participants indicated that they definitely or probably would not share their browsing behavior with advertisers, and only 15% indicated being willing or probably willing to consent to being tracked online for relevant ads. Only 8% of participants indicated liking OBA, and only 5% showed awareness of the Advertising Option Icon [30]. A 2011 marketing survey of 9,600 individuals across 31 countries found that 90% of respondents expressed concerns about the privacy of their personally identifiable information, yet 62% were willing to allow online advertisers to track their web usage "under the right circumstances" [14]. Our work fills in the gap of understanding how consumers are simultaneously privacy-concerned and willing to have their information collected. Furthermore, we explore these previously nebulous "right circumstances," identifying situations that cause particular concern for consumers.

Much of this past work has employed surveys to gauge the attitudes of a large number of participants. However, surveys are inherently limited in that they don't provide a way for consumers to discuss ideas and thoughts outside the questions asked, or for followup questions to be asked. As a result, surveys alone cannot fully explain how different nuances of attitude are connected to each other. Our research thus delves deeper than prior studies, employing 48 in-depth, in-person interviews. We gain an understanding of why users are hesitant to be tracked for OBA: privacy concerns and misunderstandings of OBA both appear to play roles. We also provide insight into how users make choices about tracking for specific companies and in specific scenarios, as well as how they understand industry-established OBA icons.

3. METHODOLOGY

In August 2011, we recruited 48 participants for a combination interview and usability study of privacy-enhancing tools. This study was approved by the Carnegie Mellon University IRB. All participants were recruited from the Pittsburgh region of the United States using Craigslist, flyers, and a university electronic message board. Recruitment material directed prospective participants to a screening survey. For the purposes of the usability study, we required participants to be familiar with either Internet Explorer 9 or Firefox 5, be willing to test privacy tools, and have no previous experience with the tools tested. We screened out individuals who had a degree or job in computer science or information technology.

The study lasted approximately 90 minutes. In this paper, we report on the results of a semi-structured interview that took place in the first 30 minutes of each session. The second part of the study was a usability test, on which we have reported separately [17].

Interviews took place at the CyLab Usable Privacy and Security Laboratory on the Carnegie Mellon University campus. Each of the 48 interviews was moderated by one of two researchers who had jointly moderated 11 pilot interviews. We used audio recording to document each session. Participants were compensated $30 for participating in the combination interview and usability study.

3.1 Semi-structured Interview

Our semi-structured interviews consisted of two parts separated by an informational video about OBA. The appendix contains the full interview script. The first part of the interview gauged participants' opinions and knowledge of Internet advertising. After participants watched the video, we asked more detailed questions about participants' impressions and understanding of online behavioral advertising.

Interview part one: We began with general questions to explore participants' attitudes about Internet advertising. Then, we asked questions about tailored advertising and interviewees' knowledge of online tracking mechanisms. To evaluate participants' knowledge and perception of Internet icons, we showed two disclosure icons, both of which are depicted in Figure 1. These icons were the Advertising Option Icon, which the DAA has standardized [5], as well as the older "Power-I" icon, which was still in use as of August 2011 [12].

The icons and accompanying taglines were first shown alone, and then "in context" on an advertisement. The DAA specifies that

the Advertising Option icon should be displayed with one of three approved taglines [21], of which "AdChoices" is commonly used, while the "Power I" icon is usually displayed with the tagline "Interest based ads." We spent between five and ten minutes on this first portion of the study.

Informational video: When piloting the interview, we noticed that participants were generally unfamiliar with OBA. To give participants a baseline understanding of OBA for the remainder of the questions, we showed participants an informational video produced by the Wall Street Journal for their "What They Know" series.[2] The video lasted approximately 7 minutes. We selected this video because it clearly explains what behavioral targeting is and how cookies are used in the process of tracking online activities for the purpose of delivering tailored ads.

Interview part two: Following the video, we evaluated participants' understanding of behavioral advertising. Then, we asked questions about the benefits they perceived for users and other stakeholders. We also asked about any negative aspects they perceived in OBA activities. Next, we presented six hypothetical browsing scenarios, asking whether participants would be willing to have information collected about their browsing for the purpose of OBA in each situation. We further asked participants about their familiarity with advertising companies and willingness to allow these companies to collect information about their web browsing to tailor ads. Finally, we asked participants how they believed they could stop receiving targeted ads if they wanted to do so.
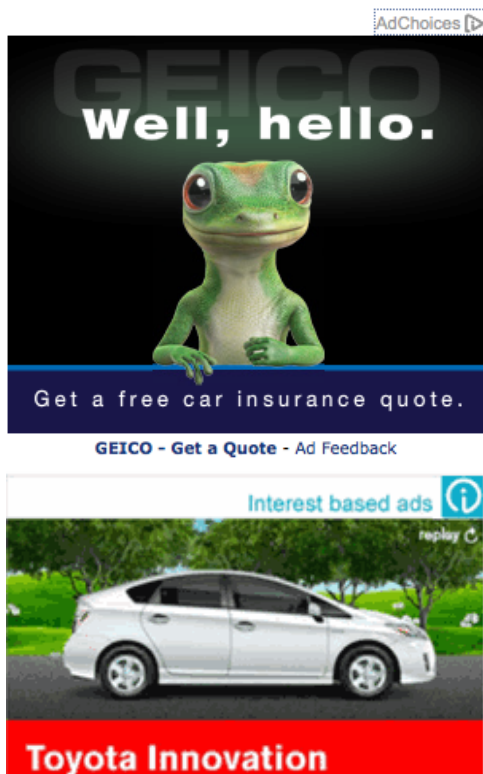

Figure 1: OBA disclosure icons "in context" on an ad. The *AdChoices* icon is on top, and the *Power I* icon below.

3.2 Analysis

The moderators audio recorded the interviews and took notes during the interview sessions. Once all interviews had been completed, we collaboratively developed a codebook of salient themes we identified in the moderators' written notes. We then coded the audio recording of each interview, transcribing quotes that were especially representative of participants' attitudes. If a response was not captured by existing codes, we added a new code to the codebook. Our coding strategy allowed us to identify both common and uncommon concepts that arose during each interview. We further investigated how concepts correlated between questions to capture mental models underlying participants' attitudes towards OBA.

Although our results are purely qualitative, we report the number of participants who fell into different coding categories. These numbers are intended to provide a sense of how frequently participants mentioned these concepts and do not imply statistical significance. Throughout the paper, we also report representative quotes with the goal of illuminating the thought process captured by important codes.

At some points in the interview, participants' responses to a particular question varied widely, with a number of views each held by only a handful of participants. When a question elicited a number of divergent viewpoints, we report an exhaustive list of all points mentioned by any participant. In some cases, these views were reported by as few as a single participant, and we don't necessarily expect that these views would generalize. However, we believe it is valuable for the reader to see the range of misconceptions.

3.3 Participants

Our 48 participants were fairly well-educated. They included 15 males and 33 females between the ages of 19 and 57 (mean age 29); eight were undergraduate students, 16 were graduate students, 2 were unemployed, and 22 were employed in a variety of occupations. As a result of our screening process, none had a background in computer science or web development. We refer to our participants using codes representing the order in which they were interviewed (P-1 through P-48).

Due to the limited recruitment area, our participants are not representative of the general Internet population. We make no effort to draw statistically significant conclusions, but instead focus on collecting rich qualitative data that allow us to understand the mental models of laypeople, unpacking the rationale behind their attitudes and behaviors.

4. RESULTS

Overall, participants believed that online behavioral advertising provided benefits to consumers, yet posed privacy risks. Participants exhibited a lack of trust of advertising companies, most commonly associating the phrase "Internet advertising" with "pop-ups." Few participants understood industry-standard icons intended to communicate to them that OBA is occurring, and the majority of participants believed that cookies could be used by advertisers to collect their personally identifiable information. Furthermore, participants did not understand the role advertising networks play in OBA and felt that their attitude towards OBA would change based on the context of their browsing. However, they were unsure how to control OBA, expecting that they could turn to their web browser and antivirus software to do so.

For the remainder of this section, we report detailed results on participants' opinions of and beliefs about Internet advertising, tailored ads, and potential mechanisms for tailoring advertisements. All of these responses were given before participants watched the informational video about behavioral advertising. In Section 5, we

present additional results from after participants watched the information video, focusing on participants' reactions to OBA.

4.1 Impressions of Internet Advertising

Participants had negative impressions of Internet advertising as a whole, often associating ads with annoying pop-up windows. When asked, "What is the first thing that comes to your mind when you hear 'Internet Advertising'?" the most common response was "pop-ups" (21 of 48 participants). P-23 was representative in saying, "I think about those really annoying pop-up ads that always kind of pop up out of nowhere, and I just wanna get rid of them and block them, and they don't go away." The second most common response was "annoying" (7 participants). According to P-40, Internet advertising is "bothersome, not needed, distracting, potentially harmful or dangerous." The same participant explained that "it could be a rogue site trying to obtain information in a less than forthright manner." A number of participants recalled advertising techniques that have been discontinued. For instance, P-7 noted "a few bad experiences with late-90's spyware," mentioning both BonziBUDDY and Comet Cursor.

While many participants had negative impressions of Internet advertising, 25 of the 48 participants said "yes" when asked, "Is Internet advertising useful?" Six participants noted that it helps them find new products. Five participants specifically stated that Internet advertising is useful because it pays for free online services, though most participants expressed a desire for it to be less obtrusive. For example, P-33 expressed, "I am OK with it as long as it does not interfere with what I am trying to do... I understand that a lot of sites are free for my use because of advertising." Five participants volunteered that they generally ignore advertising. For instance, P-40 explained, "I rarely pay attention to [Internet advertising]."

4.2 Tailored Advertising

Before watching the OBA informational video, more than half of participants stated that at least some of the advertisements they see on the Internet are tailored to their interests. However, they did not differentiate between contextual and behavioral ads. 34 of 48 participants responded affirmatively when asked, "Do you think that the ads you see when browsing the Internet are tailored to your personal interests?" Of these 34, 7 said that tailoring happens only on Facebook, 5 said only on Gmail, one referred to Amazon, and 24 did not mention a specific website. Although most participants appeared comfortable with Gmail and Facebook customizing ads based on the contents of their emails or their Facebook profile, a few did express discomfort. For example, P-46 said, "It kind of bothers me that the program they use is monitoring my email...It makes you wonder how much access someone else might have to your emails if a program's monitoring it." P-34 commented, "Just when I'm on Gmail, for instance, I notice that when I look at an email, the ad at the top seems to cater to what I'm looking for, and I just think that might be an invasion of privacy."

Overall, participants found it useful to receive tailored ads; 31 of 48 participants responded in the affirmative to our question, "Is it useful for you to see ads that are tailored to your interests?" Non-obtrusive contextual ads were deemed particularly useful.

4.3 Beliefs About How Ads Are Tailored

To gauge participants' awareness of how information could be collected for OBA purposes, we asked, "How do you think online advertising companies decide which ads are more suitable for you?" Participants provided an array of responses, sometimes mentioning several mechanisms for profiling users. The two most popular responses stated that ads could be customized based on a user's

browsing history (14 of 48 participants) and web searches (13 participants). P-46 explained, "If a website tracks your history, which I'm not comfortable with, it might know what website you constantly go to." Some of the participants who mentioned browsing history specifically noted that they thought this was a hypothetical technique. For instance, P-22 conjectured, "I guess if they were monitoring what I did on the Internet...But I'd hope they weren't doing that."

Other common beliefs of how advertisements were tailored included a user's Facebook account (10 participants) and "using cookies" (10 participants). However, none of the participants who mentioned cookies could explain how they were used, often assuming that cookies were repositories of information on a user's computer that advertisers could access. P-34 explained, "I guess they can get into the cookies. I don't know all the details or understand all the technical details about it." Other common responses were the contents or subject of emails (8 participants) and previous online purchases (5 participants). Furthermore, 4 participants volunteered that websites sell or share customers' information. In the words of P-32, "I imagine that if I bought something from a website, that information may be bought/sold/shared with other websites as well."

4.4 Interpreting OBA Icons

The Digital Advertising Alliance states that "a prominent feature" of self-regulation is to "clearly inform consumers about data collection and use practices through enhanced notice provided via an icon" [5]. We asked participants about their familiarity with both the DAA's Advertising Option Icon (with the text "AdChoices") and older "Power I" icon (with the text "Interest based ads"). We further investigated what purpose participants believed these icons served, as well as what participants thought would happen if they clicked on the icon.

To gauge participants' familiarity with the icons themselves, we first presented enlarged icons and their corresponding taglines on a white background, lacking context. 41 of 48 participants responded that they had never seen either icon. One participant recalled having seen both icons, one participant recognized only the AdChoices Icon, and four participants stated they had seen the "Power I" icon. The remaining participant was unsure.

When shown these icons in context, next to advertisements, 25 participants still stated that they had never before seen either icon, while 8 were unsure. A total of 15 participants said they had seen the AdChoices icon and tagline, while 13 participants recognized the "Power I" icon and tagline. However, three participants misread the "Power I" icon's "Interest based ads" tagline as "*Internet* based ads," which P-45 felt represented "really great deals *online*."

The purpose of these icons, to provide information to consumers, eluded participants, even when the icons were shown in context on an advertisement. Only five participants thought either icon was intended to provide information about OBA. All five of these participants said the icon informed them that the advertisement was tailored to their interests. P-38 was representative of these participants, explaining that the icons "say that maybe these ads are chosen for you specifically based on your interests." However, no participants thought they were being informed about data collection, even though the DAA considers informing consumers about data collection a "prominent feature" of self regulation [5].

There was a wide range of participant misconceptions about the meaning of the icons and taglines, which we report exhaustively in order to illuminate this divergence. One of the most common expectations was that the AdChoices icon would let users choose the categories of ads they'd like to receive. Ten participants expected that clicking on the icon would let users inform advertisers

of their interests. P-21 was representative of these users, thinking that "maybe a list would come up of the topics or subjects. You could choose to either add or remove subjects from that list." P-11 expected he could refine advertisers' existing profile of his interests. He thought that after visiting a site unrelated to his interests, he could "[choose] that those kinds of ads aren't targeted to me since I have zero interest in them." On the other hand, P-22 expected that "you could click on something that would say what your interests were or what you were currently looking for, and then a certain number of ads would pop up that were relevant to that."

Ten other participants believed that the icons served to solicit marketers to advertise in that spot. For example, P-21 said, "it looks like an icon advertising advertisements... A 'place ad here' kind of thing." Similarly, P-14 explained, "I imagine the purpose would be to offer you the option to be able to advertise yourself on webpages."

An additional common misconception was that clicking the icon would provide additional information about the advertised product. Eight participants expected to be taken to the website of the product being advertised if they clicked the icon, and seven additional participants thought they would see additional, related ads after clicking on the icon. For instance, P-18 expected to "see some advertising" while P-41 anticipated being presented with "a list of ads." Two other participants believed they would receive more information about the advertised product.

Other participants expected that clicking the icons would lead to negative consequences or pop-ups. Five participants believed that clicking on the icon would let advertisers track users, three participants believed that pop-ups would appear, and P-41 thought that the advertisement would expand. P-20 believed the icons "might be some kind of a scam, or different pop-ups would come up for the ad," while P-23 thought the icons were intended to "get more information about you somehow."

Some participants expressed surprise at the question itself when we asked what would happen if they clicked on the icon; they believed the icon couldn't be clicked. For instance, P-48 said, "I wouldn't imagine that you could click on it. I would just think it would be like part of the ad." In contrast, three participants thought the icon was intended to differentiate the ad from the content of the page and two thought it was intended to legitimize the ad. Four participants said they had no idea what the icons indicated, while many others were uncertain about their answers. For instance, P-06 thought that "because people are usually annoyed by ads, they want to let people know that they have choices. But I am not sure which kinds of choices."

5. REACTIONS TO OBA

After showing participants the informational video, we investigated participants' reactions to and knowledge of the OBA ecosystem, which we report in this section. Many participants found value in behavioral advertising, yet the majority of participants noted that the practice negatively impacted their privacy; taken as a whole, participants found OBA smart, useful, scary, and creepy at the same time. They had many different impressions of the types of information collected during OBA, potentially influencing their attitudes towards OBA. Participants also varied in the situations in which they would like data to be collected for OBA purposes, as well as their opinions of companies that conduct OBA.

5.1 Opinions of OBA

Participants found both pros and cons to online behavioral advertising, weighing benefits such as helping consumers find products they might be interested in against privacy fears.

Participants felt that OBA's main benefits for users were helping them to find things they were interested in (19 of 48 participants) and seeing more relevant ads (18 participants). Four participants mentioned that OBA could provide a better Internet experience, while four other participants thought OBA could help them get better deals. For example, P-18 thought that while a consumer is shopping for books and "a competitor suggests a cheaper price, it can help you to save money."

Participants were also cognizant of the economic benefits advertisers can reap from OBA. 26 participants pointed out that advertisers could better target the right person, while 18 participants specifically mentioned that advertisers could make more money using OBA. Only five participants made a distinction between the company displaying an advertisement and the company whose product is advertised, noting that more merchants will advertise with a particular advertising network if it can better target potential customers. In addition, nine participants noted that OBA can command more money for websites on which ads are placed.

In contrast, the majority of participants noted privacy concerns as the main negative aspect of OBA. 41 of the 48 participants expressed concerns related to privacy when asked, "Are there any negative aspects of behavioral advertising?" In particular, participants disliked the idea of being monitored (8 participants) and complained about lacking control (6 participants) over this practice. P-12 explained, "I don't really like the idea of someone looking at what I am looking at, and that kind of freaks me out. Also, I do not like the idea of them putting stuff on my computer without me knowing about it." P-20 was especially concerned with the lack of control, expressing, "The user should be able to decide what kind of ads the user wants to see. The user needs to be in control." Similarly, P-31 said, "It is a little creepy... because I feel that I should get to decide what is going in and out of my computer."

While many participants were concerned about their information being used to create accurate profiles of them, five participants also feared the creation of inaccurate profiles. P-5 was annoyed because she felt the ads she sees are supposed to be tailored to her, yet do not match her needs. She explained, "I feel that sometimes advertisers stereotype me. I find this to be offensive." Similarly, P-45 commented, "Sometimes you click things by accident and it takes you there... it's collecting all this information about you that doesn't even describe who you are, or it could be someone else using your computer." P-27 noted that after making Google searches for her job investigating sexual homicides, she started receiving explicit advertisements that were unrepresentative of her actual interests.

Participants' overall feelings about OBA were mixed, weighing the perceived usefulness of OBA against privacy concerns. After participants spoke about the benefits and downsides of OBA, we asked, "Overall, how do you feel about online behavioral advertising?" On balance, 8 participants had primarily positive feelings about OBA, 19 viewed the practice negatively, and the remaining 21 were mixed. P-16 was representative of those who felt positively, stating, "I don't really see it as anything harmful unless I'm unaware of companies getting more personal information." She did note that she expects OBA to continue regardless of consumer sentiment, explaining that "all the companies are out to make money, so I don't see it stopping."

Many participants liked that OBA would show them more useful ads, yet they were concerned about privacy. P-41 was representative of this attitude when she said, "It seems like it can be helpful for the users, but at the same time it is also dangerous for the privacy problems." P-38 also had mixed feelings. She said, "I think the idea's good, but I don't like the fact that I feel like it's an invasion of your privacy. It makes me feel very insecure. Like if this

is what people can figure out about me, then what else can they get off my computer?" P-43 was one of several participants who commented that OBA is a "smart strategy," while P-47 called OBA a "good advertising technique." P-31 synthesized positive and negative aspects of OBA, stating, "It is creepy but clever."

A number of participants suggested ways to make them more comfortable with OBA. P-20 suggested that he would "be more comfortable if the websites or the advertisers ask you directly what are your interests and what are the kinds of things that you like," as opposed to collecting data on user behavior. P-38 added, "I guess I would be more willing to do it if I had like a firmer understanding of how everything worked."

Many of the participants with negative opinions viewed OBA as scary or creepy, though they noted not being very familiar with how it works. For instance, P-14 said, "I don't think I really noticed it...but it definitely is kind of creepy when you think about it." P-45 concurred, relating a story about how she was searching for furniture the previous night and was confused when her advertisements started to feature those items. She stated, "It's scary. It makes me nervous. I was thinking about it last night when I was searching for stuff. Like I thought how do they know all this, how do they keep track of this, how do they do this?"

P-34 was unabashedly angry when she learned about OBA from the informational video. She said, "It makes me want to go home and delete all my cookies, but then I know that's not gonna help much. It makes me mad."

5.2   Concerns About Data Collection

Participants believed that advertisers could access a large range of information about them, including personally identifiable information such as their mailing address, name, and potentially even financial information. 26 of the 48 participants stated that advertisers could collect their name and address. P-46 was concerned about "people using it for more malicious means, stealing your credit card information, identity, SSN." Participants also expressed concern about advertising networks collecting and sharing information without telling users. In P-1's words, "They are gathering information...without you knowing it, maybe even giving that data to another party."

Participants commonly said they were scared about being tracked and monitored. P-32 expressed, "It is kind of a creepy thought that you are being followed and monitored." While discussing data collection, P-22 said, "People shouldn't be able to do that. And I think if everybody knew that everything you were doing was being tracked, they wouldn't do half the things that they did." P-40 said she was so concerned with online tracking that she deletes cookies on a daily basis. In a closing thought, P-17 stated, "Following me around, that turns me off."

A number of participants believed that their personal information was stored in cookies on their computers by third-party advertisers. When asked to describe a third-party cookie, P-41 said it was "another cookie that's accessible to my computer history of the web browsing." After learning about OBA from the informational video, P-21 stated, "I've obviously heard of cookies, but I just thought they were temporary Internet files. I didn't know what it was that they were holding, so that's kind of surprising." P-34 hypothesized that to target advertisements, "I guess they can get into the cookies." P-18 described cookies as "little pieces of software that collect certain information about you." However, third-party advertisers most commonly store only a unique identifier in a cookie in order to correlate visits to different websites as coming from a particular browser on a particular machine.

5.3   Attitudes Depend on Situation

We presented participants with six different browsing scenarios and asked for each, "Would you like online advertising companies to collect information about your web browsing in order to deliver tailored ads?" Participants were nearly evenly divided about whether to allow or disallow data collection in scenarios about planning a vacation, shopping for a car and car loan, looking for a job, and shopping online for food and household goods. Most participants said they would allow data collection while they were reading the news, while only a few participants expressed a willingness to permit data collection while they searched for STD treatments for a friend.

Participants' preferences were complex. None of the participants said they would allow data collection in all six scenarios, and only five participants said they would not allow data collection in any scenario.

For many situations, participants said they were willing to allow data collection because it would be harmless and might result in cheaper prices for them. For instance, P-22 was willing to allow data collection while she shopped for food and household goods since "there may be a sale on something I wanted anyway."

Privacy concerns drove participants' unwillingness to allow the collection of information. For instance, when deciding whether she wanted her information collected while planning a vacation, P-14 explained, "I'm always looking for...cheaper flights." However, she considered the privacy risk that "you'll know when I'm not at home," before exclaiming, "That's tricky!" Health records were a common source of privacy concern. When asked about a hypothetical STD-treatment search scenario, P-45 said she was unwilling to permit data collection. She explained, "That's really personal. The other stuff, it's just material things. That's your health, it's really private."

However, participants sometimes said they didn't want their data collected because they perceived no utility in receiving related advertisements. P-41 declined data collection while shopping for food and household goods, saying, "I know what I'm buying, and I don't want any other distraction to spend money." In other cases, participants sensed a disutility in giving any data to marketers in certain industries. For instance, P-18 felt that "in the travel business, there's a lot of spam," while P-23 didn't want "to be bombarded with car ads for the rest of my life."

5.4   Attitudes Depend Partially on Company

While participants were very willing to allow certain companies to collect information about their browsing for the purpose of tailoring advertisements, they were hesitant to allow others. For seven different advertising networks, we first asked, "Are you familiar with [name of company]?" Over 75% of participants were familiar with AOL Advertising, Google, Microsoft Advertising, and Yahoo, whereas fewer than 20% of participants had heard of BlueKai, Casale Media, or 24/7 Real Media. We then asked, "Would you permit that company to collect information about your web browsing to show tailored ads?" As shown in Figure 2, 77% of participants would permit Google to collect information about their browsing, while very few would permit the unfamiliar companies to do so. Participants were mixed about whether they wanted Yahoo and Microsoft Advertising to collect their information, while the majority of participants did not want AOL Advertising to do so.

Many of the 37 participants who were willing to grant Google access to their information explained their decision in terms of trust. P-11 was representative in stating, "Their motto is to not be evil, and so far they've shown that they're not." Most participants mentioned using Google products, explaining that they trust Google

Participants' Data Collection Preferences Versus Familiarity with a Company
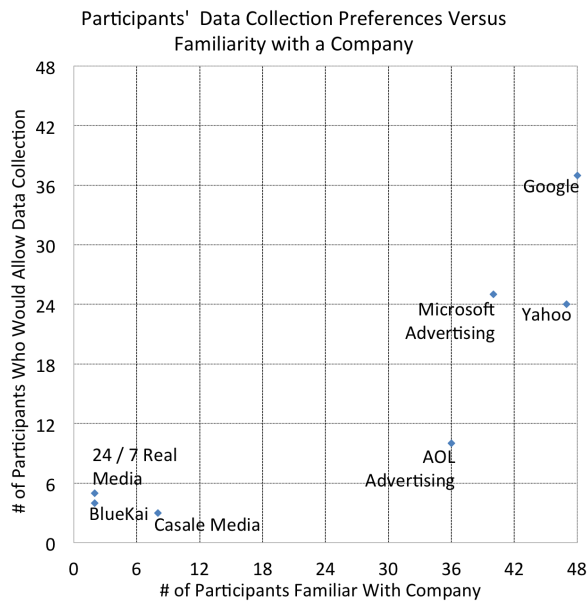
Figure 2: Participant familiarity with seven advertising companies versus their willingness to allow each company to collect their browsing information for OBA. The cluster in the bottom left indicates companies that were unfamiliar to participants and with whom they did not want to share information.

because of their positive experiences with these services.

Google's size and its preponderance of stored data factored into some participants' decisions. For example, P-21 laughed when asked about Google, saying he was willing to let them collect his information since "they have a lot already." P-41 recognized both benefits and downsides to Google's size, stating, "In good ways it's a really huge company that has a lot of information and it can be helpful. But at the same time, since they're a really big company, I don't know what they're gonna do with my information." P-31 was among those who felt the scope of Google's services was a disadvantage, stating, "Google is a bit worse because it is like your doctor has also been your drug dealer. Google is supposed to be my secure email provider and protect my documents...Where do they draw the line?"

Apart from trust, a common explanation for allowing Google to collect browsing information was that it would help in search. For instance, P-16 felt that Google collecting her information "would probably help if I put in a search, if they could tailor it even more towards my interests." P-20 seemed not to recognize Google's advertising activities, stating that "Google is a very good and a safe search engine." Similarly, P-23 was surprised that she was asked about Google advertising since, to her, Google is "not a company that I really associate with advertisements."

As with Google, a number of participants were willing to let Microsoft collect information about their browsing, making this judgment based on the company's non-advertising activities. For example, P-22 was willing to permit data collection, saying, "I know Microsoft has to do a lot of things on your computer if it's your operating system, and I assume that they would collect information that would help them update your operating system." P-44 had the opposite reaction, saying he would not permit data collection from Microsoft because "I am a Mac guy." Many other participants also did not seem to distinguish between Microsoft as an advertising

network and Microsoft as an advertiser. For instance, P-16 didn't want Microsoft to collect data "just because I really couldn't see myself buying Microsoft products on a regular basis."

In contrast to Google, Yahoo and AOL were viewed negatively by many participants. P-11 was concerned about Yahoo's viability as a corporation when he said he would not permit data collection, stating, "They're financially not so hot and I wouldn't trust what they would do if they got into a real pinch." P-18 felt that "Yahoo historically has had too many incidents where it made the media that their files were hacked into." When asked about AOL Advertising, P-34 began by stating, "I hate AOL." When asked if this attitude was the result of bad experiences, she continued, "That was a long time ago, and they're still on my list." P-23, who had also been unfamiliar with Google's advertising activities, stated, "I've heard of AOL, but I don't know that I knew that they had advertising."

Few participants wished to permit data collection by BlueKai, 24/7 Real Media, and Casale Media, the three companies that were most unfamiliar. Participants' responses were potentially biased since we asked about their familiarity with each company before asking if they would allow that company to collect their information. However, P-45 was representative of interviewees in stating, "If I don't know the name...I don't trust them, just like you wouldn't trust a friend or doctor you don't know too well." Multiple participants falsely concluded that 24/7 Real Media is a music vendor, potentially confusing it with Real Media. For instance, P-46 said, "Sounds like if you could buy songs from them, I'd be uncomfortable with it, because that means credit card and all that."

5.5 Exercising Choice

Near the end of the interview, we asked participants, "Are you aware of any ways that can help you stop receiving targeted ads?" "Deleting cookies" was the most common response by far, mentioned by 25 participants. However, a number of these participants mentioned that they learned about this technique from the informational video they watched earlier in the interview, suggesting that deleting cookies is overrepresented in our data. Three of these participants suggested clearing the browser's cache, in addition to deleting cookies, in order to stop tailored advertising.

Beyond the deleting cookies, participants' responses were quite divergent. In order to show the range of these responses, we report all responses participants gave, grouped into thematic categories.

A number of participants expected that general computer security tools would limit behavioral advertising. For instance, ten participants thought that antivirus and anti-spyware programs, such as Norton or McAfee, would have options for blocking behavioral advertising. To limit OBA, three participants also mentioned firewalls, one suggested using a proxy, and another participant suggested using Linux.

Seven participants expected there to be an option built into their web browser for controlling OBA. However, these participants expressed uncertainty. For example, P-20 thought there "should be an option for that in the web browser... There should be a privacy section." Similarly, P-41 explained, "I think it's already embedded in the computer program, like the Microsoft one. And does the Google Chrome also block the ads?" Three participants specifically mentioned browsers' "Private Browsing" modes as a way to stop receiving targeted advertising. No participants were aware of any specific software or browser plug-ins for managing OBA preferences. In addition, P-17 believed that changing Facebook's privacy settings would limit OBA.

Some participants thought ignoring advertisements was the best strategy for not receiving targeted advertising. Four participants suggested using ad-blocking software, while three others suggested

never clicking on ads to control OBA. They believed that companies would be unable to track them as long as they didn't click on advertisements. On the other hand, P-14 thought she should unsubscribe from email lists to limit OBA.

Three participants expected there to be some sort of website on which they could choose to stop receiving targeted advertisements. However, two of these three participants were uncertain if such a website existed. For instance, P-34 "thought there were websites that could help you [stop receiving targeted ads], but I'm not sure." When asked to describe those websites, she said, "Same kind, I would assume, like you could choose your catalogs you want shipped at home. I have no idea, no idea, I'm just guessing." P-37 assumed that such a website might be part of the Norton Antivirus site. P-18 was the only participant who felt certain of the existence of such a website. She explained, "There's supposed to be [a national] agency that oversees marketing... There's a Do Not Call list. There's also, I've been told, a Do Not Email list."

No participants mentioned industry self-regulatory websites or opt-out programs at any point during the interviews. Similarly, no participants mentioned "Do Not Track" or "Tracking Protection List" efforts that are part of popular web browsers. In contrast, twelve participants felt they had no options at all for controlling targeted advertising.

6. DISCUSSION

In our interviews, we recorded not only participants' attitudes about OBA, but also their knowledge of its practice. In this section, we discuss how participants' understanding and misunderstanding of OBA may have influenced their attitudes, filling a gap left by prior work employing surveys. We further discuss why many participants seemed unaware that their browsing activities are currently used for OBA purposes and felt unable to control OBA in accordance with their preferences. We conclude with suggested directions for improving notice and choice mechanisms.

6.1 Explaining Participants' Attitudes

Participants recognized in behavioral advertising both benefits for consumers and economic advantages for advertising networks. The most commonly articulated benefit of OBA was that it would help participants see advertisements targeted towards and relevant to their personal interests. Some participants also expected that marketers would use OBA to target special offers to consumers who were interested in a particular product.

However, privacy in the face of OBA was the most common concern for users, preventing them from wholeheartedly embracing behavioral advertising. Although some participants had specific privacy fears, such as being monitored or being profiled inaccurately, it was mostly a general, abstract notion of privacy violation that participants articulated. Despite recognizing the potential benefits of OBA, the majority of participants said they were opposed overall to the concept because of general fears of their privacy being violated.

Participants were reluctant to accept OBA, and they exhibited a distrust of advertising born from poor past experiences. Participants recalled aggressive advertising on the Internet to an extent that their most common free-association with "Internet advertising" was "pop-up." The association participants made between advertising and the words "pop-up" and "annoying" suggests that they lacked trust in the advertising industry, which may have led them to set a high bar to acceptance of behavioral advertising.

Although participants were generally aware that some advertisements were somehow targeted to them, many believed this tailoring occurred contextually on Gmail or based on their activities on Face-

book. Participants' familiarity with contextual advertising is not surprising since the data used to select the advertisement is in clear view on the same page as the ad. Although many participants believed that advertisers could hypothetically choose advertisements based on which websites they had visited, they were less aware that this technique is currently practiced.

By its nature, behavioral profiling occurs over the long-term, temporally separating the presentation of an advertisement from the data that influenced its selection. Profiling based on browsing or search history doesn't inherently provide consumers with obvious context clues. To combat this structural lack of notice, a core tenet of industry self-regulation in the U.S. is to inform consumers when an ad has been tailored based on browsing activities. However, from our interviews, the icons intended to provide this notice seem ineffective. Many participants saw these icons, which are intended to inform them about data collection and use, and assumed they could click the icon and place an advertisement themselves, or receive more information about the advertised product. Considering the failure of these icons, which are the primary vehicle for notifying consumers about OBA, it is not surprising that participants were unaware that behavioral profiling currently occurs.

When participants learned that behavioral advertising currently occurs, even some of the participants who believed it to be theoretically possible expressed surprise. OBA is not visible on its own, and participants did not glean the intended meaning from industry icons for notifying consumers about OBA and providing a gateway to additional information and the possibility of opting out. This surprise, combined with participants' close association between the advertising industry and annoying pop-ups, may have led them to assume the worst about potential privacy violations due to OBA.

Had participants understood the profiling technologies that underpin most behavioral advertising strategies, pairing a browsing history with a unique identifier, they would have realized that some of their worst fears about the collection of personal information were likely unfounded. However, they did not understand these mechanisms, nor should they. A consumer should not need to be a technologist to be empowered to control the use of his or her information. Participants said that they had heard from the news or from the informational video we presented that cookies enable advertisers to track their browsing history, but that cookies also must be enabled for e-commerce shopping carts to function. Therefore, they seem to have constructed a mental model in which cookies on the computer store both their browsing history and their financial records from past online transactions, which would explain why a number of participants incorrectly believed that advertisers could look at their existing cookies to gather personal information. Following this incorrect mental model, when advertisers or hackers scoop up these cookies from the consumer's computer, they have access to a wide range of personal and financial information previously used for online commerce.

While participants recognized the benefits of OBA, they were upset that it currently occurs without their knowledge. They assumed that the same untrusted advertising companies that bombard them with annoying pop-ups are likely violating their privacy in other ways. Participants were unaware of the types of data that are used for OBA profiling. They were also unaware that long-standing industry guidelines explicitly prohibit the merging of personally identifiable information with previously collected non-personally identifiable information for OBA purposes without explicit user consent [24]. On the other hand, participants might rightly have been concerned if they had heard media reports about web sites accidentally leaking data to advertisers or about companies exploiting technical mechanisms to circumvent privacy protections [15, 29].

6.2 Notice and Choice

Because the icons intended to provide notice and choice to consumers did not convey this information to participants, we unpack how participants parsed these icons. Given the large number of participants who thought the icon solicited potential advertisers to "place their ads here," the icon and its text could more clearly indicate that they are intended for consumers. Considering participants' divergent expectations of the message it was communicating, the "AdChoices" tagline seems particularly ineffective.

Furthermore, the icon's location and presentation are a potential area for improvement. The icons are displayed near or within the advertisement itself, which we speculate may have caused participants to think the icon was part of the advertisement. If this hypothesis is true, it would help explain why many participants expected that clicking the icon's "i" symbol would provide more information about the product advertised. Some participants did not expect to receive information from clicking the icon, and some were simply scared to click it at all. Participants' hesitance may have stemmed from their past experience with advertisements, in concert with the icon's location. Pop-up and pop-out advertisements often have a box in the corner of the ad intended to expand or collapse the ad, so this concern may have been consistent with participants' aversion to advertisements popping out or expanding. To provide effective notice, it might be possible to distinguish more clearly both the provenance and purpose of the icon from the advertisement itself. The icon, its accompanying text, and its location are all potential areas for future investigation.

The taglines that accompany these icons contributed to this lack of notice. Participants' common misunderstanding that they could click on the AdChoices icon to select interesting advertising categories is not surprising. They expected to be able to make *choices* about *ads*. While some participants had no idea what choices they could make, others reasonably assumed that they would be able to choose which types of ads they would receive. A small number of advertising networks, including Google,[3] Microsoft,[4] and Yahoo,[5] already allow consumers to view and edit the categories of advertisements targeted to them. To align better with participants' expectations for the icon, the Advertising Option Icon could provide consumers similar functionality. Giving consumers a reasonable set of choices that they can customize in a small amount of time could benefit both advertisers and consumers. Such a system would empower consumers to control the types of ads they receive and correct inaccurate profiles, as well as provide advertisers with potentially more accurate and actionable information about particular consumers' interests. However, such a system could also be used to leak private information about a user.

6.3 Supporting Consumer Control

The reactions, misbeliefs, and mental models of our 48 participants suggest potential directions for improved notice and choice mechanisms. In particular, users could be empowered in ways that more closely match their existing expectations and understanding of OBA.

In addition to their responses to the icons and taglines, participants' expectations about how to stop behavioral advertising bode poorly for existing opt-out mechanisms. Deleting cookies, the most common response to our question about how a consumer could stop receiving targeted ads, would actually nullify existing cookie-based

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[3]http://www.google.com/ads/preferences/
[4]http://choice.live.com/AdvertisementChoice/Default.aspx
[5]http://info.yahoo.com/privacy/us/yahoo/opt_out/targeting/details.html

opt-out mechanisms. Although a number of participants stated that they were inspired by the informational video to delete their cookies, others stated that deleting cookies was common knowledge, suggesting that the informational video was not the only driver of this sentiment. When a participant states that learning about behavioral advertising "makes me want to go home and delete all my cookies," the idea of using cookies to record opt-out preferences seems problematic.

Furthermore, few participants thought about going to a website to manage their OBA preferences, and none of the participants mentioned clicking on the icons to limit OBA. However, these are currently the two main opt-out vectors. Participants receive advertisements on websites, so it makes sense that they don't expect to go to other websites to exercise preferences. While it seems reasonable for an opt-out mechanism to be located near behaviorally-targeted advertisements, unless consumers are clearly notified that this icon is not part of the advertisement and that they could control OBA by clicking on it, they will not click it.

While it may seem that more effective opt-out mechanisms would benefit consumers to the detriment of advertisers, participants who suggested never clicking advertisements in order to limit OBA provide a counterexample. Participants didn't understand how their browsing is recorded, so some assumed they could be tracked only if they interacted with an advertisement. In the absence of effective notice and choice about OBA, consumers may choose to disengage entirely from advertising. As a result, more effective notice and choice mechanisms may provide benefits to principals throughout the OBA ecosystem.

Whereas few participants thought they could stop OBA by visiting websites and none were aware of existing cookie-based opt-out mechanisms, participants commonly believed that their existing tools for maintaining security and privacy could stop tracking. Although no participants stated familiarity with any specific browser features related to OBA or tracking (e.g., Do Not Track), participants' mental model of turning to their browsers' privacy settings to stop tracking lends support for tools built into browsers.

While the expectation held by ten participants that the Norton or McAfee antivirus suites contained a mechanism for limiting OBA might appear strange at first blush since OBA is unrelated to computer viruses, it seems to indicate that they expected the software that already protects their privacy and security to extend to OBA. As with browsers' built-in tools, security suite software is a one-stop shop for computer protection. Users did not want to take separate action for each new threat to their privacy. The Spring 2012 inclusion of privacy enhancing tools for OBA in the AVG antivirus suite thus seems to align with participants' expectations [1]. In contrast, opt-out mechanisms that would impose additional burdens on users or introduce new paradigms for protecting their privacy may be misaligned with users' expectations.

6.3.1 Users Shouldn't Need to Evaluate Companies

While most currently deployed mechanisms for consumer choice focus on asking users to make decisions about which advertising companies can serve them OBA, participants' difficulty reasoning about companies reveals flaws in this approach. When we asked participants whether they'd permit particular companies to collect information about their browsing, their reasoning differed for companies that engage only in advertising and companies that have a variety of consumer-facing divisions. Participants were unfamiliar with companies that work primarily in advertising, and many participants said they would prohibit data collection from these unfamiliar companies since they felt unqualified to judge their trustworthiness.

For companies such as Google, Microsoft, and Yahoo, which engage in a variety of activities familiar to consumers, participants misunderstood the activities of these companies' advertising divisions. For instance, some participants assumed that Microsoft Advertising collected data primarily for advertising or updating the Windows operating system. In this mindset, participants made decisions using information unconnected to these companies' OBA activities, and it is possible that these decisions would correlate only weakly with fully-informed opinions about those companies' OBA efforts. For Google and Yahoo, many participants assumed that these companies only advertised on Gmail or Yahoo, misunderstanding the role both companies take as advertising networks across many disparate web pages.

Overall, participants seemed to have great difficulty understanding the role of advertising networks within the OBA ecosystem. They felt uncomfortable allowing unfamiliar companies to collect their information, and they judged familiar companies on activities unrelated to advertising. While a user's perception of a company's overall trustworthiness does seem a reasonable metric with which to make decisions regarding the collection of information, the extent to which users' decisions were based on information unrelated to OBA suggests that their decisions were not fully informed.

6.3.2 Situational Choices

When asked whether they would permit information about their browsing to be collected for the purpose of OBA in different scenarios, participants displayed complex preferences. We speculate that participants' variegated preferences suggest that some users who would not want their browsing tracked in general would be willing to have information collected in certain scenarios. Participants differed in which situations aroused concerns about privacy, and both privacy and utility guided their decisions about whether data could be collected. The idea that privacy is sensitive to the norms of a particular context underlies Nissenbaum's idea of privacy as contextual integrity [25], yet the divergence in attitudes expressed by participants in this study suggests that norms about OBA differ from person to person.

The confluence of privacy and utility in participants' decision-making might suggest an approach in which users specify interest categories, although this idea was not investigated in our study. Such an approach could serve a dual purpose: users could prohibit the collection of data on particular topics for either privacy or utility reasons, while advertisers would have self-reported, potentially more accurate, data on a user's interests.

Investigating how a user might situationally control data collection is a potential direction for future work. Would such a system better empower users, or would even the most usable solution unnecessarily burden users? Would such a mechanism be built into browsers, and if so, what interface design would best help users express their potentially complex preferences?

7. CONCLUSIONS

Participants found behavioral advertising both useful and privacy-invasive. The majority of participants were either fully or partially opposed to OBA, finding the idea smart but creepy. However, this attitude seemed to be influenced in part by beliefs that more data is collected than actually is. Participants understood neither the roles of different companies involved in OBA, nor the technologies used to profile users, contributing to their misunderstandings.

Given effective notice about the practice of tailoring ads based on users' browsing activities, participants wouldn't need to understand the underlying technologies and business models. However, current notice and choice mechanisms are ineffective. Furthermore,

current mechanisms focus on opting out of targeting by particular companies, yet participants displayed faulty reasoning in evaluating companies. In contrast, participants displayed complex preferences about the situations in which their browsing data could be collected, yet they currently cannot exercise these preferences.

Participants were unaware of existing ways to control OBA. To exercise consumer choice, participants expected that they could turn to familiar tools, such as their web browser or deleting their cookies. However, mechanisms to exercise choice about OBA in browsers are limited and difficult to use [17]. Deleting cookies, participants' most common response in this study, would nullify consumers' opt-outs. A Do Not Track header has been designed to allow users to set a preference in their browser that does not disappear when cookies are deleted. A handful of companies, including Yahoo [33], have announced plans to implement this header, although efforts to define fully the meaning of Do Not Track are ongoing in the W3C Tracking Protection Working Group.[6] Regardless, it remains to be seen whether this mechanism will provide effective choice for consumers. Future investigation is needed to test notice and choice mechanisms that better align with users' understanding of OBA, particularly by taking users' mental models of the process into consideration.

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APPENDIX

A.   INTERVIEW SCRIPT

1. What is the first thing that comes to your mind when you hear "Internet advertising"?

2. How do you feel about Internet Advertising?

    a. Do you like Internet advertising?

    b. Is Internet advertising useful?

    c. Is Internet advertising distracting?

3. In general, do you find the advertisements you see on the Internet to be relevant to your interests?

4. Do you think that the ads you see when browsing the Internet are tailored to <u>your</u> personal interests?

If yes:
    a. Is it useful for you to see ads that are tailored to your interests?

    b. How do you think online companies decide which ads are more suitable for you?

If not:
    c. Would it be useful for you to see ads more tailored to your interests?

    d. How do you think online companies could know which ads are more relevant for you?

5. Have you heard of the term "targeted advertising"?

If yes:
    a. What does targeted advertising mean to you?

    b. How do you think it works?

6. Have you heard of the term "behavioral advertising"?

If yes:
    a. What does behavioral advertising mean to you?

    b. How do you think it works?

7. When surfing the Internet, have you ever seen either of these icons?
[A page with the two OBA icons and taglines is shown here]

If yes:
    a. Where did you see it?

    b. Have you clicked on it?

        If yes:
            i. What happened when you clicked on it?

        If not:
            i. What do you think would happen if you clicked on it?

    c. What do you think is the purpose of this icon?

If not:
    a. What do you think is the purpose of this icon?

8. These icons usually appear on Internet ads. Here are two examples:
   [A page with the ads containing these icons and taglines is shown here]

   a. Do you remember having seen any ads with this icon?

   If yes:
   b. Have you ever clicked on the icon?

       If yes:
       i. What happened when you clicked on it?

       If not:
       ii.   What do you think would happen if you clicked on it?

   c. What do you think is the purpose of this icon?

   If not:
   a. What do you think is the purpose of this icon?

[VIDEO was shown here]

9. What does behavioral advertising mean to you?

10. In your understanding, what is a third-party cookie?

11. What information do you think online advertising companies can collect about you?

12. Do you think online advertising companies can have access to:

    b. Your name?
    c. Your address?
    d. Your telephone number?
    e. Your email address?
    f. The city where you live?

13. How do you think behavioral advertising can benefit Internet users?

14. How do you think behavioral advertising can benefit online advertising companies?

15. Is there any other party that could benefit from behavioral advertising?
    g. Who?
    h. How?

16. Are there any negative aspects of behavioral advertising?

17. Overall, how do you feel about online behavioral advertising? Why?

18. Are there situations in which you would be more willing to let companies collect information about your web browsing in order to send you ads tailored to your interests?

19. For each of the following scenarios, please indicate if you would like online advertising companies to collect information about your web browsing in order to deliver tailored ads. Please explain the reasoning behind your decisions

Scenario	YES/NO	Reason
You are planning your next vacation using the internet.		
You are shopping for a car and a car loan.		
A friend of yours has an STD and asks you to help him to find some treatment alternatives.		
You are job-hunting online		
You are ordering all of your food and household goods for the week online		
You are reading the news		

If the participant expressed any concern about OBA:
20. Would your attitude towards behavioral advertising change if
    a. The advertising companies notified you what information is being collected and how that information is used?

    b. The company that is collecting information allows you to decide when to allow or block the data collection?

21. For each of the following companies, please tell me a) if you're familiar with the company and b) if you would permit that company to collect information about your web browsing to show tailored ads.

Company name	I am familiar with this company	I would like to let it collect data. Why?
Google Inc.		
Yahoo!		
24/7 Real Media		
AOL Advertising		
BlueKai Inc.		
Casale Media		
Microsoft Advertising		

22. Are there any circumstances in which you would NOT like online companies to collect data about your browsing in order to show tailored ads?

23. Are you aware of any ways that can help you stop receiving targeted ads?
    If yes:

If affirmative answer to previous question but the participant did not mention "software tools":
24. Are you aware of any software designed to help users manage the targeted ads that they receive?

25. Are you aware of any laws dealing with online behavioral advertising?

26. Do you have any additional comments?